MISO/PJM Cross Border Cost Allocation

November 20, 2008

Wilmington, DE

Energizing the Heartland

Agenda

1. Conclude Hurdle rate discussion
2. Detail the RTO selected proposal
   - Definition of a cross border economic project
   - Proposed Metrics
   - Thresholds
   - Modeling and other assumptions
3. Operational Performance Projects
4. December Meeting

Hurdle Rates

- RTO examples had been using a $0 hurdle rate for real-time dispatch, representative of real-time treatment of reciprocal flowgates
- Model also uses a $10 commitment hurdle
- Prior JCM work had argued for a more general $2.5 dispatch hurdle representative of market inefficiencies
- Some stakeholders were interested in seeing a "separate market" analysis representative of single market commitment – by applying a very high ($9999) hurdle rate.

The $2.5 Hurdle Rate – JCM discussion in 2006

Model Benchmark – MISO/PJM Interchange

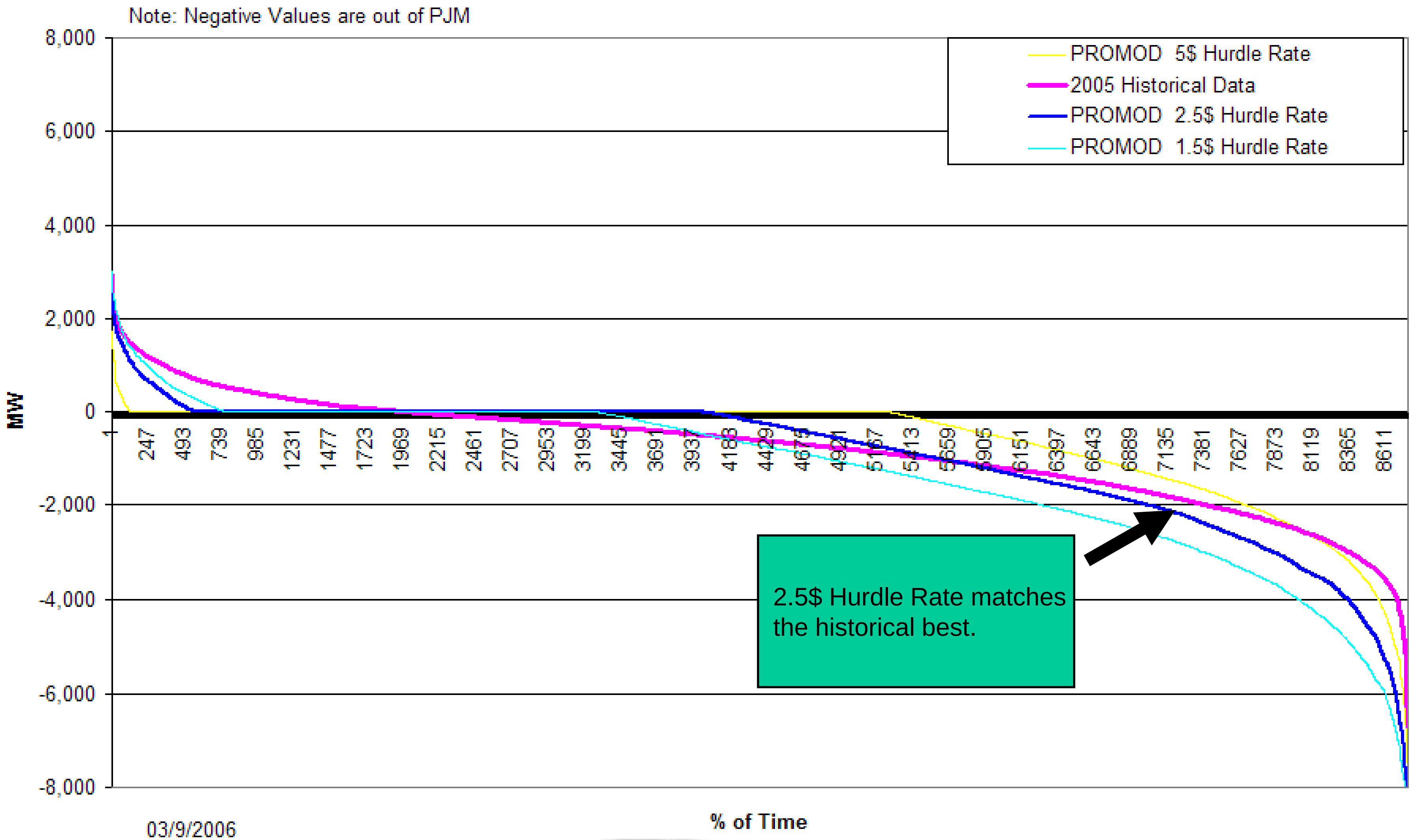
Both PJM (GE MAPS) and MISO (PROMOD) performed their own independent model benchmarks. The scheduled interchange benchmark served as the primary metric to determine the dispatch hurdle rate to be used for the base case:

- 1.5 $/MWH
- 2.5 $/MWH
- 5 $/MWH

All cases used a $10/MWH Commitment Hurdle Rate

The hourly MISO/PJM interchange from these cases are compared to the 2005 actual MISO/PJM scheduled interchange values.

Model Benchmark – MISO/PJM Interchange (PROMOD)



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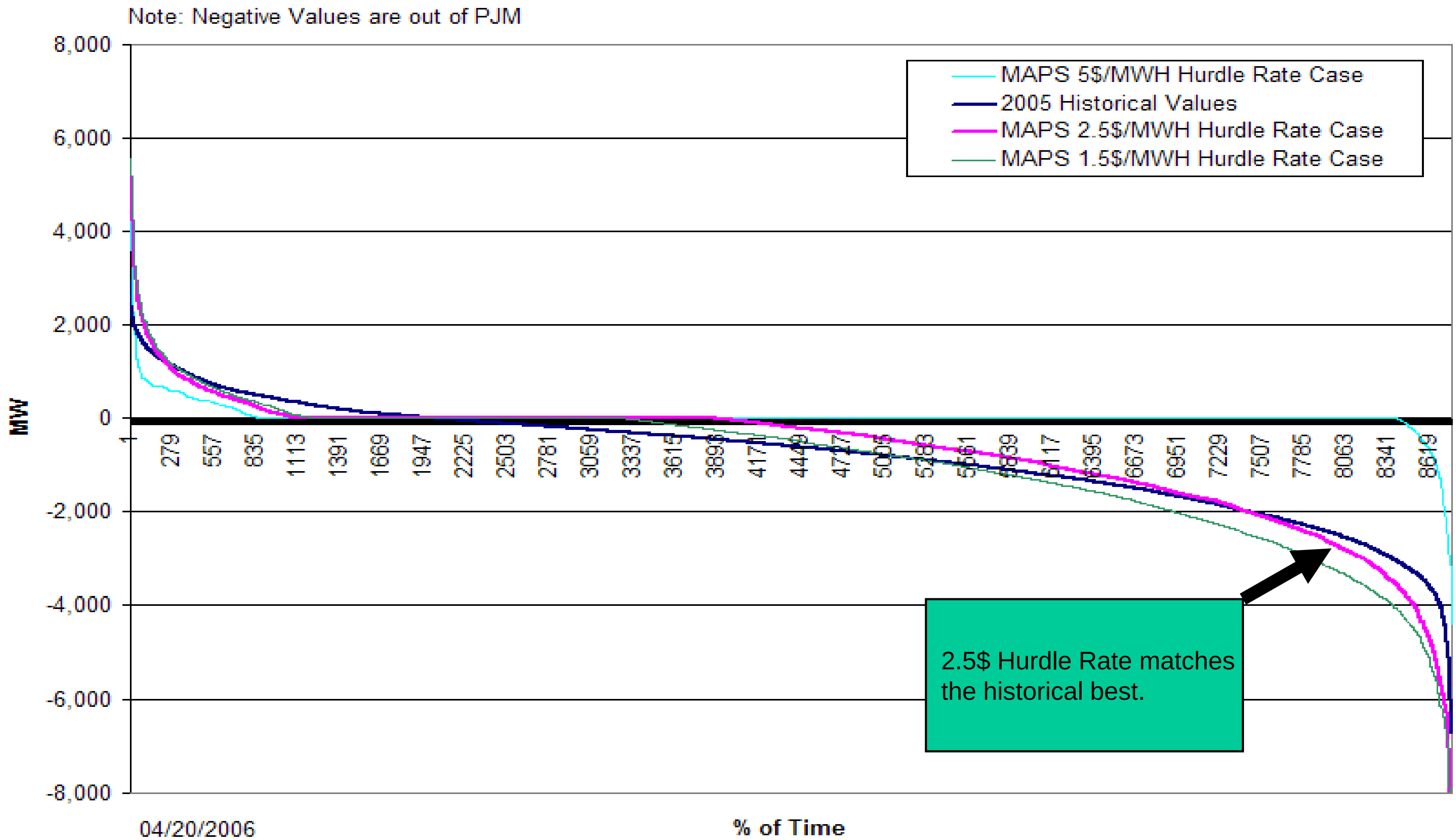
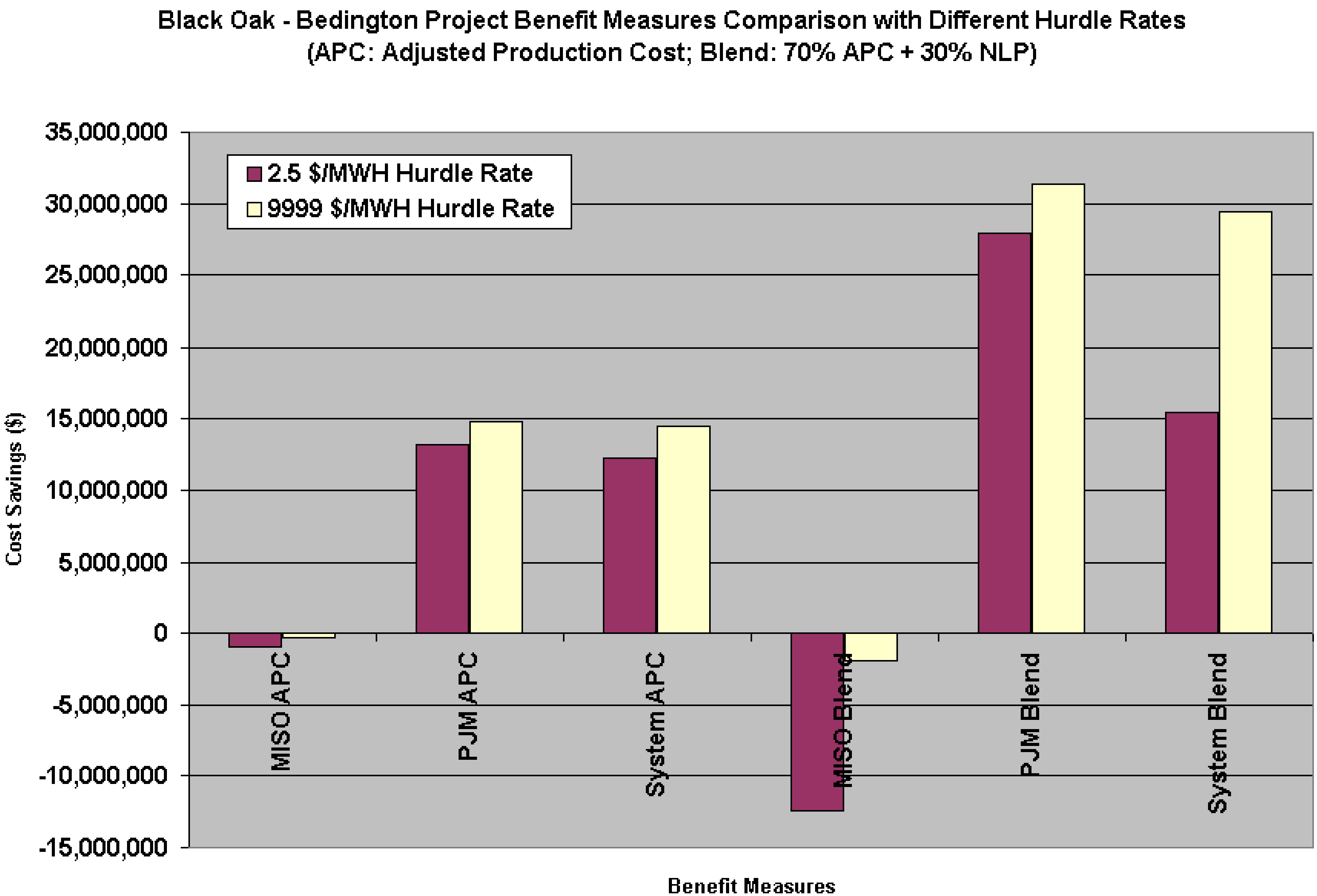
Model Benchmark – MISO/PJM Interchange (MAPS)



“Single Market” high Hurdle Rate effects

- Ran additional PROMOD cases by setting a 9999$/MWH hurdle rate between MISO and PJM. The results are shown together with the 2.5$/MWH hurdle rates cases
- Looked at Black Oak Beddington example
- See comparison charts

Effect of Hurdle Rate on Benefit Measures Comparison Charts



Black Oak - Bedington

2.5 $/MWH Hurdle Rate	MISO	PJM	Total System	
Generation MW	$79,850	-$79,930	-$80	
Gross Generation Revenue (GGR)	$43,845,139	-$68,512,415	-$24,667,276	
Gen Production Cost	$5,635,465	-$19,533,053	-$13,897,587	
Net Gen Revenue (NGR)	$38,209,674	-$48,979,363	-$10,769,689	
Load MW	0	0	0	
Gross Load Payment (GLP)	$41,001,868	-$165,412,192	-$124,410,324	
FTR Credits	$1,800,091	-$103,202,507	-$101,402,416	
Net Load Payment (NLP)	$39,201,777	-$62,209,686	-$23,007,908	
Net Cost (NLP - NGR)	$992,104	-$13,230,323	-$12,238,219	
Adjusted Production Cost	**$992,104**	**-$13,230,323**	**-$12,238,219**	
70%(Gen Prod Cost) + 30%(NLP)	**$15,705,359**	**-$32,336,042**	**-$16,630,683**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**$12,995,033**	**-$58,884,884**	**-$45,889,851**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**$12,455,006**	**-$27,924,132**	**-$15,469,126**	MISO Method (w/ NLP)
9999 $/MWH Hurdle Rate	**MISO**	**PJM**	**Total System**	
Generation MW	-$60	-$87	-$147	
Gross Generation Revenue (GGR)	$5,774,859	-$69,952,314	-$64,177,455	
Gen Production Cost	$286,435	-$14,869,786	-$14,583,351	
Net Gen Revenue (NGR)	$5,488,424	-$55,082,528	-$49,594,104	
Load MW	0	0	0	
Gross Load Payment (GLP)	$3,983,362	-$167,901,998	-$163,918,636	
FTR Credits	-$1,810,846	-$97,997,347	-$99,808,193	
Net Load Payment (NLP)	$5,794,208	-$69,904,651	-$64,110,443	
Net Cost (NLP - NGR)	$305,784	-$14,822,123	-$14,516,339	
Adjusted Production Cost	**$305,784**	**-$14,822,123**	**-$14,516,339**	
70%(Gen Prod Cost) + 30%(NLP)	**$1,938,767**	**-$31,380,245**	**-$29,441,479**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**$1,409,057**	**-$60,746,085**	**-$59,337,028**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**$1,952,311**	**-$31,346,881**	**-$29,394,570**	MISO Method (w/ NLP)

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“Separate Market” high Hurdle Rate effects

Observations:

- Resulting beneficiary and allocation did not change substantially using a separate market approach
- Combined market, adjusted for efficiency makes sense as representative of real-time opportunities for market efficiency caused by transmission expansions
- This should not be hard-wired into tariff, but left as a study input assumption, similar to fuel costs, to be developed as a part of a study undertaken at a particular time in the future.

Black Oak-Bedington Example – Hurdle Rate @ $2.5
Generation Shift due to Constraint Relief

Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost ($)	Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost ($)
SAMMIS	7	FE	MISO	13,842		HTFLDSFR	2	PJMW	PJM	112,507	
COVERT	4	CEC	MISO	11,243		ASWRRRRN	1	PJMW	PJM	74,501	
MDLNDCGN	1	CEC	MISO	8,344		SPRNGDLE	1	PJMW	PJM	38,855	
FRMNTNRG	1	FE	MISO	7,545		GERMAN	1	PJMW	PJM	37,067	
HGHBRDGE	1	NSP	MISO	6,660		ALBRIGHT	1	PJMW	PJM	35,038	
NEWTON	2	CIPS	MISO	5,549		FRTMRTNM	2	PJMW	PJM	28,619	
RVRSDNSP	1	NSP	MISO	5,523		LNGVWPWR	1	PJMW	PJM	24,264	
FOXEGCTR	1	WPS	MISO	5,381		HTFLDSFR	1	PJMW	PJM	23,567	
AVONLAKE	7	FE	MISO	5,278		LMPRJECT	1	AEP	PJM	19,380	
PRTWSHNG	11	WEP	MISO	4,342		BTHLHMCV	22	PJME	PJM	16,401	
BURGER	13	FE	MISO	4,265		ALBRIGHT	2	PJMW	PJM	15,460	
NLSORION	2	FE	MISO	4,121		WTRFR2PS	1	AEP	PJM	15,049	
MNKTENRG	1	NSP	MISO	4,031		AEP IGCC	1	AEP	PJM	15,000	
NBLSVLLE	3	PSI	MISO	3,733		ALBRIGHT	3	PJMW	PJM	14,339	
SAMMIS	1	FE	MISO	3,652		LNDNPSGF	8	PJME	PJM	14,134	
			Top 15	93,509	5,097,542				Top 15	484,180	20,409,544
			Total MISO	**220,225**	**11,854,272**				**Total PJM**	**743,682**	**36,606,642**
PRTWSHNG	12	WEP	MISO	-6,487		CATOCTIN	1	PJMW	PJM	-96,085	
SGRCREEK	11	PSI	MISO	-4,438		CPVWRREN	1	PJMW	PJM	-60,282	
PETE1IPL	22	IP&L	MISO	-4,328		PSSMPINT	21	VP	PJM	-48,516	
MAMIFORT	72	CGE	MISO	-3,507		DSWLLCMB	2	VP	PJM	-34,771	
PRRSTTNR	2	ILPC	MISO	-5,333		DSWLLCMB	11	VP	PJM	-31,081	
BECKJORD	13	CGE	MISO	-2,876		WLMNGTON	21	PJME	PJM	-17,372	
WBSHRVER	4	PSI	MISO	-2,693		PNDBRNDY	1	PJMS	PJM	-18,122	
GLLAGHER	4	PSI	MISO	-2,557		BLLMEADE	1	VP	PJM	-15,365	
PRSQISLE	3	WEP	MISO	-2,248		CHSTRFLD	12	VP	PJM	-13,889	
MERAMEC	1	AUEP	MISO	-2,806		ASRNWDPR	1	PJMW	PJM	-18,874	
GIBSON	12	AUEP	MISO	-2,445		FLVNNCNT	1	VP	PJM	-14,452	
BRWNSIGE	21	SIGE	MISO	-2,411		HAY ROAD	1	PJME	PJM	-12,181	
COFFEEN	1	CIPS	MISO	-1,887		BRNDNSHR	1	PJMS	PJM	-10,481	
BRWNSIGE	4	SIGE	MISO	-2,050		HARRI1ON	2	PJMW	PJM	-10,893	
SIOUX	1	AUEP	MISO	-2,113		HARRI1ON	3	PJMW	PJM	-10,715	
			Top 15	-48,180	-1,962,546				Top 15	-413,078	-28,965,565
			Total MISO	**-131,390**	**-5,896,125**				**Total PJM**	**-831,020**	**-56,443,825**

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Black Oak-Bedington Example – Hurdle Rate @ $9999
Generation Shift due to Constraint Relief

Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost ($)	Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost ($)
SAMMIS	6	FE	MISO	9,607		HTFLDSFR	1	PJMW	PJM	145,834	
EASTLAKE	5	FE	MISO	5,434		ASWRRRRN	1	PJMW	PJM	93,973	
SAMMIS	2	FE	MISO	4,814		ALBRIGHT	3	PJMW	PJM	47,239	
BURGER	3	FE	MISO	4,713		SPRNGDLE	1	PJMW	PJM	34,398	
BURGER	5	FE	MISO	4,463		LNGVWPWR	1	PJMW	PJM	34,201	
DRBRNNDS	1	DETED	MISO	3,995		GERMAN	1	PJMW	PJM	33,957	
FRMNTNRG	1	FE	MISO	3,858		HTFLDSFR	3	PJMW	PJM	31,291	
SAMMIS	7	FE	MISO	3,774		FRTMRTNM	2	PJMW	PJM	31,257	
PRTWSHNG	11	WEP	MISO	3,585		LMPRJECT	1	AEP	PJM	29,800	
AVONLAKE	9	FE	MISO	3,486		AEP IGCC	1	AEP	PJM	24,000	
SAMMIS	4	FE	MISO	3,460		ALBRIGHT	1	PJMW	PJM	15,705	
NLSORION	2	FE	MISO	3,420		HTFLDSFR	2	PJMW	PJM	14,355	
CMPBL1CC	3	CEC	MISO	3,167		ALBRIGHT	2	PJMW	PJM	13,652	
NEWTON	2	CIPS	MISO	3,136		HNTRSTWN	21	PJMW	PJM	13,561	
NWCASTLE	5	FE	MISO	2,967		SWRDRLNT	11	PJMW	PJM	13,272	
			Top 15	63,879	2,506,290				Top 15	576,494	21,431,332
			Total MISO	**158,134**	**8,002,477**				**Total PJM**	**856,394**	**39,617,959**
PRTWSHNG	12	WEP	MISO	-9,301		CATOCTIN	1	PJMW	PJM	-88,404	
MAMIFORT	6	CGE	MISO	-4,285		CPVWRREN	1	PJMW	PJM	-50,769	
RVRSDNSP	1	NSP	MISO	-4,177		PSSMPINT	21	VP	PJM	-43,574	
PRRSTTNR	1	ILPC	MISO	-4,052		DSWLLCMB	1	VP	PJM	-42,827	
GIBSON	1	PSI	MISO	-3,931		DSWLLCMB	2	VP	PJM	-29,700	
BAILLY	7	NIPS	MISO	-3,086		HARRI1ON	2	PJMW	PJM	-18,663	
COFFEEN	2	CIPS	MISO	-3,066		HARRI1ON	1	PJMW	PJM	-17,807	
PWRIOWA1	1	ALWST	MISO	-3,016		PNDBRNDY	1	PJMS	PJM	-17,628	
BECKJORD	3	CGE	MISO	-2,795		FLVNNCNT	1	VP	PJM	-15,604	
MERAMEC	3	AUEP	MISO	-2,775		WLMNGTON	21	PJME	PJM	-14,448	
WBSHRVER	5	PSI	MISO	-2,561		HARRI1ON	3	PJMW	PJM	-14,314	
PRRSTTNR	2	ILPC	MISO	-2,471		HAY ROAD	1	PJME	PJM	-11,273	
WARRICK	4	SIGE	MISO	-2,394		BLLMEADE	1	VP	PJM	-11,260	
GLLAGHER	4	PSI	MISO	-2,341		HPWLLCGN	1	VP	PJM	-10,633	
COVERT	3	CEC	MISO	-2,323		NRTHB1NC	1	VP	PJM	-10,337	
			Top 15	-52,573	-2,184,542				Top 15	-397,239	-26,314,249
			Total MISO	**-158,633**	**-7,716,041**				**Total PJM**	**-859,894**	**-54,487,745**

Black Oak-Bedington Example – Hurdle Rate @ $2.5
Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment ($)	Delta Load-Weighted LMP ($/MWh)	
ALWST	21,132,718	295,356	0.01	
AUEP	50,162,850	-310,524	-0.01	
CEC	45,935,233	4,676,043	0.10	
CGE	33,995,220	2,074,673	0.06	
CIL	10,891,850	604,621	0.06	
CIPS	21,581,547	138,278	0.01	
DETED	59,610,024	6,986,135	0.12	
FE	74,043,067	19,092,580	**0.26**	MAX
GRE	13,282,488	-16,110	0.00	
HEC	7,603,526	388,123	0.05	
HUC	312,248	-2,768	-0.01	
ILPC	19,847,458	467,121	0.02	
IP&L	17,357,647	730,836	0.04	
LBWL	2,474,844	243,786	0.10	
MDU	2,203,260	15,817	0.01	
MGE	3,480,188	117,768	0.03	
MPL	12,401,219	-15,591	0.00	
NIPS	21,629,173	1,351,407	0.06	
NSP	52,536,316	-333,993	-0.01	
OTP	6,271,153	26,883	0.00	
PSI	42,435,426	2,241,051	0.05	
SIGE	11,772,946	-70,273	-0.01	
SIPC	2,189,962	-51,347	-0.02	
SMMP	3,603,498	62,624	0.02	
SPRIL	2,086,509	-115,156	**-0.06**	MIN
WEP	35,117,253	984,087	0.03	
WPL	14,991,768	560,561	0.04	
WPPI	5,739,224	121,087	0.02	
WPS	14,931,569	381,165	0.03	
WPSC	3,743,226	357,628	0.10	
Total MISO	613,363,409	41,001,868	0.07	
Total MISO (reductions only)	144,744,538	-915,761	-0.01	

Company	Total Load (MWH)	Delta Gross Load Payment ($)	Delta Load-Weighted LMP ($/MWh)	
AEP	162,049,484	14,490,379	0.09	
COED	114,021,013	7,755,717	0.07	
DP&L	17,720,973	1,867,013	0.11	
DQE	15,778,069	6,334,476	**0.40**	MAX
PJME	160,541,994	-11,139,864	-0.07	
PJMS	75,342,989	-77,231,429	**-1.03**	MIN
PJMW	135,210,018	-9,009,164	-0.07	
VP	107,522,012	-98,479,321	-0.92	
Total PJM	788,186,552	-165,412,193	-0.21	
Total PJM (reductions only)	478,617,013	-195,859,778	-0.41	

	MISO	PJM	Total
Delta GLP	$41,001,868 0.0%	-$165,412,193 100.0%	-$124,410,324
Delta GLP (reductions only)	-$915,761 0.5%	-$195,859,778 99.5%	-$196,775,539
Load MW (reductions only)	144,744,538 23.2%	478,617,013 76.8%	623,361,551

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Black Oak-Bedington Example – Hurdle Rate @ $9999
Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment ($)	Delta Load-Weighted LMP ($/MWh)	
ALWST	21,132,718	-808,327	-0.04	
AUEP	50,162,850	-3,227,694	-0.06	
CEC	45,935,233	974,249	0.02	
CGE	33,995,220	-740,493	-0.02	
CIL	10,891,850	-194,235	-0.02	
CIPS	21,581,547	-1,390,881	-0.06	
DETED	59,610,024	2,075,605	0.03	
FE	74,043,067	15,059,992	**0.20**	MAX
GRE	13,282,488	-275,338	-0.02	
HEC	7,603,526	-309,089	-0.04	
HUC	312,248	-5,968	-0.02	
ILPC	19,847,458	-940,634	-0.05	
IP&L	17,357,647	-701,490	-0.04	
LBWL	2,474,844	51,364	0.02	
MDU	2,203,260	-23,204	-0.01	
MGE	3,480,188	-157,930	-0.05	
MPL	12,401,219	-235,114	-0.02	
NIPS	21,629,173	-330,840	-0.02	
NSP	52,536,316	-980,967	-0.02	
OTP	6,271,153	-78,396	-0.01	
PSI	42,435,426	-1,346,526	-0.03	
SIGE	11,772,946	-657,834	-0.06	
SIPC	2,189,962	-162,644	**-0.07**	MIN
SMMP	3,603,498	4,516	0.00	
SPRIL	2,086,509	-71,377	-0.03	
WEP	35,117,253	-468,751	-0.01	
WPL	14,991,768	-684,585	-0.05	
WPPI	5,739,224	-284,607	-0.05	
WPS	14,931,569	-163,868	-0.01	
WPSC	3,743,226	58,428	0.02	
Total MISO	613,363,409	3,983,362	0.01	
Total MISO (reductions only)	423,953,518	-14,240,792	-0.03	

Company	Total Load (MWH)	Delta Gross Load Payment ($)	Delta Load-Weighted LMP ($/MWh)	
AEP	162,049,484	10,652,166	0.07	
COED	114,021,013	4,877,994	0.04	
DP&L	17,720,973	1,378,752	0.08	
DQE	15,778,069	6,022,258	**0.38**	MAX
PJME	160,541,994	-7,916,165	-0.05	
PJMS	75,342,989	-76,033,071	**-1.01**	MIN
PJMW	135,210,018	-7,885,073	-0.06	
VP	107,522,012	-98,998,858	-0.92	
Total PJM	788,186,552	-167,901,998	-0.21	
Total PJM (reductions only)	478,617,013	-190,833,167	-0.40	

	MISO	PJM	Total
Delta GLP	$3,983,362 0.0%	-$167,901,998 100.0%	-$163,918,636
Delta GLP (reductions only)	-$14,240,792 6.9%	-$190,833,167 93.1%	-$205,073,960
Load MW (reductions only)	423,953,518 47.0%	478,617,013 53.0%	902,570,531

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1. Definition
2. Metric of benefit
3. Threshold tests
   - Cost
   - Voltage
   - Internal methods
4. Modeling and Other Study Assumptions
   - Number of and which years to study for benefits
   - Discount rate / Fixed charge rate
   - Others?

Definition of a Cross-border Mkt Efficiency Project

A Cross-border Market Efficiency Project (CBMEP) is a Network Upgrade consisting of a single transmission project or a portfolio of projects that meets all of the following criteria: (i) is evaluated in a Coordinated System Plan or other study under the terms of the JOA; (ii) meets the threshold Benefit to Cost ratio as prescribed under the terms of, and using the benefit measure prescribed under the JOA; (iii) shows a positive benefit to each RTO using the benefit measure prescribed under the JOA, and; (iv) meets the internal benefit to cost metrics required of a Market Efficiency or Regionally Beneficial Project as defined under the PJM and Midwest ISO tariffs, respectively, and (v) addresses constraints for which at least one dispatchable generator in the adjacent market has a generation-to-load distribution factor (GLDF) of greater than 5% with respect to serving load in that adjacent market.

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Non-cross border market efficiency projects

- Projects that show an economic benefit to only one RTO, may be pursued by that RTO by having the project constructed if within the benefiting RTO under the terms of that RTOs tariff, or by negotiating outside of the tariff to have the project constructed if within the other RTO.
- RTO CSP analysis would inform stakeholders of values of such projects, but they would not be implemented in the MTEP and RTEP as CBMEPs.
- To do so could cause a TO to build a market efficiency project for which the benefiting parties are not even a part of the same RTO, and could make construction difficult.

Internal versus cross border projects: Process Issue

- When is an internal project tested for cross border?
- For Reliability, JOA says annually, all MTEP/RTEP identified projects
- Could an internal economic project be identified and approved by one RTO, subject to a later determination of cross order benefits?
- Yes, provided that: Projects that are approved by either RTO's BOD as Market Efficiency or Regionally Beneficial Projects are only eligible for cross border consideration as a CBMEP after being evaluated in a coordinated study with input from the IPSAC, as provided for under the JOA.
- There could be reasons for wanting to move ahead with internal approvals for a project that at least passes internal tests, before full cross border tests can be completed and vetted. Such internal action should not preclude later evaluation as a cross border project under the JOA terms in place at the time the project was approved internally.

Metrics for Benefit and Allocation

- Benefit Metric: Adjusted Production Cost
- B/C threshold: 1.25
- Allocation Metric: 70% APC + 30% NLP

Rationale

- APC is a better measure of the long term market efficiency benefit provided by the upgrade
- B/C threshold is PJM's lower value and appropriate for the APC measure that results in lower benefit values.
- Allocation measure discounts the generator benefit by 30% to reflect uncertainty in extent to which generator benefits flow directly to loads from whom costs are recovered.

APC = NLP-NGR
.70APC + .30NLP = 1.00NLP – .70NGP
= 100% load benefit + 70% generator benefit

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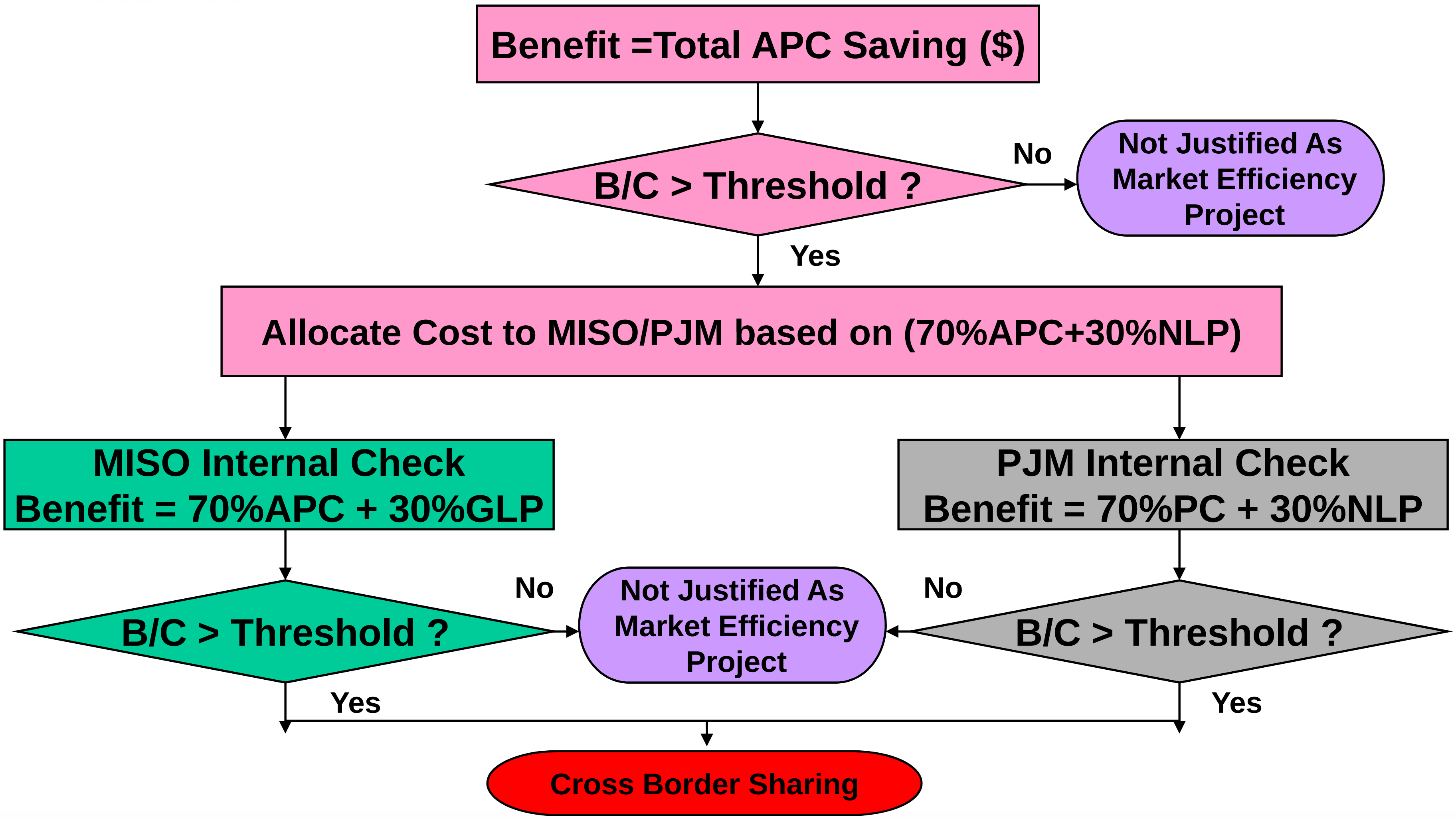
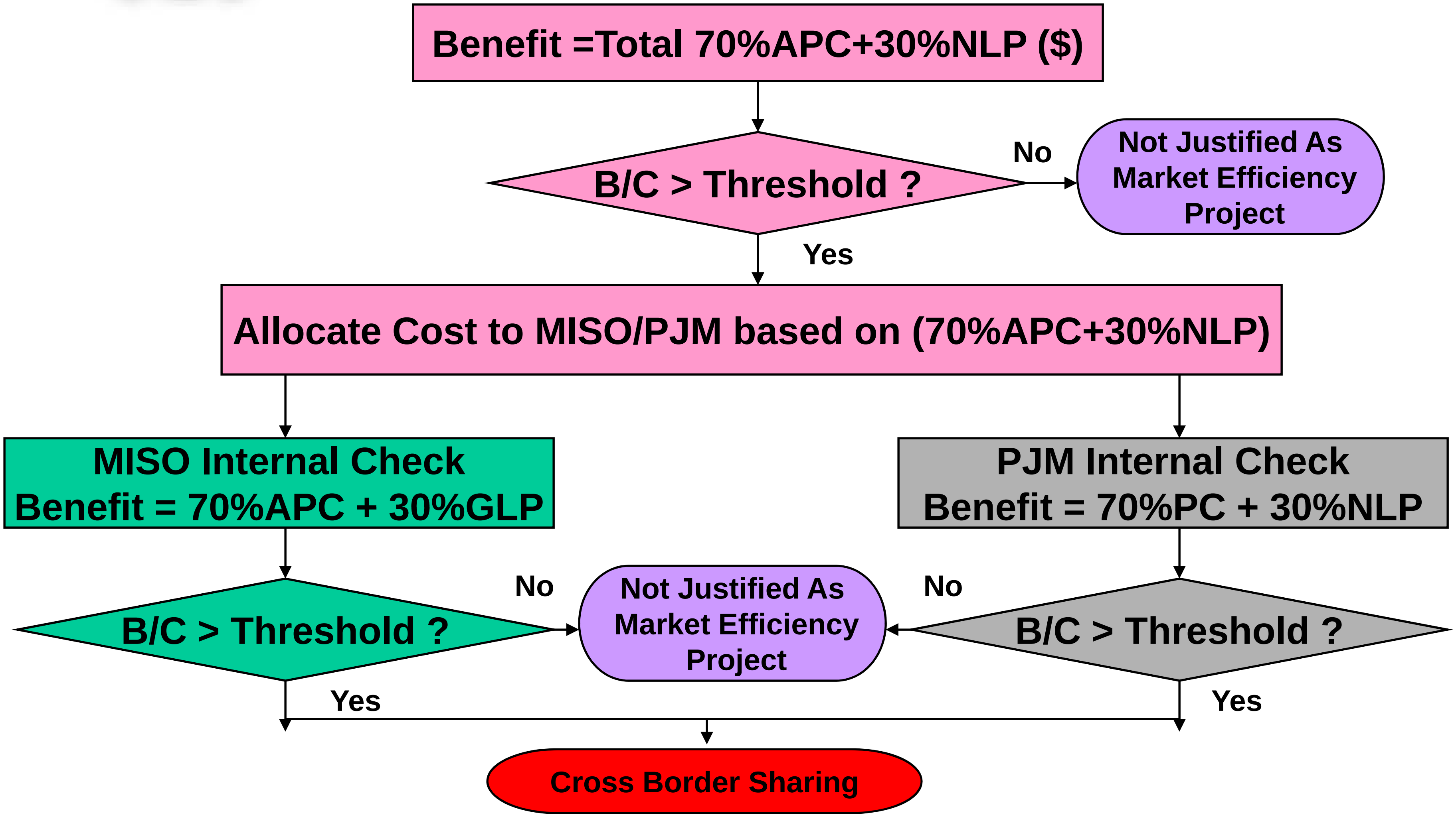
Threshold Tests

- Project Voltage Threshold: 345 kV
- Project Direct Cost Estimate Threshold: $20 M
- Must show benefit to both against cross border metric
- Must show benefit to each under own internal methods

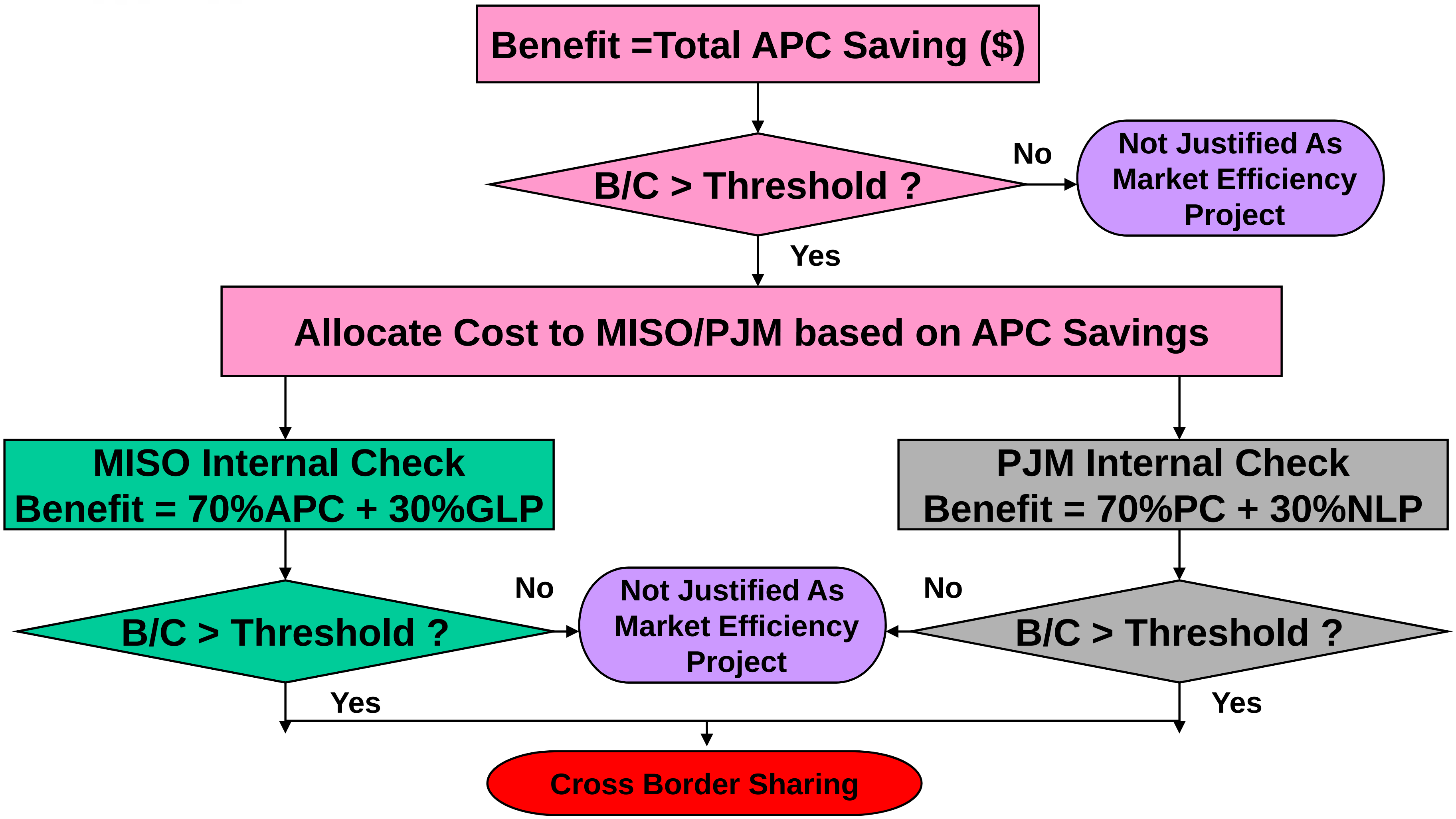
Proposal 2a: APC as Efficiency Measure; Load-weighted benefit as Allocator



Proposal 1: Use 70%APC + 30%NLP



Proposal 2: Use Adjusted Production Cost



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Comparison of Proposals using Project Examples (Constraints Relieved)

Example 1: Paddock Transformer

	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

0$/MWH Hurdle

Blended Metrics

	MISO	PJM	Total System	
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

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Proposal 2a: APC as Efficiency Measure; Load-weighted benefit as Allocator

[Paddock Transformer]

Assume:
Project Cost = 100M$,
FCR = 20%,
so annual cost = 20M$
B/C Threshold = 1.25
5 years in service

System APC Benefit = $39.3 M

B/C = 1.96 > 1.25?

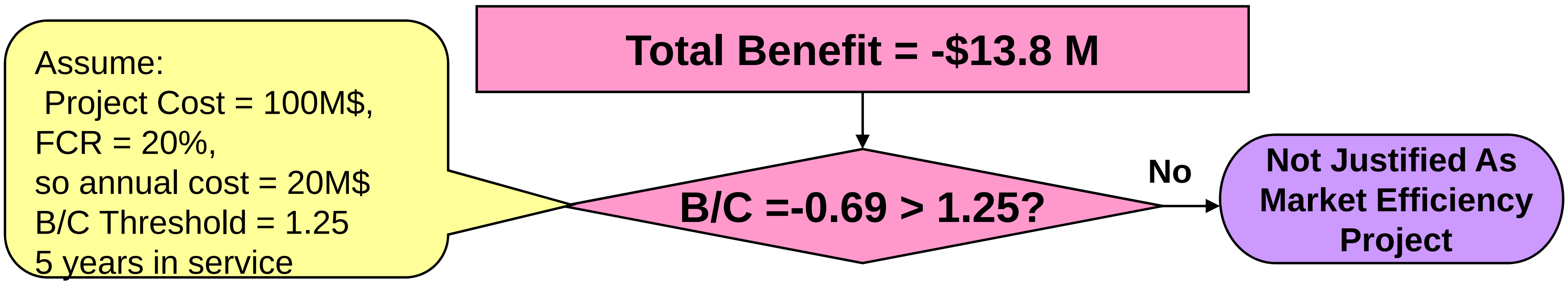
Yes

Use 70%APC +30%NLP savings to allocate the cost

MISO Share = $20 M (100%) ($33.6 M Vs. -$47.4 M); PJM Share = $0 M

No cost sharing as PJM sees no benefit.
But it still could be MISO internal economic project.

Proposal 1: Use 70%APC + 30%NLP [Paddock Transformer]



Proposal 2: Use Adjusted Production Cost [Paddock Transformer]

Assume:
Project Cost = 100M$,
FCR = 20%,
so annual cost = 20M$
B/C Threshold = 1.25
5 years in service

System APC Benefit = $39.3 M

B/C = 1.96 > 1.25?

Yes

Use APC savings to allocate the cost

MISO Share = $20*($34.6 M/$39.3 M) = $17.6 M; PJM Share = $2.4 M

MISO Internal Check
Benefit = 70%APC + 30%GLP = $45.0 M

PJM Internal Check
Benefit = 70%PC + 30%NLP = -$72.9 M

B/C = 2.56 > 2?

Yes

Not Justified As Market Efficiency Project

No

B/C = -30.0 > 1.25 ?

No cost sharing as PJM sees no benefit.
But it still could be MISO internal economic project.

pjm

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Example 2: Bunsonville-Eugene

	MISO	PJM	Total System
Generation MW	$1,652,883	-$1,651,316	$1,568
Gross Generation Revenue (GGR)	$41,060,884	-$325,592,253	-$284,531,369
Gen Production Cost	$15,133,381	-$84,572,848	-$69,439,467
Net Gen Revenue (NGR)	$25,927,503	-$241,019,405	-$215,091,902
Load MW	0	0	0
Gross Load Payment (GLP)	$45,485,627	-$227,037,072	-$181,551,444
FTR Credits	$60,524,245	$20,003,677	$80,527,922
Net Load Payment (NLP)	-$15,038,617	-$247,040,749	-$262,079,366
Net Cost (NLP - NGR)	-$40,966,120	-$6,021,344	-$46,987,464

0$/MWH Hurdle

Blended Metrics

Adjusted Production Cost	**-$40,966,120**	**-$6,021,344**	**-$46,987,464**	
70%(Gen Prod Cost) + 30%(NLP)	$6,081,781	**-$133,313,218**	**-$127,231,437**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$15,030,596**	**-$72,326,062**	**-$87,356,658**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$33,187,869**	**-$78,327,165**	**-$111,515,034**	MISO Method (w/ NLP)

Delta Total System Congestion 102,979,925

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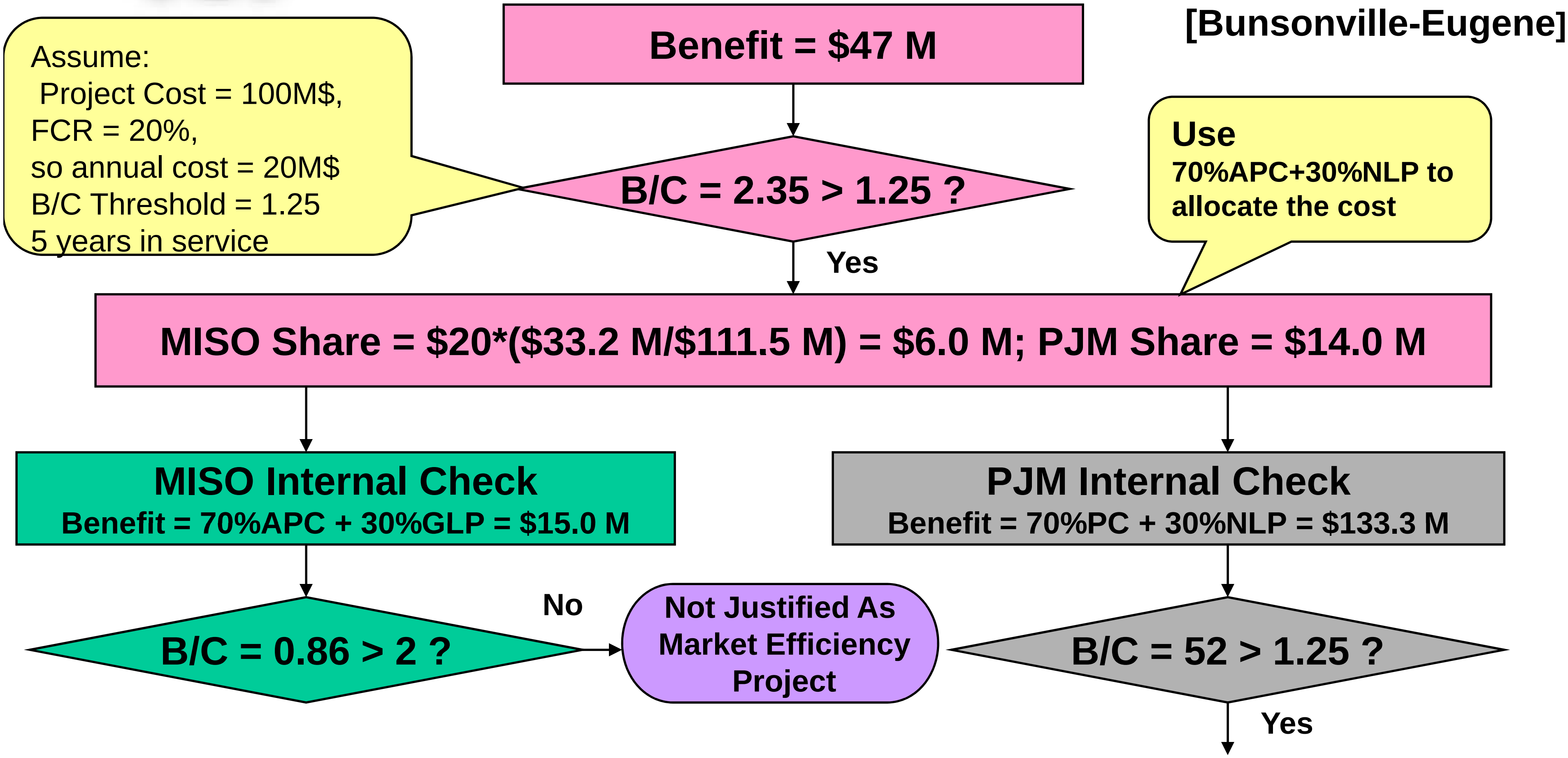
Proposal 2a: APC as Efficiency Measure; Load-weighted benefit as Allocator



No cost sharing as MISO does not pass internal check.
But it still can be PJM internal economic project.

pjm

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Energizing the Heartland

Proposal 1: Use 70%APC + 30%NLP

[Bunsonville-Eugene]

Assume:
Project Cost = 100M$,
FCR = 20%,
so annual cost = 20M$
B/C Threshold = 1.25
5 years in service

Total Benefit = $ 111.5 M

B/C = 5.58 > 1.25 ?

Yes

Use 70%APC+30%NLP to allocate the cost

MISO Share = $20*($33.2 M/$111.5 M) = $6 M; PJM Share = $14 M

MISO Internal Check
Benefit = 70%APC + 30%GLP = $15.0 M

B/C = 2.53 > 2 ?

Yes

PJM Internal Check
Benefit = 70%PC + 30%NLP = $133.3 M

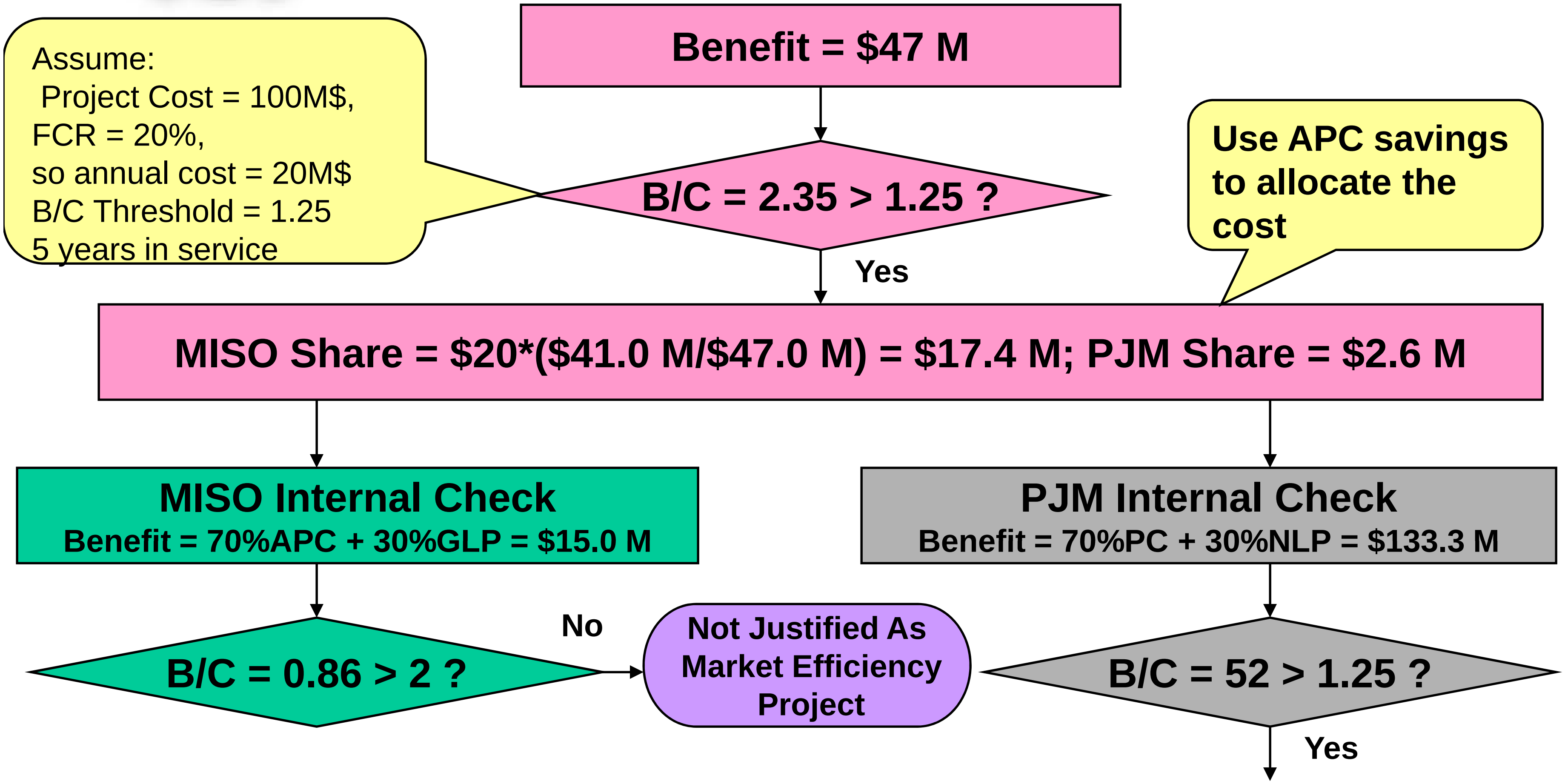
B/C = 9.49 > 1.25 ?

Yes

Cross Border Sharing

Energizing the Heartland

Proposal 2: Use Adjusted Production Cost [Bunsonville-Eugene]



No cost sharing as MISO does not pass internal check.
But it still can be PJM internal economic project.

pjm

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Energizing the Heartland

More Examples

- Following Examples use proposed method 2a
  - APC as benefit metric / Blend as allocator
- All at $2.5 Hurdle
- B/C in Examples show maximum cost supported for the project
- Comparison table at end

Black Oak - Bedington

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	79,850	-79,930	-80
Gross Generation Revenue (GGR)	$43,845,139	-$68,512,415	-$24,667,276
Gen Production Cost	$5,635,465	-$19,533,053	-$13,897,587
Net Gen Revenue (NGR)	$38,209,674	-$48,979,363	-$10,769,689
Load MW	0	0	0
Gross Load Payment (GLP)	$41,001,868	-$165,412,192	-$124,410,324
FTR Credits	$1,800,091	-$103,202,507	-$101,402,416
Net Load Payment (NLP)	$39,201,777	-$62,209,686	-$23,007,908
Net Cost (NLP - NGR)	$992,104	-$13,230,323	-$12,238,219

Blended Metrics

Adjusted Production Cost	$992,104	**-$13,230,323**	**-$12,238,219**	
70%(Gen Prod Cost) + 30%(NLP)	$15,705,359	**-$32,336,042**	**-$16,630,683**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	$12,995,033	**-$58,884,884**	**-$45,889,851**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	$12,455,006	**-$27,924,132**	**-$15,469,126**	MISO Method (w/ NLP)

Delta Total System Congestion -99,743,048

Project: Black Oak - Bedington

System APC Benefit = $12.2 M

B/C = $\geq$ 1.25 ?
C $\leq$ $9.8 M

Yes (assume)

Use
70%APC+30%NLP to allocate the cost

MISO Share = 0% (-$12.5 M benefit); PJM Share = 100% (+$27.9 M benefit)

No MISO internal check needed since nothing allocated to MISO

PJM Internal Check
Benefit = 70%PC + 30%NLP = $32.3 M

B/C = 3.31 > 1.25 ?

Yes

PJM could pursue project as an internal Market Efficiency Project

Palisades-Roosevelt

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	-120,597	120,580	-17
Gross Generation Revenue (GGR)	-$9,031,735	$6,766,227	-$2,265,508
Gen Production Cost	-$5,033,619	$3,523,526	-$1,510,094
Net Gen Revenue (NGR)	-$3,998,116	$3,242,702	-$755,414
Load MW	0	0	0
Gross Load Payment (GLP)	-$11,294,683	$3,379,372	-$7,915,311
FTR Credits	-$5,101,414	$226,835	-$4,874,579
Net Load Payment (NLP)	-$6,193,269	$3,152,537	-$3,040,732
Net Cost (NLP - NGR)	-$2,195,153	-$90,164	-$2,285,318

Blended Metrics

Adjusted Production Cost	**-$2,195,153**	**-$90,164**	**-$2,285,318**	
70%(Gen Prod Cost) + 30%(NLP)	**-$5,381,514**	$3,412,229	**-$1,969,285**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$4,925,012**	$950,697	**-$3,974,316**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$3,394,588**	$882,646	**-$2,511,942**	MISO Method (w/ NLP)

Delta Total System Congestion -5,649,803

Project: Palisades-Roosevelt

System APC Benefit = $2.3 M

B/C = ≥ 1.25 ?
C ≤ $1.8 M

Yes
(assume)

Use
70%APC+30%NLP to allocate the cost

MISO Share = 100% (+$3.4 M benefit); PJM Share = 0% (-$0.9 M benefit)

MISO Internal Check
Benefit = 70%APC + 30%GLP = $4.9 M

No PJM internal check needed since nothing allocated to PJM

B/C = 2.67 > 2 ?

Yes

MISO could pursue project as an internal Market Efficiency Project

Saukville-Pleasant Valley

2.5$/MWH Hurdle

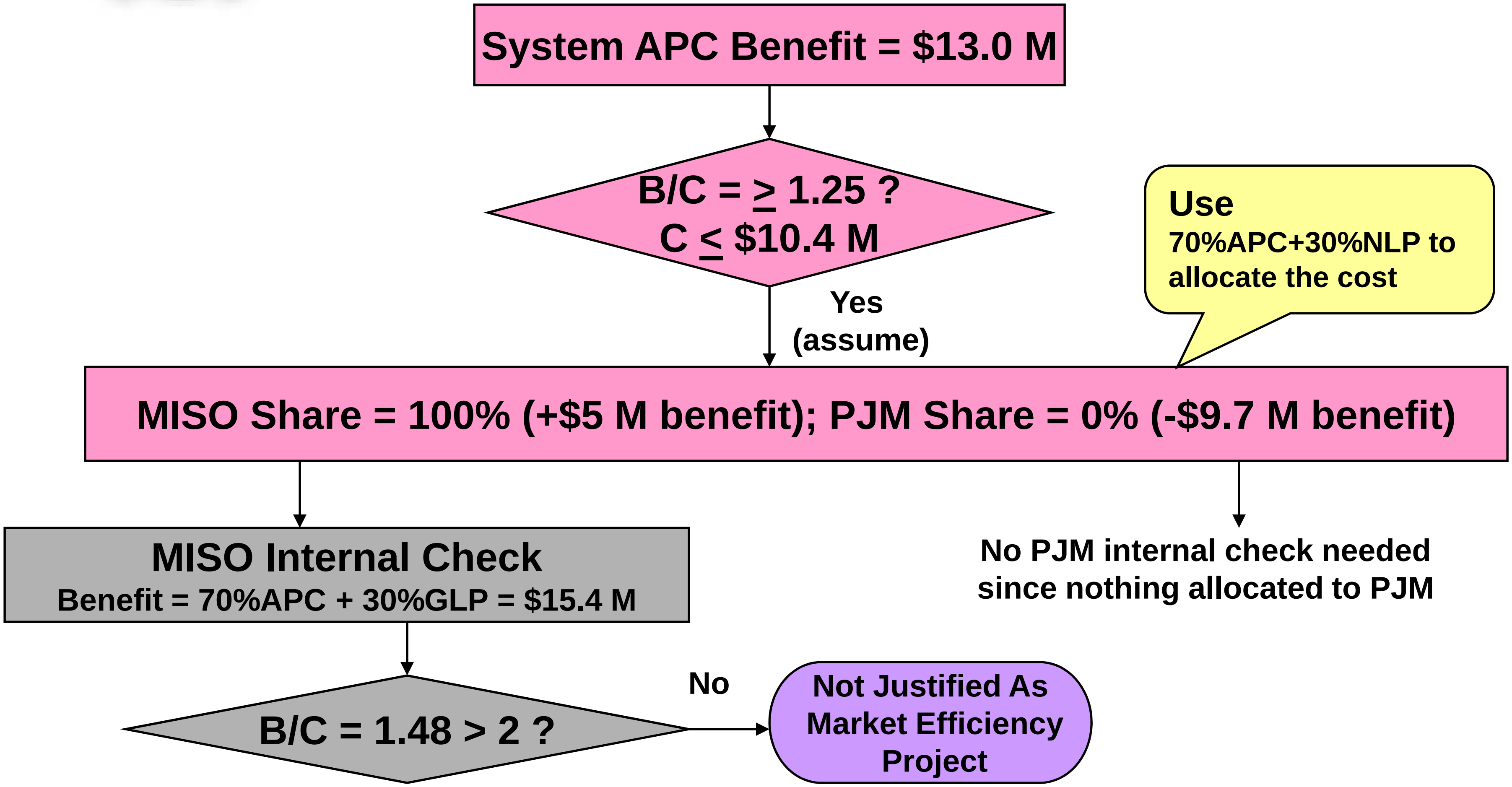
	MISO	PJM	Total System
Generation MW	-12,153	11,976	-177
Gross Generation Revenue (GGR)	$12,126,438	$33,979,496	$46,105,934
Gen Production Cost	-$13,248,632	$597,543	-$12,651,089
Net Gen Revenue (NGR)	$25,375,070	$33,381,954	$58,757,023
Load MW	0	0	0
Gross Load Payment (GLP)	-$21,861,763	$37,642,569	$15,780,806
FTR Credits	-$34,557,789	$4,567,541	-$29,990,248
Net Load Payment (NLP)	$12,696,026	$33,075,028	$45,771,054
Net Cost (NLP - NGR)	-$12,679,044	-$306,926	-$12,985,970

Blended Metrics

Adjusted Production Cost	**-$12,679,044**	**-$306,926**	**-$12,985,970**	
70%(Gen Prod Cost) + 30%(NLP)	**-$5,465,234**	$10,340,788	$4,875,554	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$15,433,860**	$11,077,923	**-$4,355,937**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$5,066,523**	$9,707,660	$4,641,137	MISO Method (w/ NLP)

Delta Total System Congestion -30,325,128

Project: Saukville-Pleasant Valley



pjm

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Energizing the Heartland

Bedford-Seymour

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	54,306	-54,310	-4
Gross Generation Revenue (GGR)	$20,950,902	-$40,598,679	-$19,647,777
Gen Production Cost	$3,083,289	-$4,902,514	-$1,819,226
Net Gen Revenue (NGR)	$17,867,613	-$35,696,165	-$17,828,552
Load MW	0	0	0
Gross Load Payment (GLP)	-$25,676,316	-$31,776,938	-$57,453,255
FTR Credits	-$41,683,452	$2,917,422	-$38,766,030
Net Load Payment (NLP)	$16,007,136	-$34,694,360	-$18,687,224
Net Cost (NLP - NGR)	-$1,860,478	$1,001,805	-$858,673

Blended Metrics

Adjusted Production Cost	**-$1,860,478**	$1,001,805	**-$858,673**	
70%(Gen Prod Cost) + 30%(NLP)	$6,960,443	**-$13,840,068**	**-$6,879,625**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$9,005,229**	**-$8,831,818**	**-$17,837,047**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	$3,499,806	**-$9,707,044**	**-$6,207,238**	MISO Method (w/ NLP)

Delta Total System Congestion -37,805,477

Project: Bedford-Seymour

System APC Benefit = $0.86 M

B/C = ≥ 1.25 ?
C ≤ $0.72M

Yes
(assume)

Use
70%APC+30%NLP to allocate the cost

MISO Share = 0% (-$3.5 M benefit); PJM Share = 100% (+$9.7 M benefit)

No MISO internal check needed since nothing allocated to MISO

PJM Internal Check
Benefit = 70%PC + 30%NLP = $13.8 M

B/C = 19.1 > 1.25 ?

Yes

PJM could pursue project as an internal Market Efficiency Project

Paddock Transformer

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	-548,564	548,128	-436
Gross Generation Revenue (GGR)	-$36,651,707	$174,221,519	$137,569,812
Gen Production Cost	-$49,073,699	$22,930,196	-$26,143,503
Net Gen Revenue (NGR)	$12,421,992	$151,291,323	$163,713,314
Load MW	0	0	0
Gross Load Payment (GLP)	-$51,355,984	$118,202,671	$66,846,687
FTR Credits	-$34,378,216	-$28,567,983	-$62,946,199
Net Load Payment (NLP)	-$16,977,768	$146,770,654	$129,792,886
Net Cost (NLP - NGR)	-$29,399,760	-$4,520,669	-$33,920,428

Blended Metrics

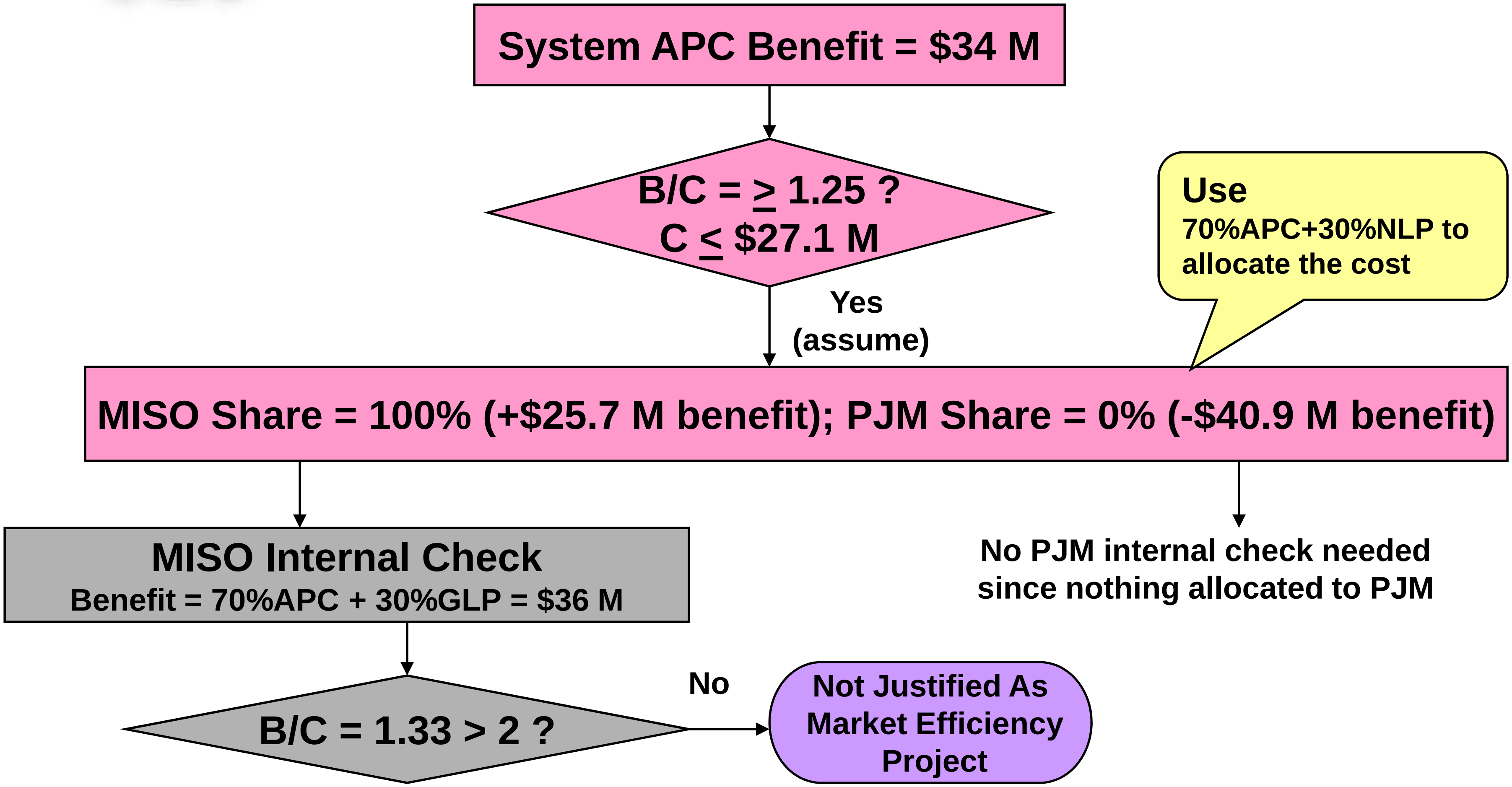
Adjusted Production Cost	**-$29,399,760**	**-$4,520,669**	**-$33,920,428**	
70%(Gen Prod Cost) + 30%(NLP)	**-$39,444,920**	$60,082,333	$20,637,414	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$35,986,627**	$32,296,333	**-$3,690,294**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$25,673,162**	$40,866,728	$15,193,566	MISO Method (w/ NLP)

Delta Total System Congestion -70,723,124

pjm

Midwest ISO
Energizing the Heartland

Project: Paddock Transformer



Pana-Mt.Zion-Kansas

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	52,312	-52,534	-222
Gross Generation Revenue (GGR)	$7,489,847	-$13,539,340	-$6,049,493
Gen Production Cost	-$1,711,250	-$2,593,719	-$4,304,969
Net Gen Revenue (NGR)	$9,201,098	-$10,945,621	-$1,744,524
Load MW	0	0	0
Gross Load Payment (GLP)	-$5,660,916	-$13,627,289	-$19,288,205
FTR Credits	-$10,452,922	-$3,182,764	-$13,635,686
Net Load Payment (NLP)	$4,792,007	-$10,444,525	-$5,652,519
Net Cost (NLP - NGR)	-$4,409,091	$501,096	-$3,907,995

Blended Metrics

Adjusted Production Cost	**-$4,409,091**	$501,096	**-$3,907,995**	
70%(Gen Prod Cost) + 30%(NLP)	$239,727	**-$4,948,961**	**-$4,709,234**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$4,784,638**	**-$3,737,420**	**-$8,522,058**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$1,648,762**	**-$2,782,590**	**-$4,431,352**	MISO Method (w/ NLP)

Delta Total System Congestion -13,238,712

pjm

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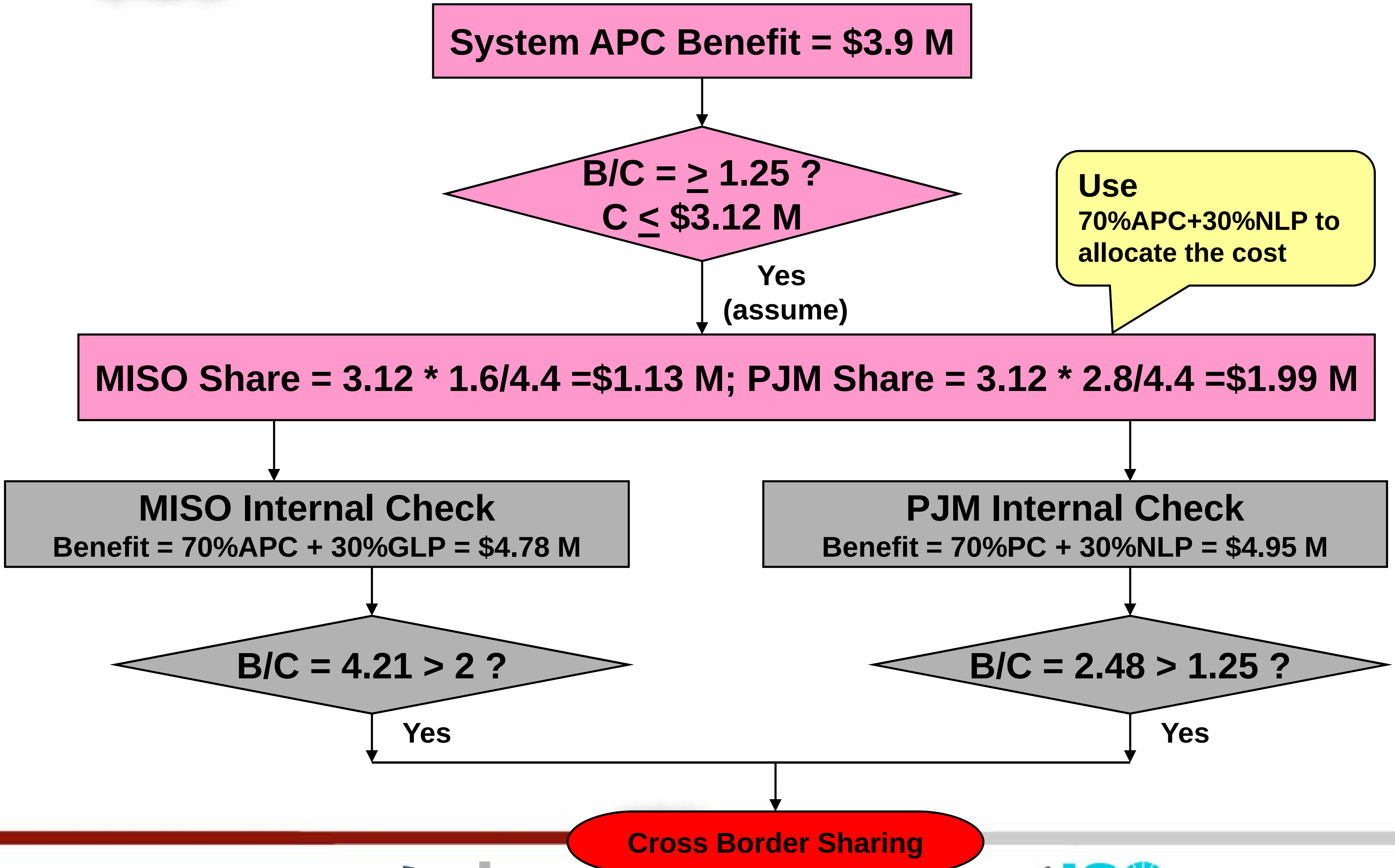
Project: Pana-Mt.Zion-Kansas



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Bunsonville-Eugene

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	1,648,003	-1,646,455	1,548
Gross Generation Revenue (GGR)	$17,285,292	-$285,921,206	-$268,635,915
Gen Production Cost	$9,561,130	-$79,686,107	-$70,124,978
Net Gen Revenue (NGR)	$7,724,162	-$206,235,099	-$198,510,937
Load MW	0	0	0
Gross Load Payment (GLP)	$26,575,795	-$190,983,501	-$164,407,706
FTR Credits	$65,649,334	$22,250,390	$87,899,723
Net Load Payment (NLP)	-$39,073,538	-$213,233,891	-$252,307,430
Net Cost (NLP - NGR)	-$46,797,700	-$6,998,792	-$53,796,492

Blended Metrics

Adjusted Production Cost	**-$46,797,700**	**-$6,998,792**	**-$53,796,492**	
70%(Gen Prod Cost) + 30%(NLP)	**-$5,029,271**	**-$119,750,442**	**-$124,779,713**	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$24,785,652**	**-$62,194,205**	**-$86,979,857**	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$44,480,452**	**-$68,869,322**	**-$113,349,774**	MISO Method (w/ NLP)

Delta Total System Congestion 104,228,209

pjm

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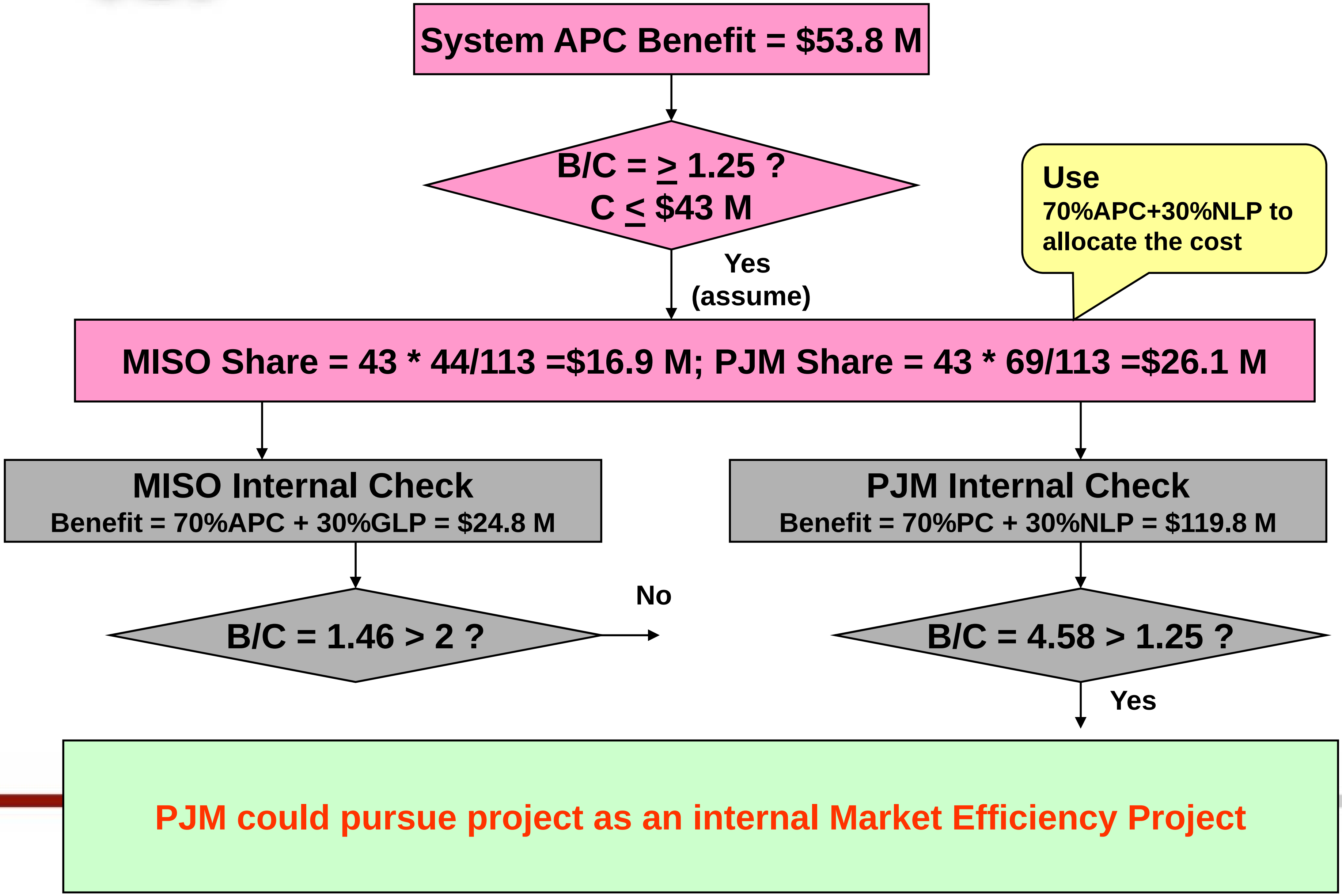
Energizing the Heartland

Project: Bunsonville - Eugene



Cayuge-Eugena

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	-43,864	43,921	57
Gross Generation Revenue (GGR)	$17,017,775	$28,315,810	$45,333,585
Gen Production Cost	-$7,742,540	$913,225	-$6,829,316
Net Gen Revenue (NGR)	$24,760,316	$27,402,585	$52,162,901
Load MW	0	0	0
Gross Load Payment (GLP)	$15,904,174	$20,414,286	$36,318,460
FTR Credits	-$2,464,368	-$6,216,474	-$8,680,842
Net Load Payment (NLP)	$18,368,542	$26,630,759	$44,999,302
Net Cost (NLP - NGR)	-$6,391,773	-$771,826	-$7,163,599

Blended Metrics

Adjusted Production Cost	**-$6,391,773**	**-$771,826**	**-$7,163,599**	
70%(Gen Prod Cost) + 30%(NLP)	$90,784	$8,628,485	$8,719,270	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	$297,011	$5,584,008	$5,881,019	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	$1,036,322	$7,448,950	$8,485,271	MISO Method (w/ NLP)

Delta Total System Congestion -9,015,125

Project: Cayuge-Eugena

System APC Benefit = $7.2 M

B/C = $\geq$ 1.25 ?
C $\leq$ \$5.76 M

Yes
(assume)

Use
70%APC+30%NLP to
allocate the cost

Both MISO (-$1 M) and PJM (-$7.4 M) have negative savings on Blend Matrix
So no cost sharing

pjm

Midwest ISO
Energizing the Heartland

WEMPLETOWN-PADDOCK

2.5$/MWH Hurdle

	MISO	PJM	Total System
Generation MW	-99,650	99,497	-153
Gross Generation Revenue (GGR)	$10,174,334	$33,665,743	$43,840,077
Gen Production Cost	-$13,020,953	$5,293,139	-$7,727,813
Net Gen Revenue (NGR)	$23,195,287	$28,372,604	$51,567,891
Load MW	0	0	0
Gross Load Payment (GLP)	$7,368,333	$18,200,788	$25,569,121
FTR Credits	-$7,308,265	-$9,972,263	-$17,280,528
Net Load Payment (NLP)	$14,676,598	$28,173,051	$42,849,649
Net Cost (NLP - NGR)	-$8,518,689	-$199,553	-$8,718,242

Blended Metrics

Adjusted Production Cost	**-$8,518,689**	**-$199,553**	**-$8,718,242**	
70%(Gen Prod Cost) + 30%(NLP)	**-$4,711,687**	$12,157,113	$7,445,425	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	**-$3,752,583**	$5,320,549	$1,567,967	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	**-$1,560,103**	$8,312,228	$6,752,125	MISO Method (w/ NLP)

Delta Total System Congestion -18,270,957

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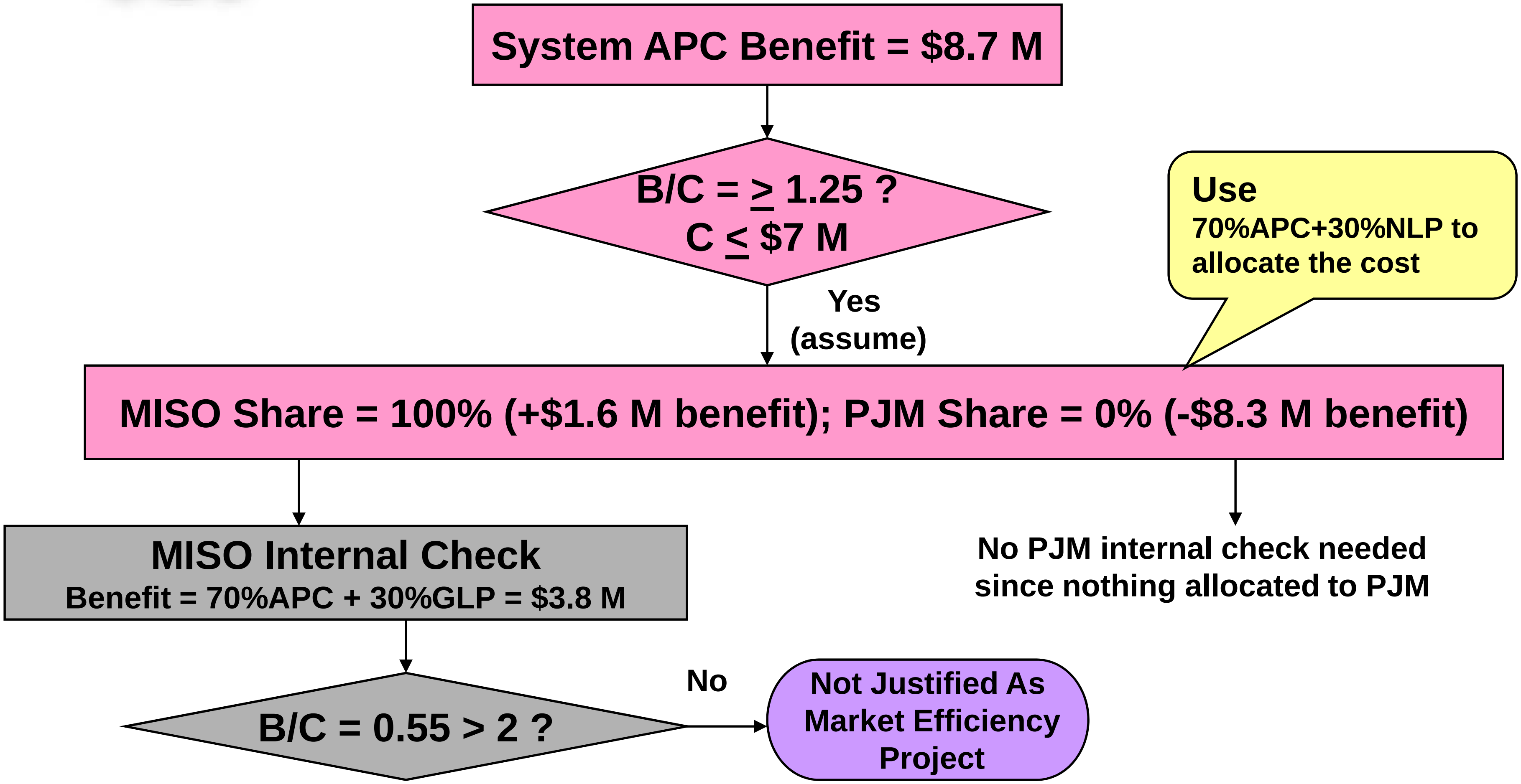
Energizing the Heartland

Project: WEMPLETOWN-PADDOCK



Comparison of 1, 2, 2a

(SEPARATE SPREADSHEET)

Other Process Issues

- Years to be Studied for Benefit
- Discount rate / Fixed charge rate

Years Studied

Years studied for benefit determination

- PJM: future years 1, 4, 7, 10; Interpolation for interim years; Extrapolation beyond year 10 to 15 years max
- MISO: In-service date year (ISD), ISD + 5, ISD + 10; Interpolation for interim; max 20 year horizon

June Meeting Proposed to Resolve as follows:

- Cross Border: In-service date year (ISD), ISD + 5, ISD + 10; Interpolation for interim years; Extrapolation to year 15

Hard –wire # of years of benefit, not the exact years

Vague on

Recapp – prior discussion

Other Process Issues

- Discount rate / Fixed charge rate
- More thought and discussion needed here

PJM filing regarding discount rate, fixed charge rate

Such assumptions shall include, but not be limited to, the discount rate used to determine the present value of the Total Annual Enhancement Benefit and Total Enhancement Cost, and the annual revenue requirement, including the recovery period, used to determine the Total Enhancement Cost. The discount rate shall be based on the Transmission Owners' most recent after-tax embedded cost of capital weighted by each Transmission Owner's total transmission capitalization. Each Transmission Owner shall provide the Office of the Interconnection with the Transmission Owner's most recent after-tax embedded cost of capital, total transmission capitalization, and levelized carrying charge rate, including the recovery period. The recovery period shall be consistent with recovery periods allowed by the Commission for comparable facilities.

MISO filing regarding fixed charge rate

The Transmission Provider shall employ a threshold benefits to costs ratio test to evaluate a potential Regionally Beneficial Project. Only projects that meet the benefits/costs ratio threshold shall be included in the MTEP as a Regionally Beneficial Project and be eligible for regional cost sharing. The costs applied in the benefits/costs ratio shall be the present value, over the same period for which the project benefits are determined, of the annual revenue requirements for the project as determined from the estimated project installed costs and the fixed charge rate applicable to the constructing Transmission Owner(s) developed using the formula in Attachment GG.

And Now for Something Completely Different

Cost Allocation for Operational Performance Projects

- 3 types of projects are identified in the JOA – Baseline Reliability, Economic and Operational Performance
- We have filed and have an accepted allocation method for Baseline Reliability
- Before the reliability was resolved by FERC, we had a complaint filed by NIPS that lead to a modified reliability-like allocation
- FERC rejected the modified approach saying that we were committed to soon filing allocations for Economic and Operational projects, and that would resolve the NIPS Operational issue
- We then received an extension and then another on the economic xborder filing to the now Jan 28 date.
- The issue of resolving the Operational Performance projects has not been addressed in our discussions
- RTOs believe that this issue is complex enough to be addressed separately immediately following the Jan 28 filing rather than rushing a solution before then. We will propose dates for this as we finalize these discussions on Economic.

pjm

MidwestISO
Energizing the Heartland

NEXT STEPS

- December discuss tariff (JOA) language
- Early January meeting or call if needed to finalize tariff
- File end of January