



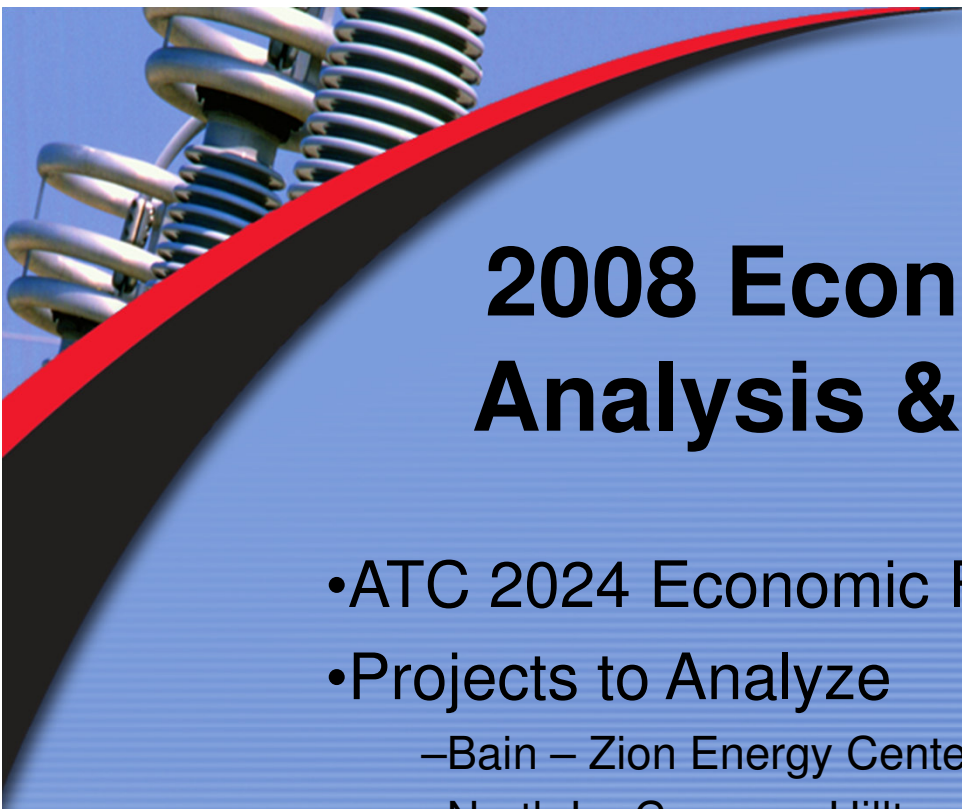
ATC Planning Stakeholder Meeting

2008 Economic Planning Analysis & Study Results

Presented by: Todd Tadych
ATC Economic Planning
3-6-09

UPDATED: 6-10-09





2008 Economic Planning Analysis & Study Results

- ATC 2024 Economic Futures Matrix
- Projects to Analyze
 - Bain – Zion Energy Center 345 kV Line
 - North La Crosse – Hilltop – Spring Green – Cardinal 345 kV Line
 - Lore – Spring Green - Cardinal 345 kV Line
- 2018 and 2024 Project Results to Date
 - Project Impacts – Economic
 - Project Impacts – Additional Metrics
 - MISO Area and Hub LMPs



ATC 2024 Futures Matrix

Drivers	Load Growth within ATC	Energy Growth within ATC	Load Growth outside ATC	Energy Growth outside ATC	Total Small Capacity Coal Retirements (or conversions to natural gas) Within ATC	Generator Additions Within ATC
Lower	0.5%	0.5%	0.5%	0.5%	907 MW	Planned Wind, No NED 3
Mid	1.75%	1.75%	1.75%	1.75%	453 MW	Planned Wind, No NED 3
Upper	3.0%	3.0%	3.0%	3.0%	Announced (289 MW)	Planned Wind, No NED 3, 600 Coal

2024 Futures Descriptions

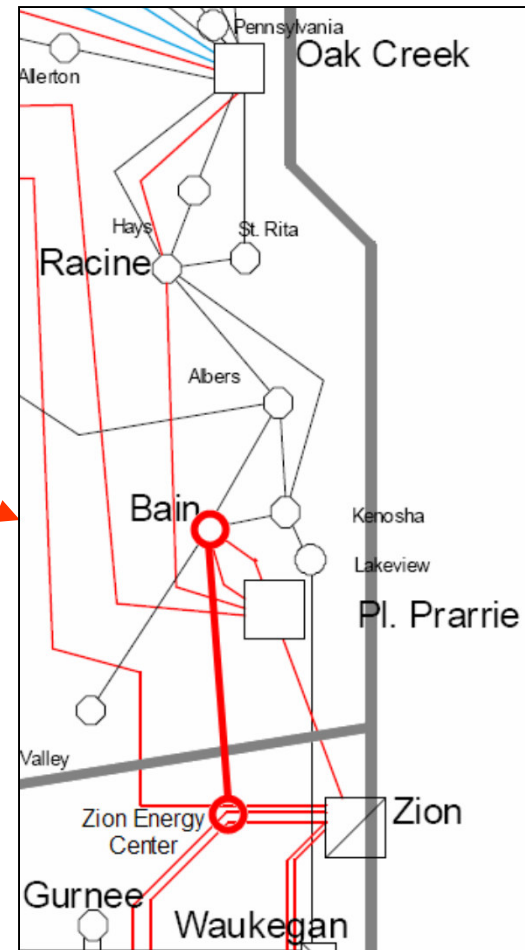
Robust Economy	3.0%	3.0%	3.0%	3.0%	Upper
High Retirements	1.5%	1.5%	1.5%	1.5%	Lower
High Environmental	1.0%	0.8%	1.1%	1.1%	Lower
Slow Growth	0.5%	0.5%	0.5%	0.5%	Mid
DOE 20% Wind	2.0%	2.0%	2.0%	2.0%	Lower
Fuel & Inv. Limitations	1.3%	1.3%	1.3%	1.3%	Mid

Drivers	% Energy in ATC from Renewables	% Renewables Inside ATC	% Renewables Outside ATC	Natural Gas Price Forecast	Coal Price Forecast for New Units	Environmental Regulations	MISO MTEP09 Generation Portfolios Outside ATC
Lower	10%	50%	50%	-40%	-10%	\$0/ton for CO ₂ , 0% higher mercury costs	N/A
Mid ³	15%	35%	65%	NYMEX For 10 years Followed by EIA Escalation rate	MISO Central & West \$2.24 & \$1.88 per MMBTU, respectively, for 2024	\$25/ton for CO ₂ , 25% higher mercury costs	N/A
Upper	25%	25%	75%	50%	20%	\$44/ton for CO ₂ , 25% higher mercury costs	N/A

2024 Futures Descriptions

Robust Economy	Mid	Mid	Mid-Upper +25%	Upper	Low	Reference
High Retirements	Mid	Mid	Mid-Low -20%	Mid	Mid	Environmental
High Environmental	20.0%	Upper	Upper	Lower	Upper	Environmental
Slow Growth	Lower	Lower	Lower	Mid	Low	Reference
DOE 20% Wind	Upper	Upper	Mid	Lower	Mid	20% Wind
Fuel & Inv. Limitations	Mid	Mid	Mid-Upper +25%	Mid	Mid	Investment Limitation

Projects to Analyze Bain – Zion Energy Center 345 kV



345 kV Mileage and Cost Estimate*

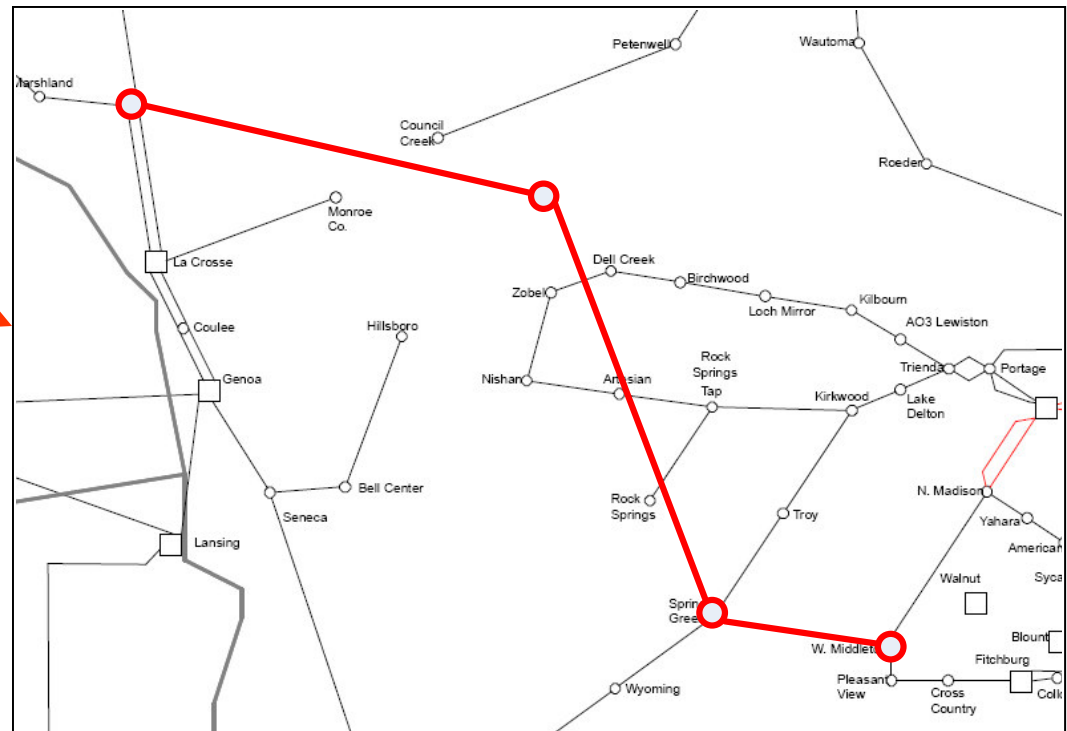
Bain – Zion = 6 miles = \$18 M

Total = 6 miles = \$18 M

*Cost estimate = \$3M/mile; mileage from PSS/E dev

These drawings are intended for informational purposes only and do not depict actual transmission line additions or potential routes and siting

Projects to Analyze North La Crosse Hilltop – Spring Green – Cardinal 345 kV



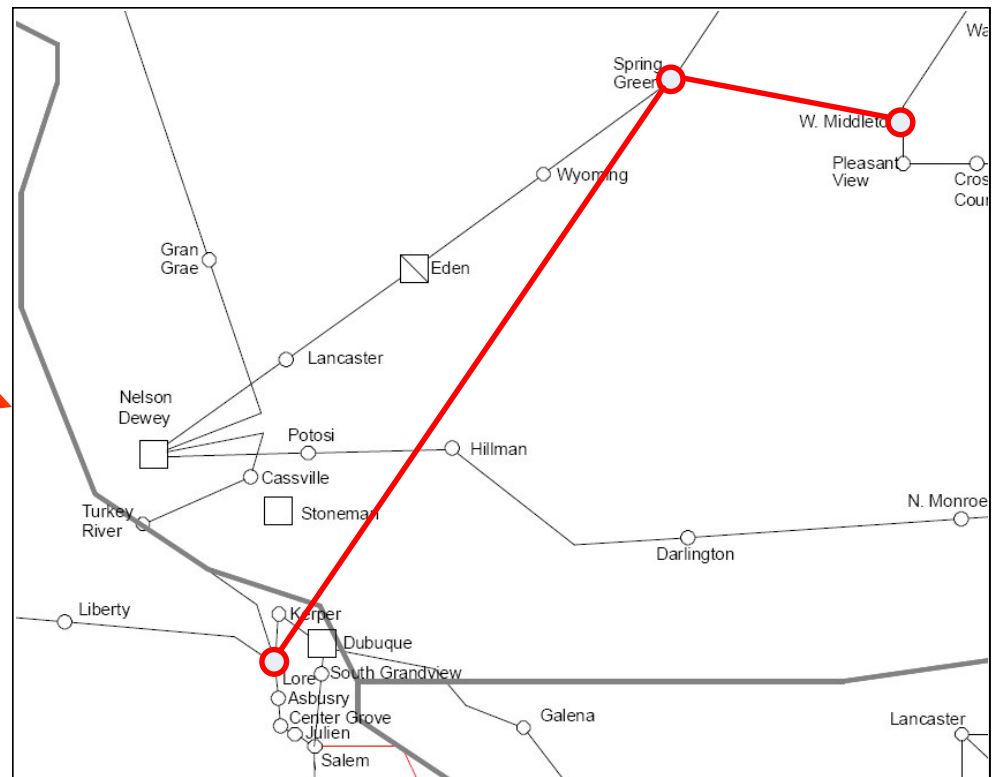
345 kV Mileage and Cost Estimate*

NLAX – Hilltop	= 75 miles	= \$225 M
Hilltop – Spring Green	= 55 miles	= \$165 M
Spring Green – Cardinal	= 28 miles	= \$84 M
Total	= 158 miles	= \$474 M

*Cost estimate = \$3M/mile; mileage from PSS/E idev

These drawings are intended for informational purposes only and do not depict actual transmission line additions or potential routes and siting

Projects to Analyze Lore – Spring Green – Cardinal 345 kV

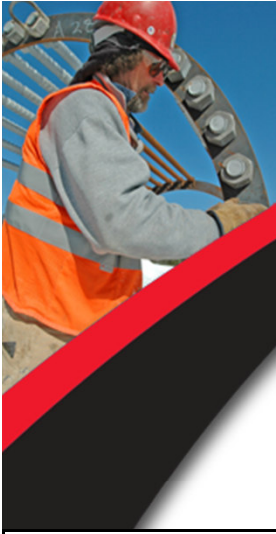


345 kV Mileage and Cost Estimate*

Lore – Spring Green	= 80 miles	= \$240 M
Spring Green – Cardinal	= 28 miles	= \$84 M
Total	= 108 miles	= \$324 M

*Cost estimate = \$3M/mile; mileage from PSS/E dev

These drawings are intended for informational purposes only and do not depict actual transmission line additions or potential routes and siting



Project Impacts - Economic Bain - Zion

ATC Bain - Zion Economic Project Savings¹

Cost Metric	Reference	Robust Economy	High Retirements	High Environmental	Slow Growth	20% Wind	Fuel & Investment Limitation
70 / 30 ² (\$2018)	(\$30,437,966)	(\$37,031,182)	(\$39,368,519)	(\$87,969,181)	(\$49,188,115)	(\$26,780,126)	(\$55,401,143)
70 / 30 ² (\$2024)	(\$31,719,961)	\$38,731,904	(\$35,314,128)	(\$121,843,373)	(\$50,686,046)	(\$14,831,027)	(\$15,596,475)
40-Year PV of Savings ³ (\$2009)	(\$218,668,310)	\$159,173,694	(\$251,412,050)	(\$797,880,000)	(\$350,215,252)	(\$120,477,836)	(\$166,282,609)

¹ Project Savings shown as a negative value (\$) indicate negative benefit (cost). Positive values indicated positive benefit (savings).

² 70 / 30 metric is calculated by adding 70% of the Adjusted Production Cost value to 30% of the Load * Load LMP value.

³ 40-Year PV value is calculated assuming 2018 as the first in-service year, a real discount rate of 5.5%, and an inflation rate of 3.0%

Project Impacts - Economic Lore - Cardinal

ATC Lore - Cardinal Economic Project Savings¹

Cost Metric	Reference	Robust Economy	High Retirements	High Environmental	Slow Growth	20% Wind	Fuel & Investment Limitation
70 / 30 ² (\$2018)	\$14,167,740	(\$45,869,092)	\$17,155,757	\$35,871,039	\$4,235,139	\$3,145,783	\$12,674,189
70 / 30 ² (\$2024)	\$11,567,905	(\$88,878,313)	\$5,580,549	(\$1,909,549)	\$4,789,579	\$153,721,185	\$15,649,767
40-Year PV of Savings ³ (\$2009)	\$84,203,677	(\$555,415,940)	\$55,620,963	\$41,631,210	\$32,496,532	\$849,904,796	\$104,479,765

¹ Project Savings shown as a negative value (\$) indicate negative benefit (cost). Positive values indicated positive benefit (savings).

² 70 / 30 metric is calculated by adding 70% of the Adjusted Production Cost value to 30% of the Load * Load LMP value.

³ 40-Year PV value is calculated assuming 2018 as the first in-service year, a real discount rate of 5.5%, and an inflation rate of 3.0%



Project Impacts - Economic North La Crosse - Cardinal

ATC North La Crosse - Cardinal Economic Project Savings¹

Cost Metric	Reference	Robust Economy	High Retirements	High Environmental	Slow Growth	20% Wind	Fuel & Investment Limitation
70 / 30 ² (\$2018)	\$16,092,851	\$42,025,406	\$27,157,685	\$41,043,120	\$1,680,871	\$16,235,800	\$10,516,048
70 / 30 ² (\$2024)	\$30,339,371	\$210,556,877	\$76,688,795	\$91,188,050	\$4,134,265	\$134,040,381	\$17,779,041
40-Year PV of Savings ³ (\$2009)	\$190,228,232	\$1,218,956,229	\$461,190,534	\$561,103,809	\$25,177,708	\$760,701,446	\$113,052,454

¹ Project Savings shown as a negative value (\$) indicate negative benefit (cost). Positive values indicated positive benefit (savings).

² 70 / 30 metric is calculated by adding 70% of the Adjusted Production Cost value to 30% of the Load * Load LMP value.

³ 40-Year PV value is calculated assuming 2018 as the first in-service year, a real discount rate of 5.5%, and an inflation rate of 3.0%

Project Impacts – Additional Metrics

2018 ATC Reference Future				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	83,820,299	83,820,299	83,820,299	83,820,299
Net Imports (MWh)	11,416,038	10,559,187	11,858,936	11,553,552
% Net Imports of Demand	13.62%	12.60%	14.15%	13.78%
Peak Imports (MW)	3,903	3,910	3,919	3,926
Demand Response (MWh)	1,142	1,028	1,514	1,241
Emergency (MWh)	1	2	7	4
Interruptibles & DLC (MWh)	294	282	824	14

2024 ATC Reference Future ¹				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	93,016,521	93,016,521	93,016,521	93,016,521
Net Imports (MWh)	8,381,305	7,635,094	8,624,763	8,590,749
% Net Imports of Demand	9.01%	8.21%	9.27%	9.24%
Peak Imports (MW)	4,222	4,213	4,345	4,001
Demand Response (MWh)	5,872	5,402	8,223	6,105
Emergency (MWh)	540	731	451	495
Interruptibles & DLC (MWh)	312	310	1,061	11

¹ Utilizes the MISO Reference Transmission Overlay



Project Impacts – Additional Metrics

2018 ATC Robust Economy Future				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	95,869,360	95,869,360	95,869,360	95,869,360
Net Imports (MWh)	24,357,443	24,221,455	25,181,732	25,051,386
% Net Imports of Demand	25.41%	25.27%	26.27%	26.13%
Peak Imports (MW)	5,122	5,962	5,318	5,312
Demand Response (MWh)	11,798	12,309	20,554	14,742
Emergency (MWh)	4,059	4,045	4,346	4,338
Interruptibles & DLC (MWh)	735	2,119	1,509	240

2024 ATC Robust Economy Future ¹				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	114,473,420	114,473,420	114,473,420	114,473,420
Net Imports (MWh)	30,162,822	30,335,782	30,651,114	31,217,129
% Net Imports of Demand	26.35%	26.50%	26.78%	27.27%
Peak Imports (MW)	6,066	6,451	6,328	6,367
Demand Response (MWh)	97,597	95,847	133,978	102,991
Emergency (MWh)	30,165	30,211	35,547	29,959
Interruptibles & DLC (MWh)	11,483	12,053	12,576	7,512

¹ Utilizes the MISO Reference Transmission Overlay

Project Impacts – Additional Metrics

2018 ATC High Retirements Future				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	81,582,360	81,582,360	81,582,360	81,582,360
Net Imports (MWh)	18,382,394	17,226,479	19,406,054	19,361,673
% Net Imports of Demand	22.53%	21.12%	23.79%	23.73%
Peak Imports (MW)	4,512	4,509	4,517	4,626
Demand Response (MWh)	586	657	880	585
Emergency (MWh)	18	18	18	17
Interruptibles & DLC (MWh)	20	22	21	22

2024 ATC High Retirements Future ¹				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	89,206,382	89,206,382	89,206,382	89,206,382
Net Imports (MWh)	12,838,014	12,126,520	12,973,644	14,730,915
% Net Imports of Demand	14.39%	13.59%	14.54%	16.51%
Peak Imports (MW)	4,294	4,294	4,330	4,431
Demand Response (MWh)	3,005	2,996	3,990	3,076
Emergency (MWh)	283	282	216	278
Interruptibles & DLC (MWh)	2	3	19	5

¹ Utilizes the MISO Reference Transmission Overlay

Project Impacts – Additional Metrics

2018 ATC High Environmental Future				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	77,421,414	77,421,414	77,421,414	77,421,414
Net Imports (MWh)	14,365,593	12,896,132	15,068,849	14,991,612
% Net Imports of Demand	18.56%	16.66%	19.46%	19.36%
Peak Imports (MW)	4,319	4,314	4,572	4,484
Demand Response (MWh)	386	521	440	386
Emergency (MWh)	87	82	88	87
Interruptibles & DLC (MWh)	9	11	11	11

2024 ATC High Environmental Future ¹				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	81,212,426	81,212,426	81,212,426	81,212,426
Net Imports (MWh)	4,909,497	2,929,425	4,907,113	6,659,277
% Net Imports of Demand	6.05%	3.61%	6.04%	8.20%
Peak Imports (MW)	3,165	3,165	3,137	3,685
Demand Response (MWh)	2,181	2,394	2,995	2,732
Emergency (MWh)	198	254	206	257
Interruptibles & DLC (MWh)	1	0	3	3

¹ Utilizes the MISO Reference Transmission Overlay



Project Impacts – Additional Metrics

2018 ATC Slow Growth Future				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	73,164,417	73,164,417	73,164,417	73,164,417
Net Imports (MWh)	958,242	-2,541,151	1,259,052	1,151,100
% Net Imports of Demand	1.31%	-3.47%	1.72%	1.57%
Peak Imports (MW)	2,826	2,825	2,802	2,825
Demand Response (MWh)	162	220	161	164
Emergency (MWh)	0	0	0	0
Interruptibles & DLC (MWh)	25	27	28	23

2024 ATC Slow Growth Future ¹				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	75,387,274	75,387,274	75,387,274	75,387,274
Net Imports (MWh)	-1,549,632	-4,893,443	-1,241,752	-1,310,542
% Net Imports of Demand	-2.06%	-6.49%	-1.65%	-1.74%
Peak Imports (MW)	2,611	2,611	2,555	2,611
Demand Response (MWh)	221	281	240	232
Emergency (MWh)	0	0	0	0
Interruptibles & DLC (MWh)	0	0	1	0

¹ Utilizes the MISO Reference Transmission Overlay

Project Impacts – Additional Metrics

2018 ATC 20% Wind Future ²				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	86,114,450	86,114,450	86,114,450	86,114,450
Net Imports (MWh)	18,941,086	18,581,860	19,453,055	19,186,277
% Net Imports of Demand	22.00%	21.58%	22.59%	22.28%
Peak Imports (MW)	6,216	6,387	6,340	6,231
Demand Response (MWh)	1,988	2,017	2,458	1,931
Emergency (MWh)	392	381	417	401
Interruptibles & DLC (MWh)	26	26	62	17

2024 ATC 20% Wind Future ²				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	96,979,468	96,979,468	96,979,468	96,979,468
Net Imports (MWh)	25,220,985	24,391,056	27,051,383	26,352,088
% Net Imports of Demand	26.01%	25.15%	27.89%	27.17%
Peak Imports (MW)	5,834	6,109	6,138	6,258
Demand Response (MWh)	11,992	10,975	17,226	11,146
Emergency (MWh)	16,623	17,108	16,877	17,116
Interruptibles & DLC (MWh)	253	307	679	200

² Utilizes the MISO Wind Transmission Overlay



Project Impacts – Additional Metrics

2018 ATC Fuel & Investment Limitation Future				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	79,832,312	79,832,312	79,832,312	79,832,312
Net Imports (MWh)	6,647,571	5,358,454	6,994,482	6,785,157
% Net Imports of Demand	8.33%	6.71%	8.76%	8.50%
Peak Imports (MW)	3,095	3,107	3,107	3,074
Demand Response (MWh)	446	442	550	460
Emergency (MWh)	99	91	104	103
Interruptibles & DLC (MWh)	36	31	313	19

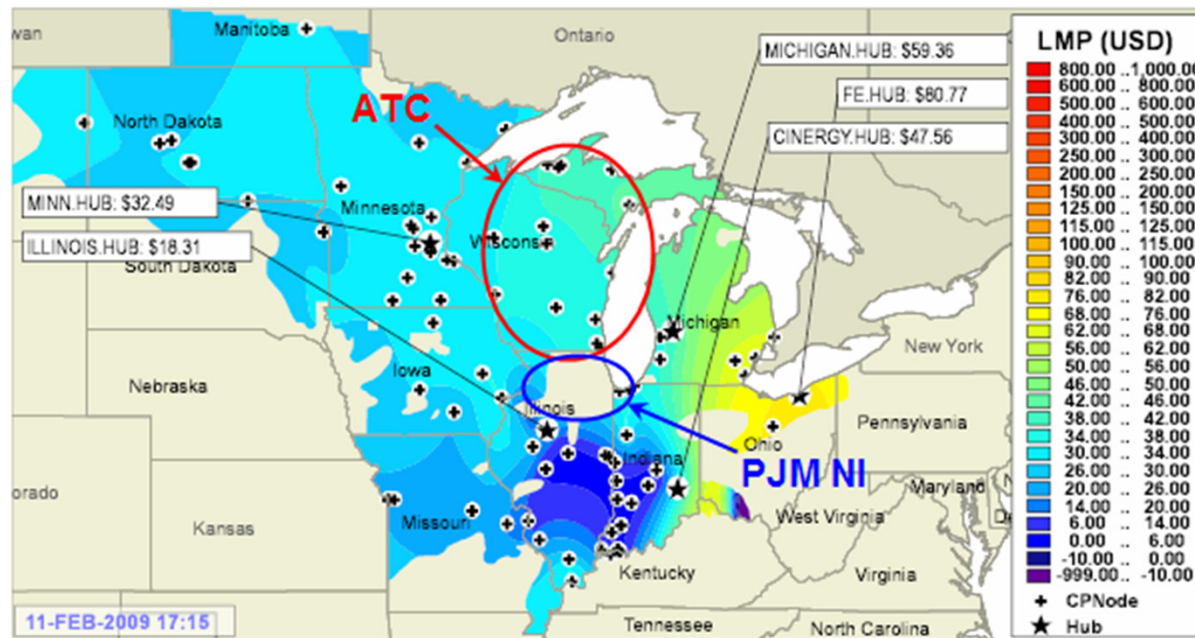
2024 ATC Fuel & Investment Limitation Future ¹				
PROMOD Run Data	Base	Bain - Zion	Lore - Cardinal	North La Crosse - Cardinal
ATC Demand (MWh)	86,264,429	86,264,429	86,264,429	86,264,429
Net Imports (MWh)	4,614,795	4,042,980	4,988,987	4,791,788
% Net Imports of Demand	5.35%	4.69%	5.78%	5.55%
Peak Imports (MW)	4,220	4,220	4,220	4,220
Demand Response (MWh)	2,666	1,884	3,807	2,668
Emergency (MWh)	181	179	194	203
Interruptibles & DLC (MWh)	124	132	398	2

¹ Utilizes the MISO Reference Transmission Overlay

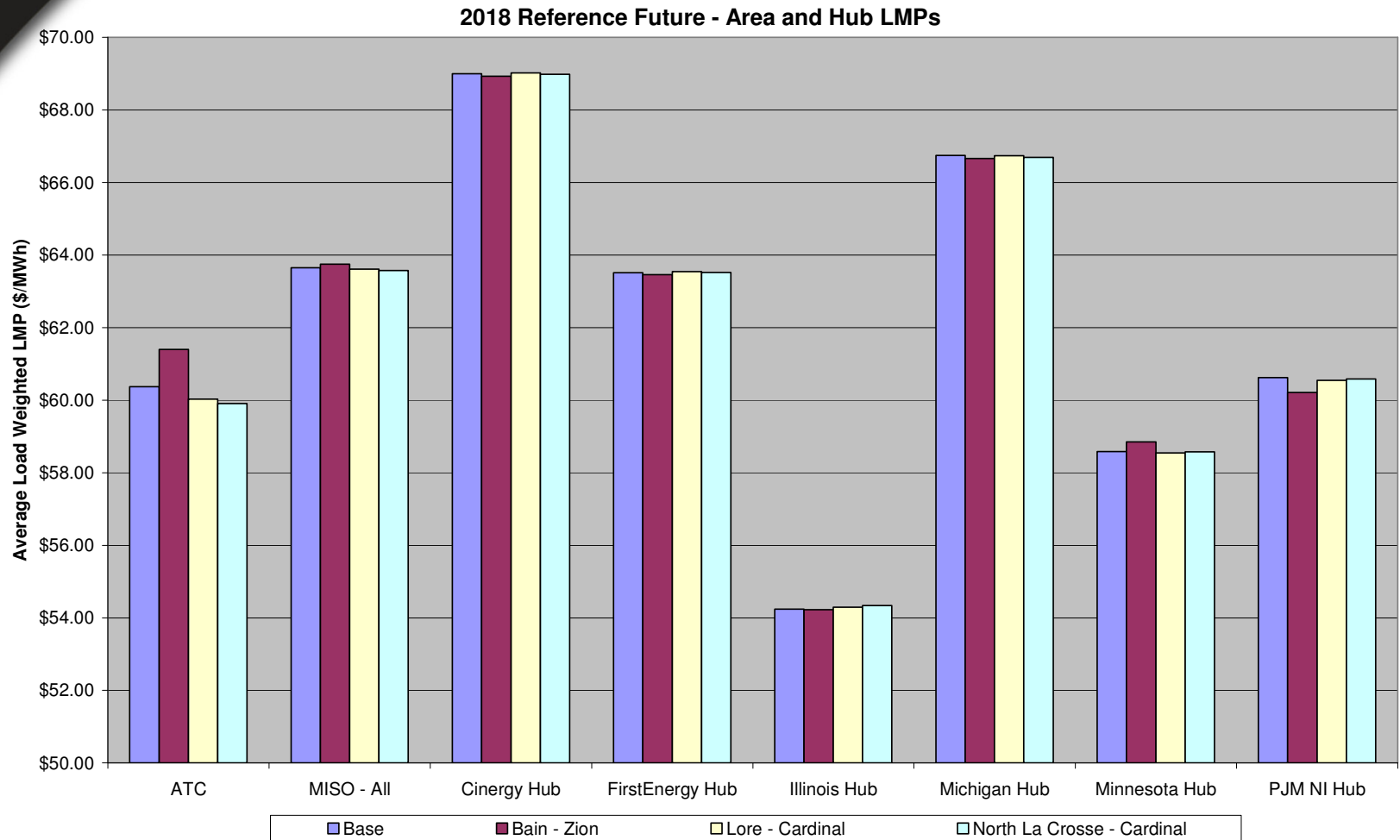


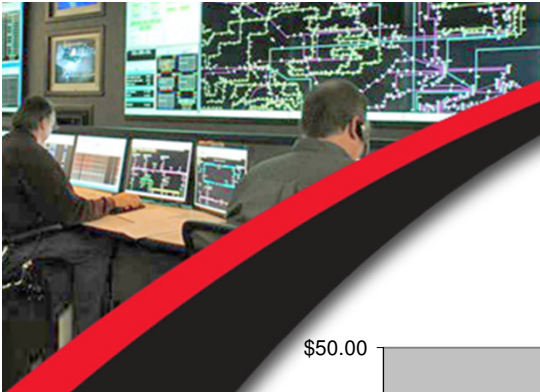


MISO LMP Contour Map



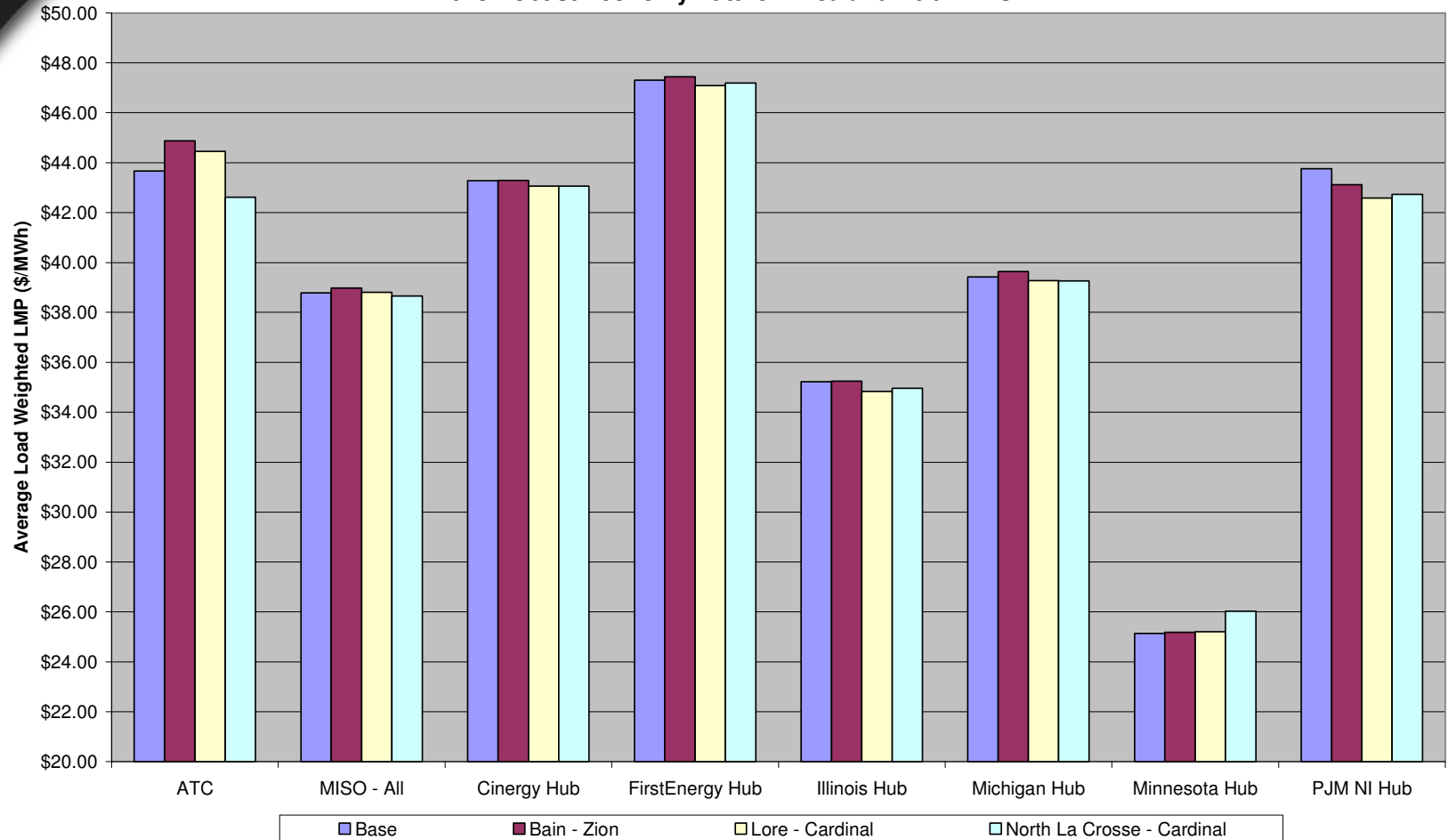
MISO Area & Hub LMPs





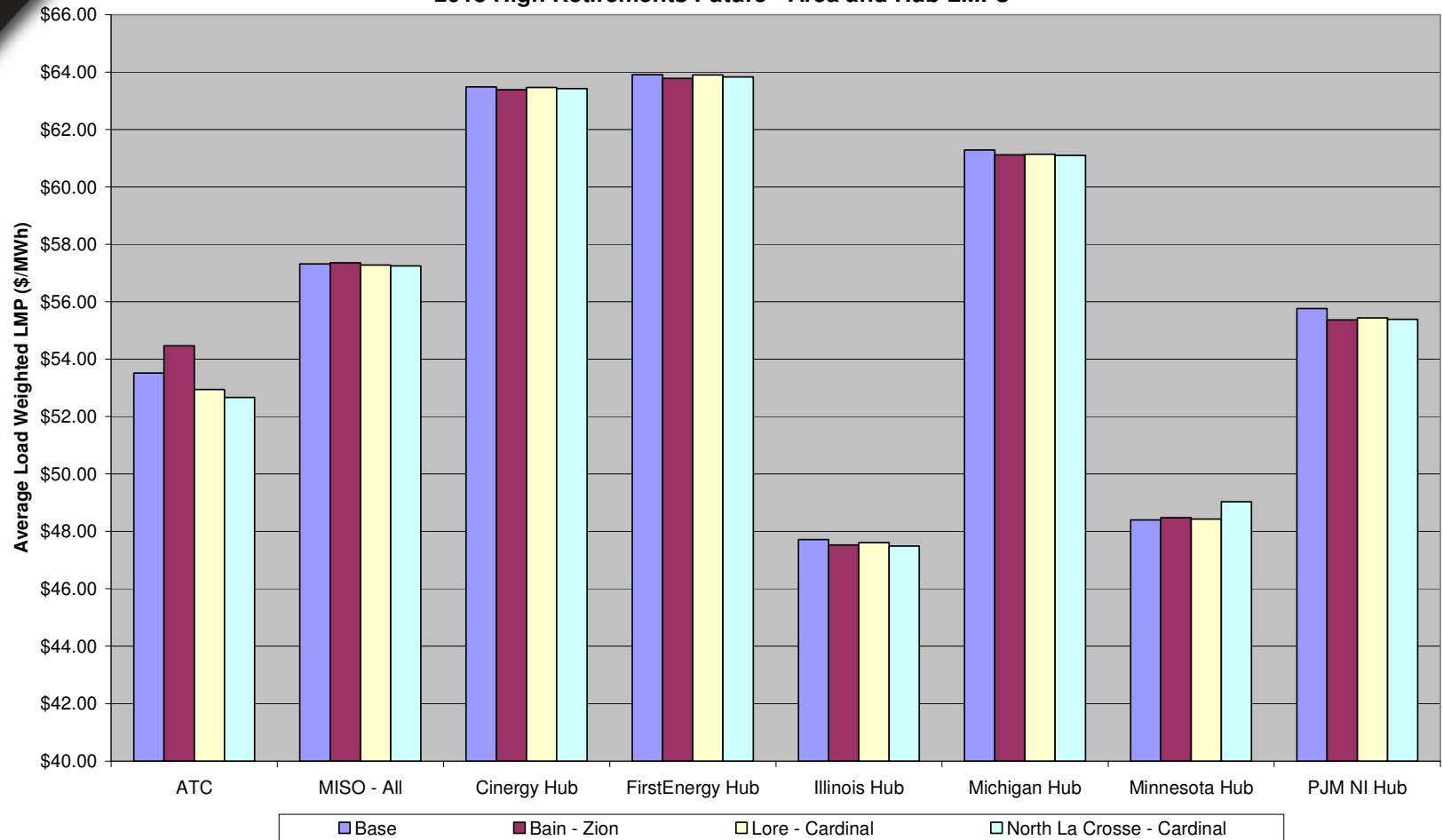
MISO Area & Hub LMPs

2018 Robust Economy Future - Area and Hub LMPs



MISO Area & Hub LMPs

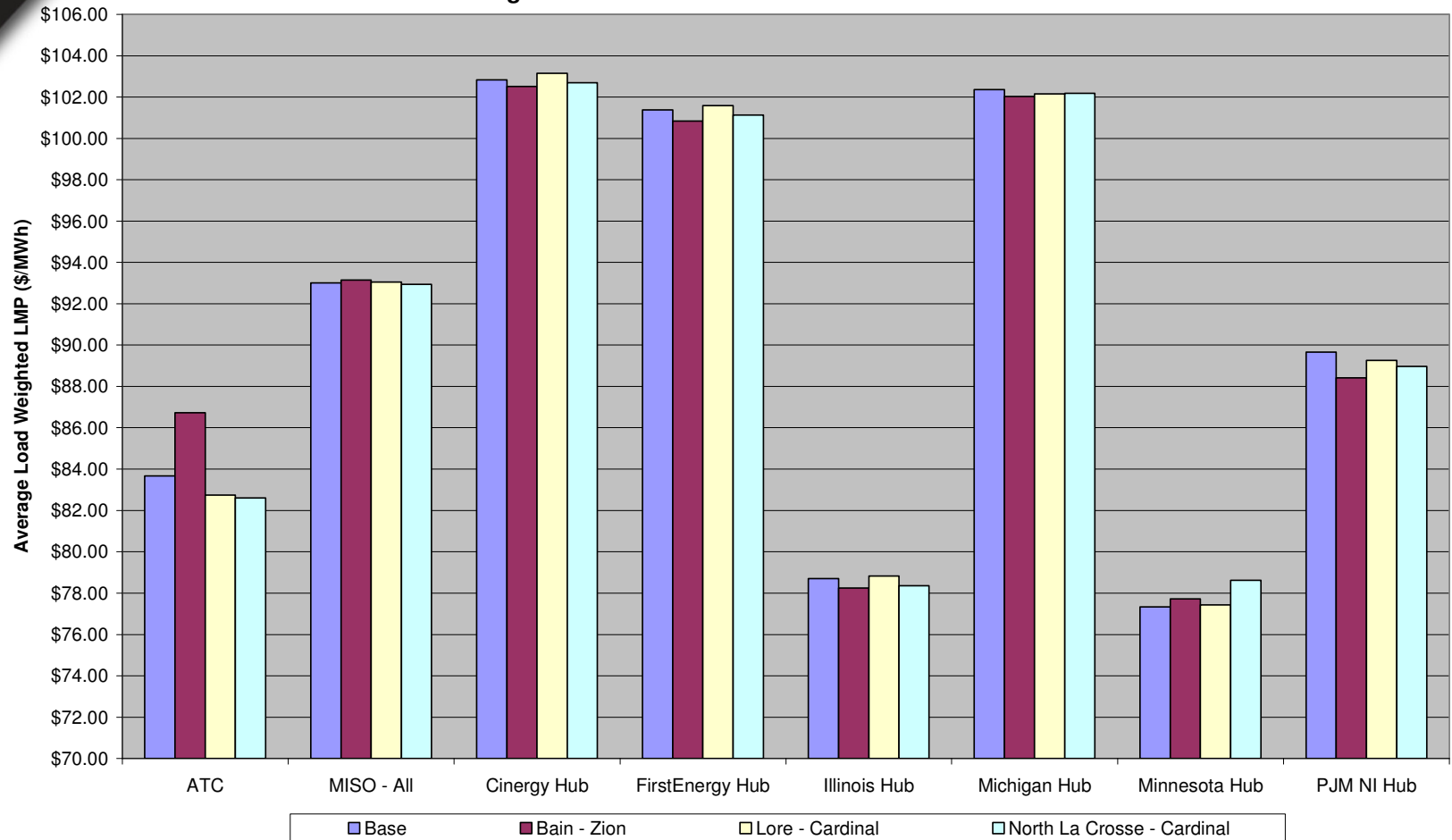
2018 High Retirements Future - Area and Hub LMPs





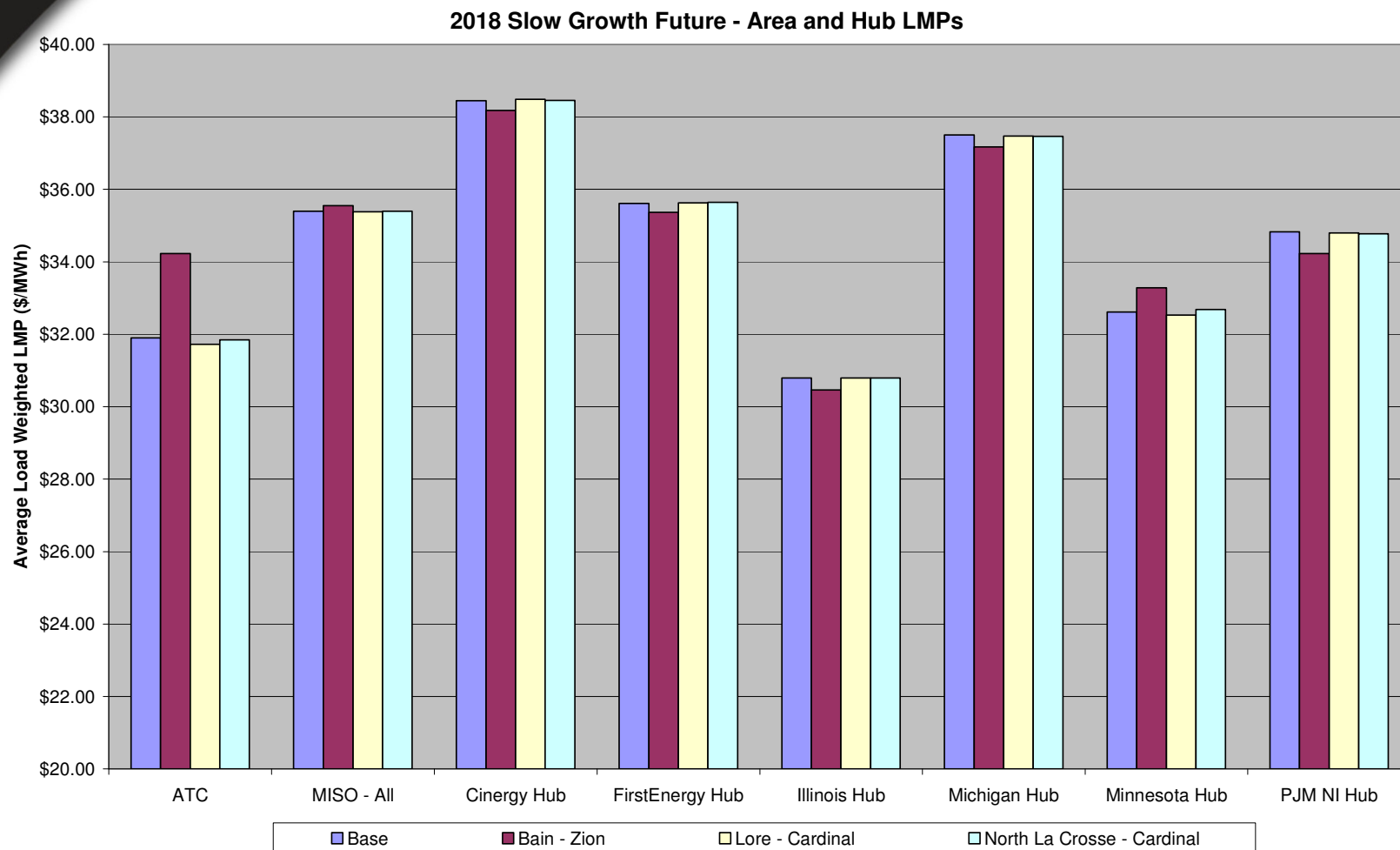
MISO Area & Hub LMPs

2018 High Environmental Future - Area and Hub LMPs

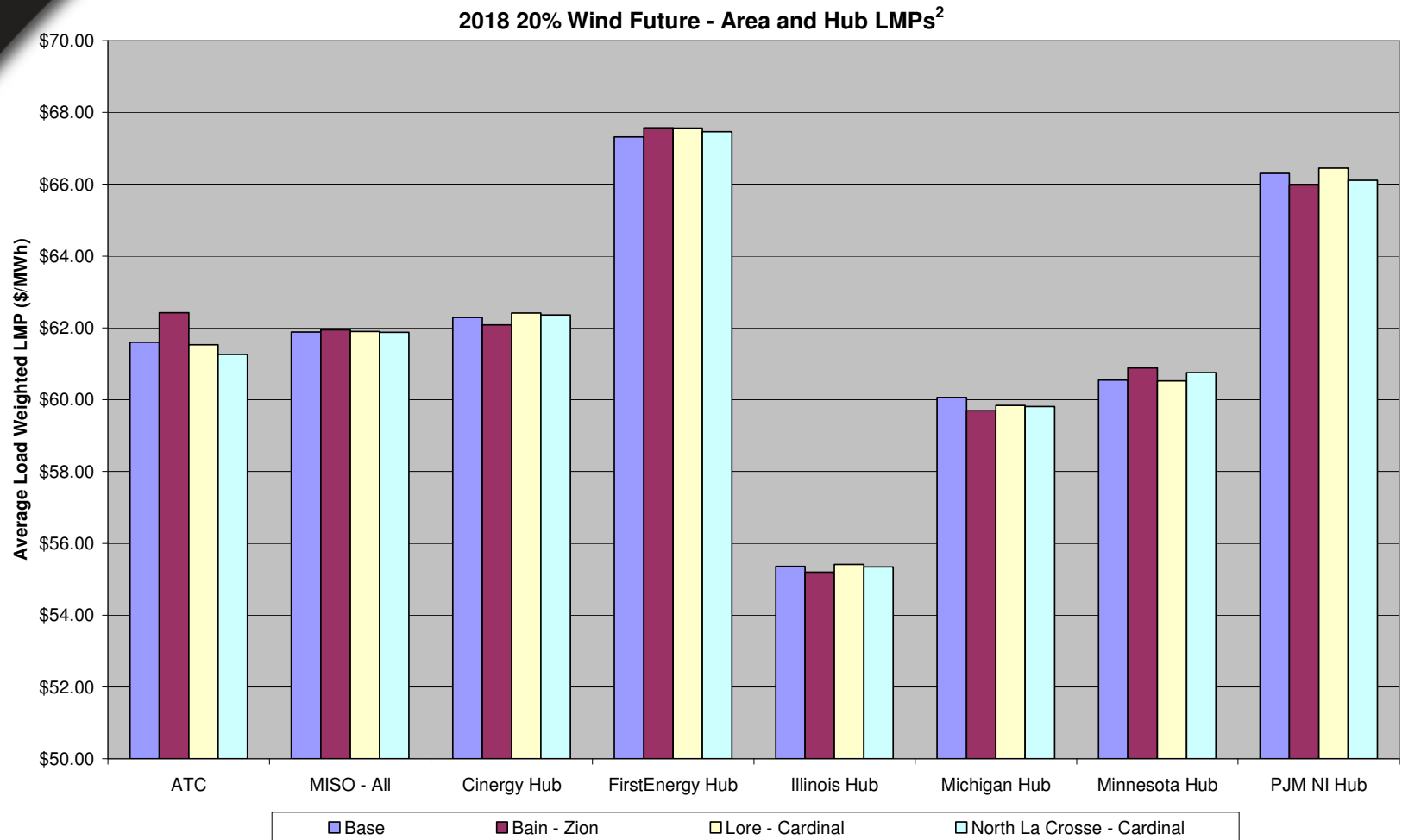




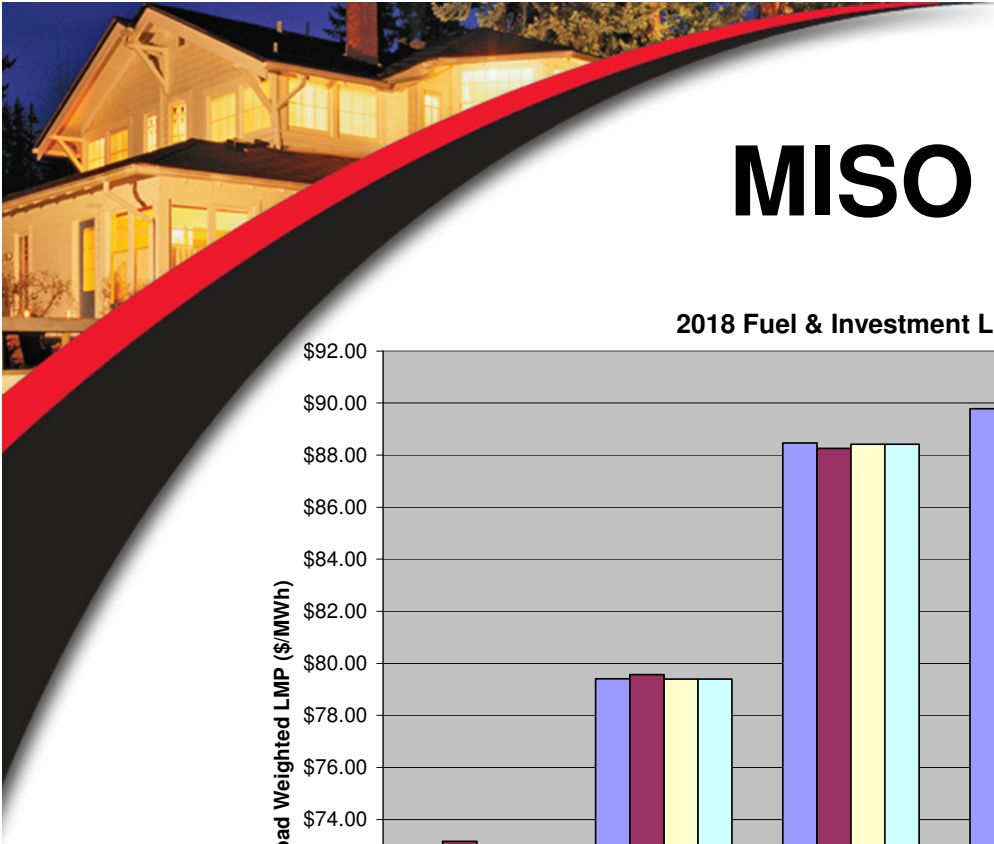
MISO Area & Hub LMPs



MISO Area & Hub LMPs

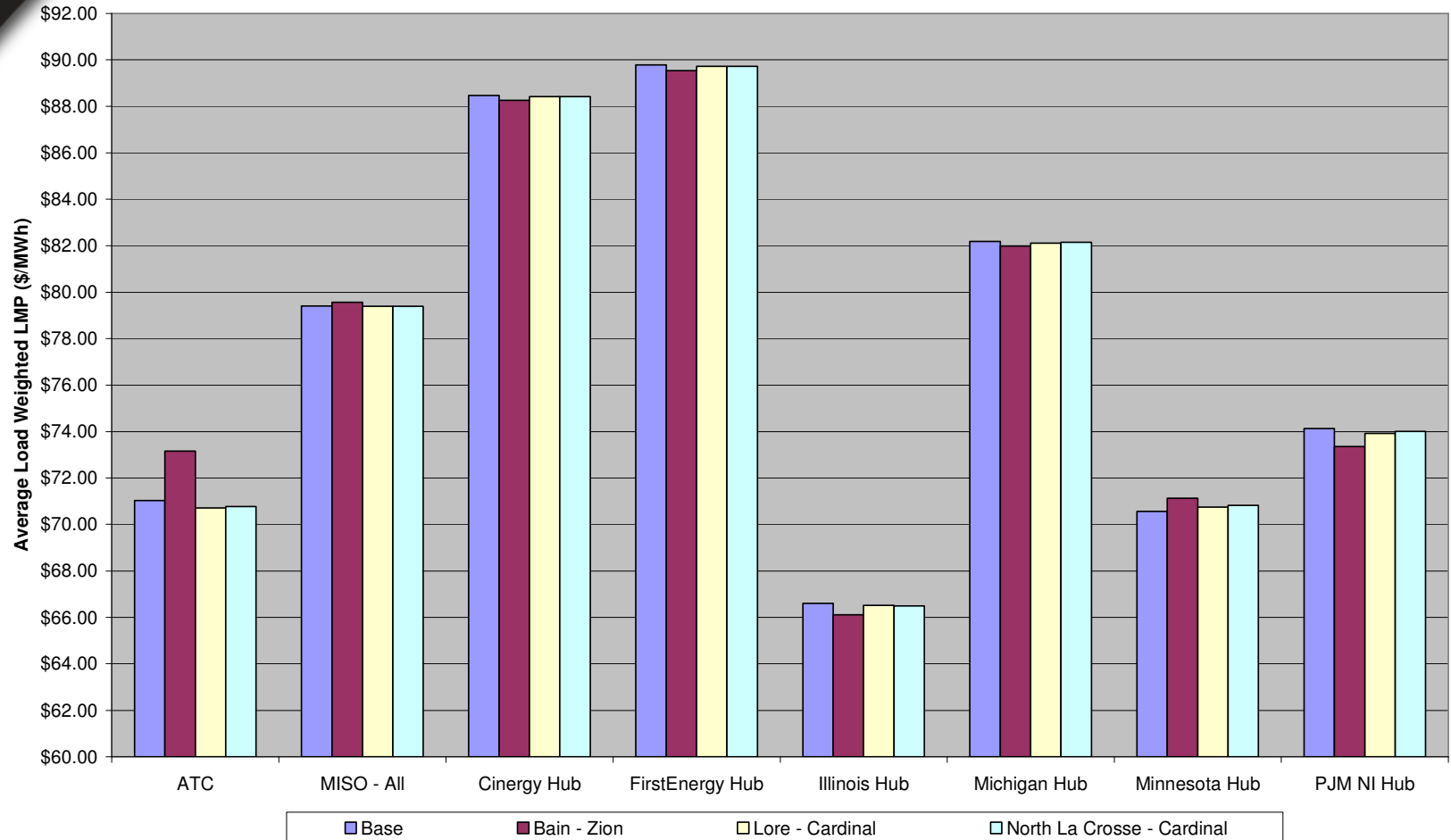


² Utilizes the MISO Wind Transmission Overlay

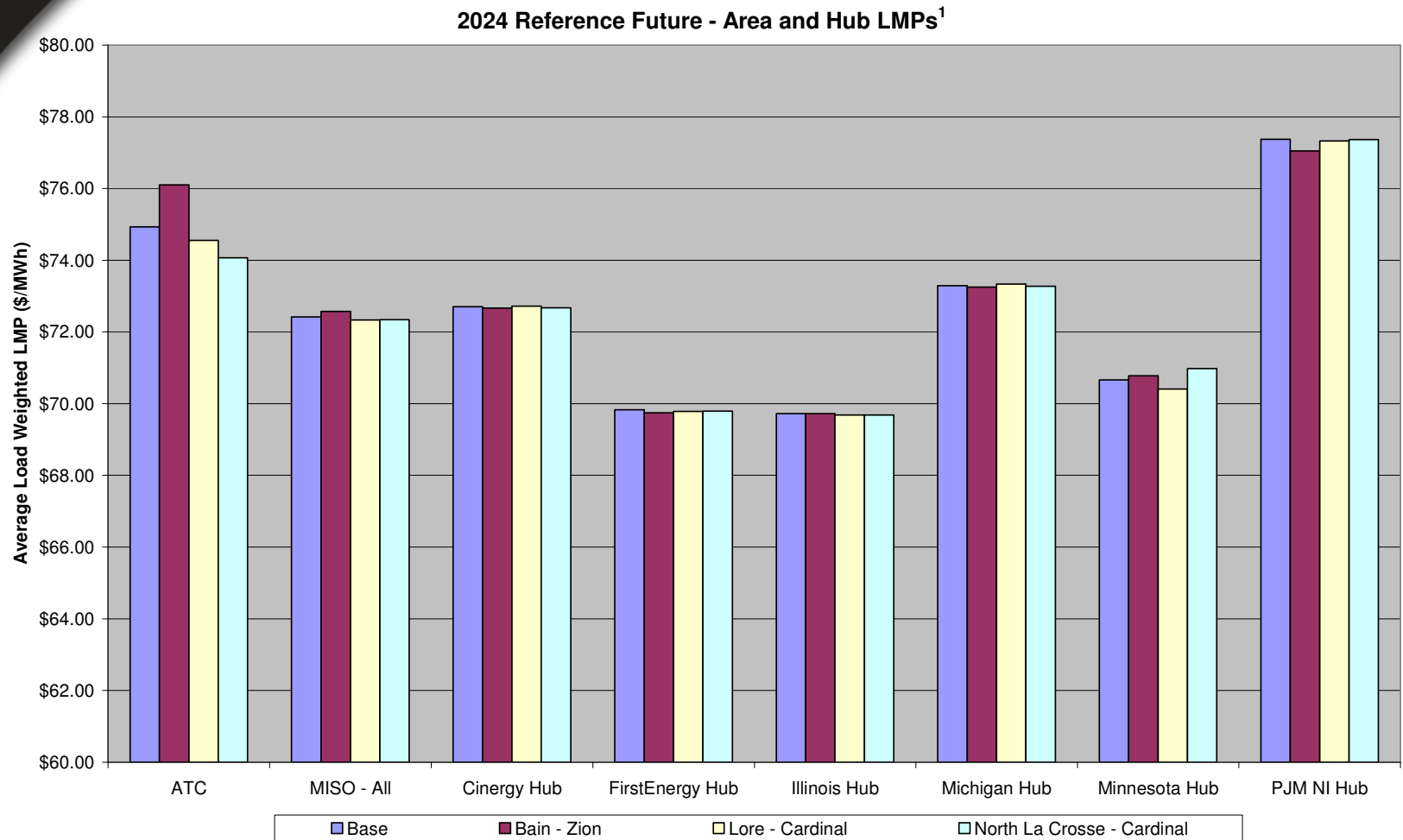


MISO Area & Hub LMPs

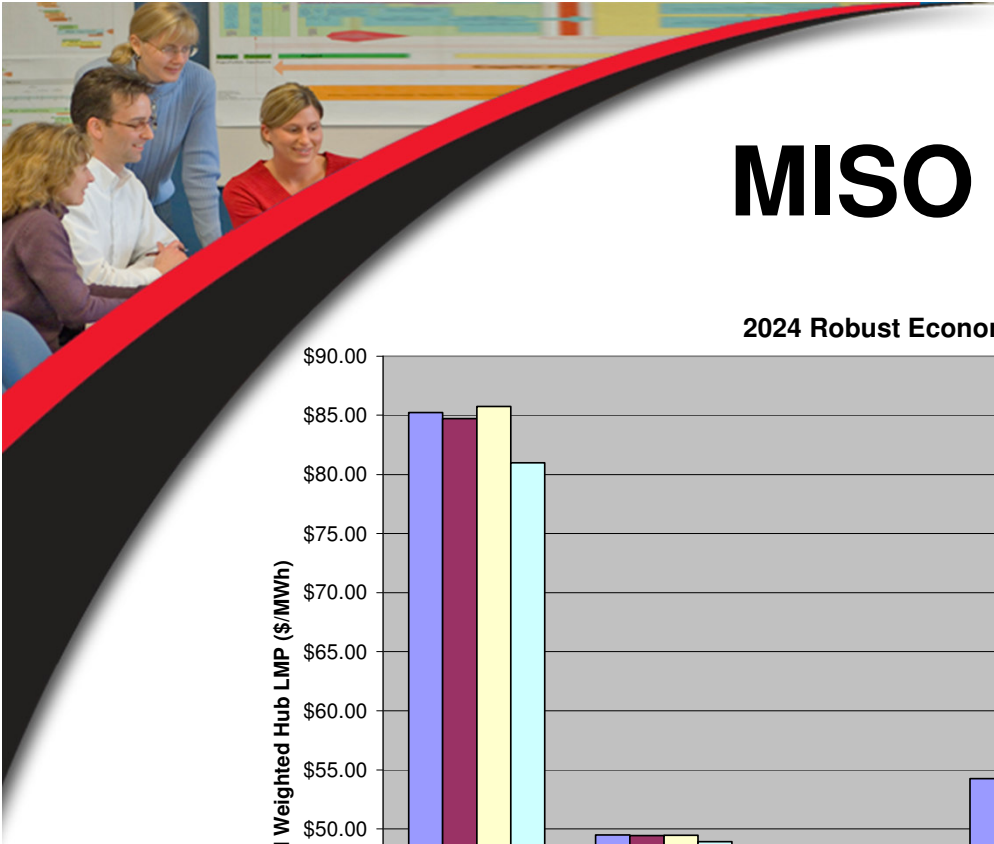
2018 Fuel & Investment Limitation Future - Area and Hub LMPs



MISO Area & Hub LMPs

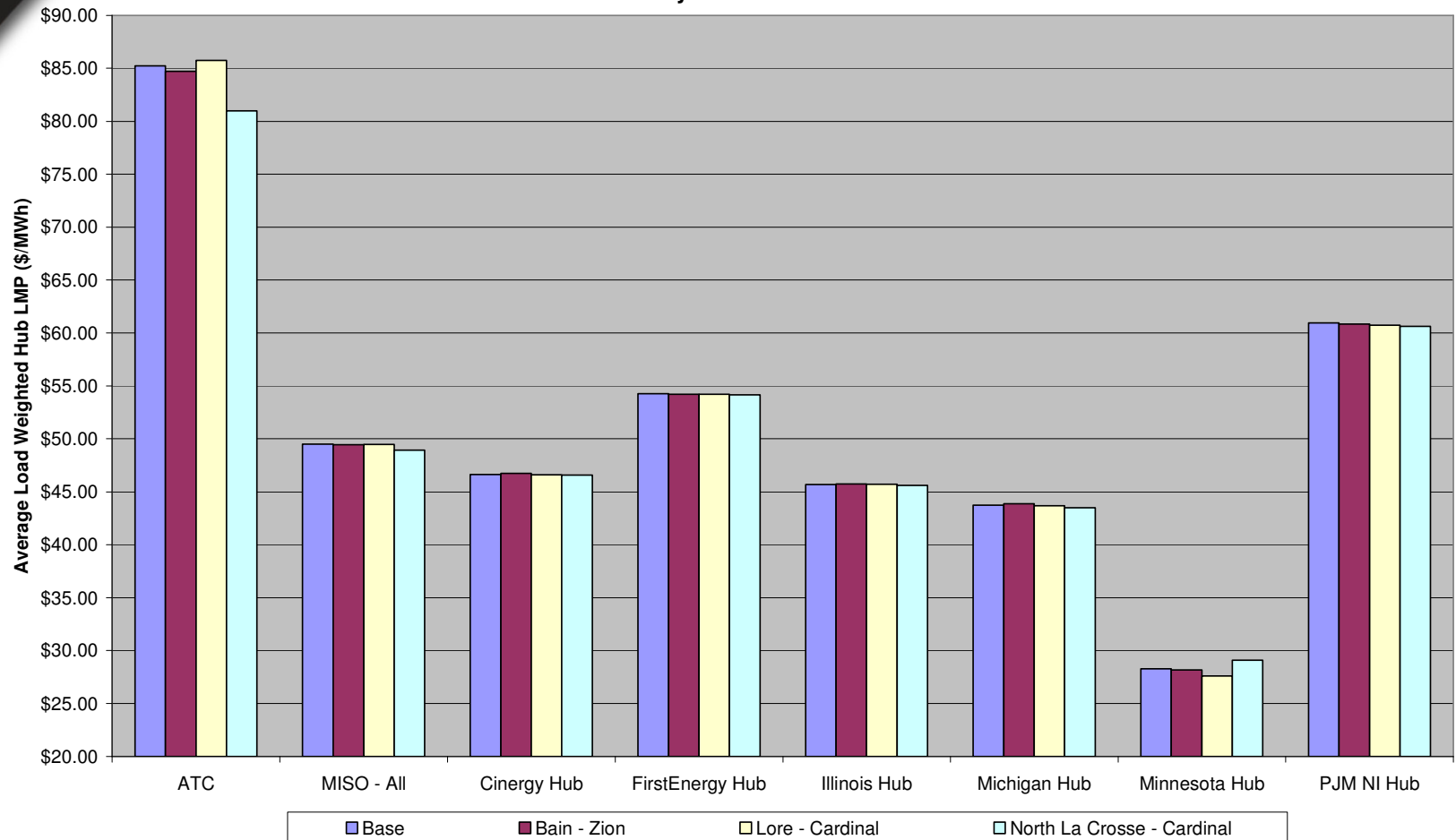


¹ Utilizes the MISO Reference Transmission Overlay

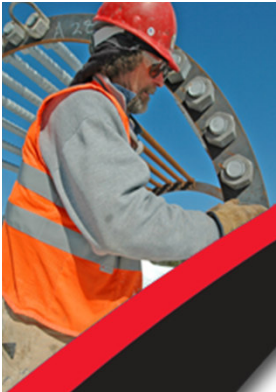


MISO Area & Hub LMPs

2024 Robust Economy Future - Area and Hub LMPs¹

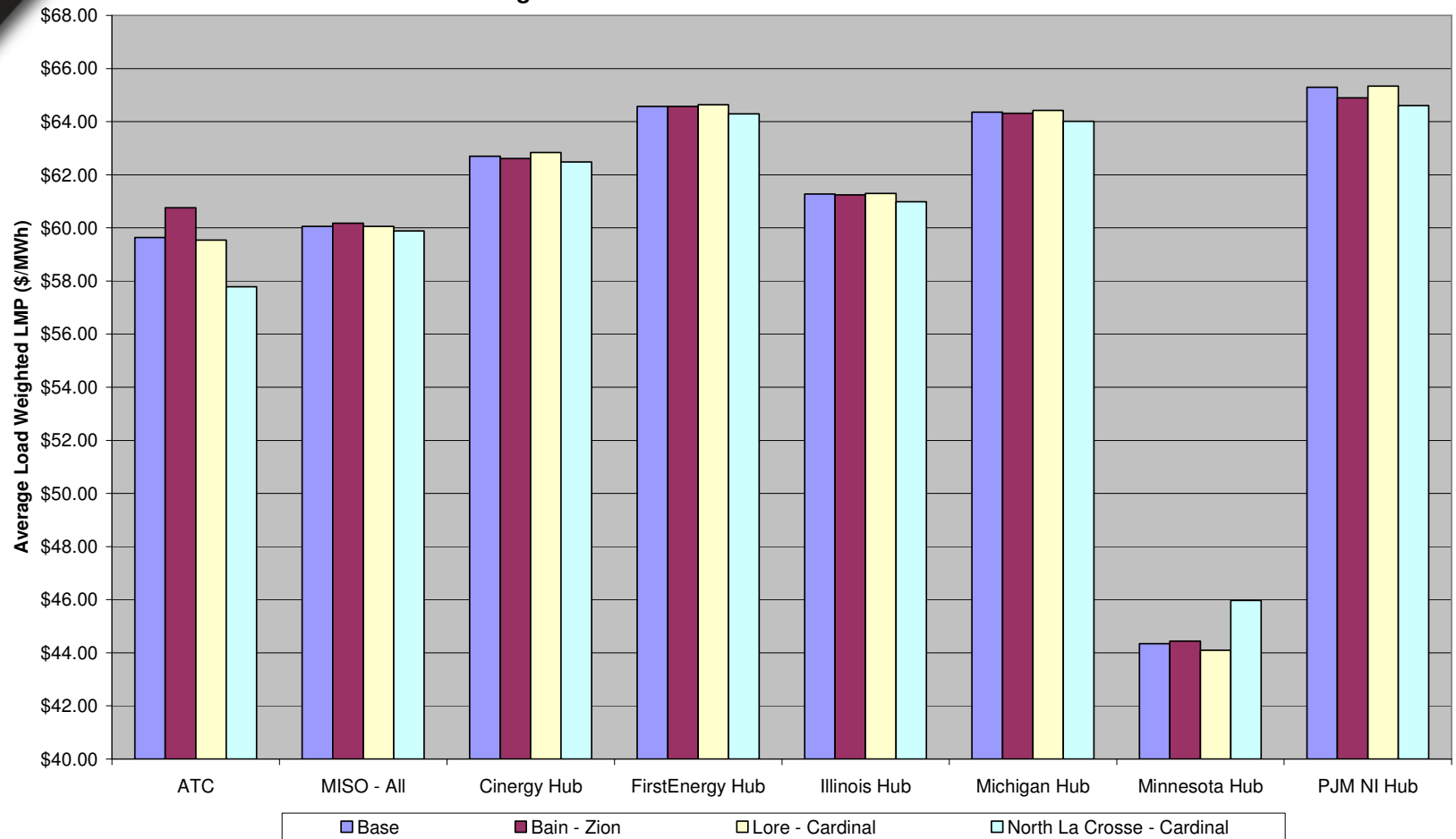


¹ Utilizes the MISO Reference Transmission Overlay



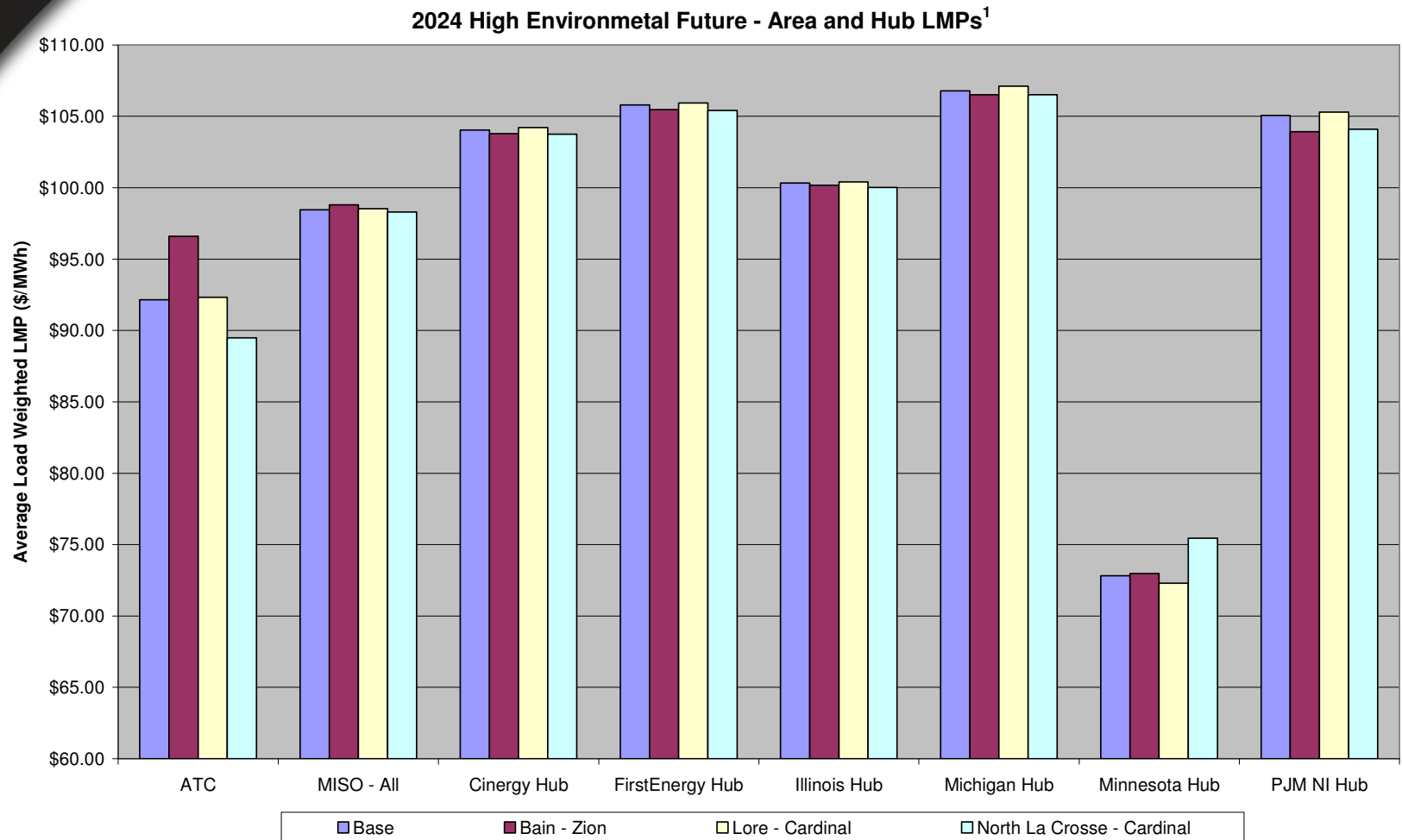
MISO Area & Hub LMPs

2024 High Retirements Future - Area and Hub LMPs¹

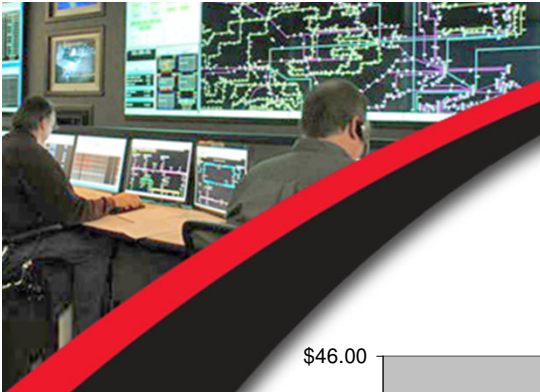


¹ Utilizes the MISO Reference Transmission Overlay

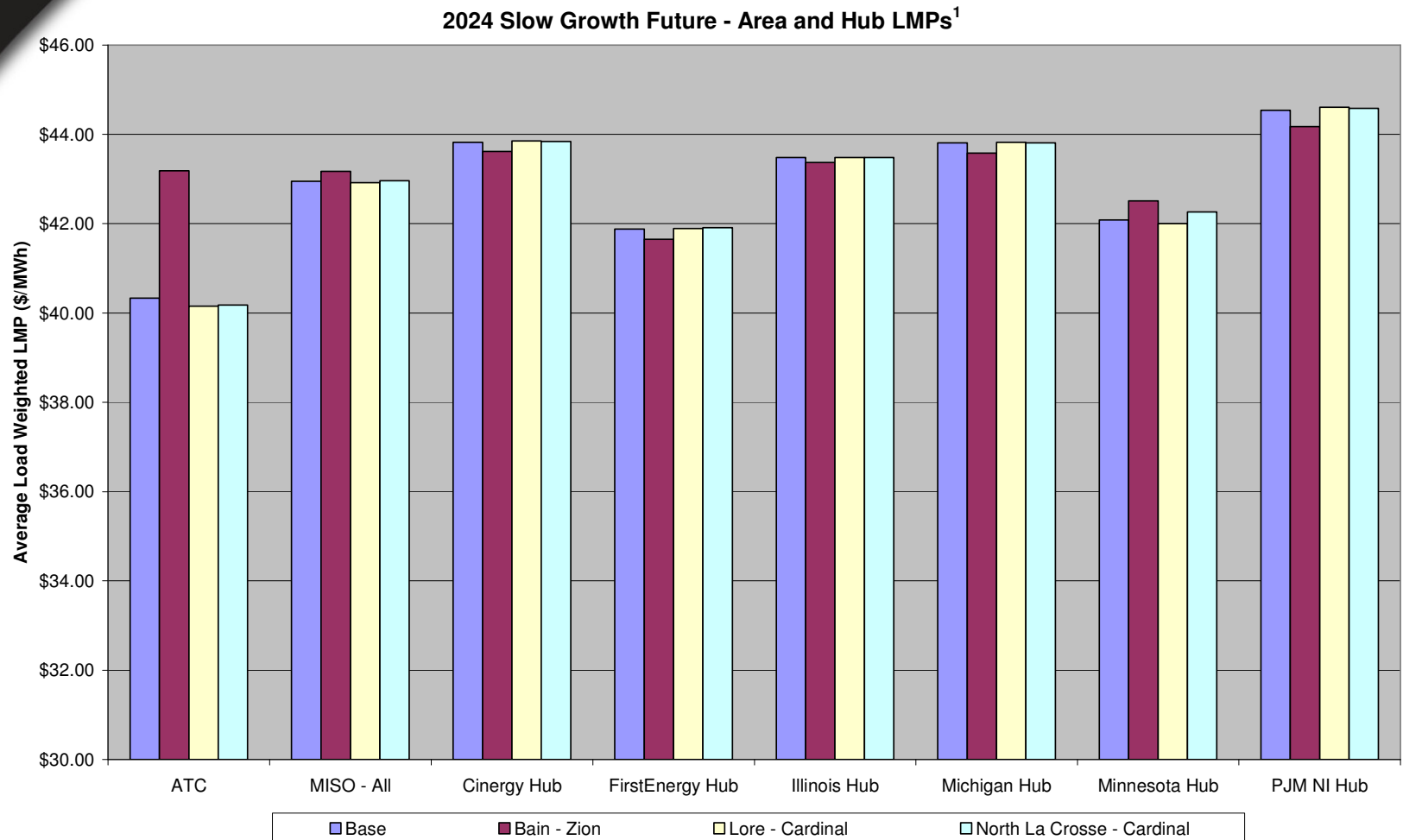
MISO Area & Hub LMPs



¹ Utilizes the MISO Reference Transmission Overlay



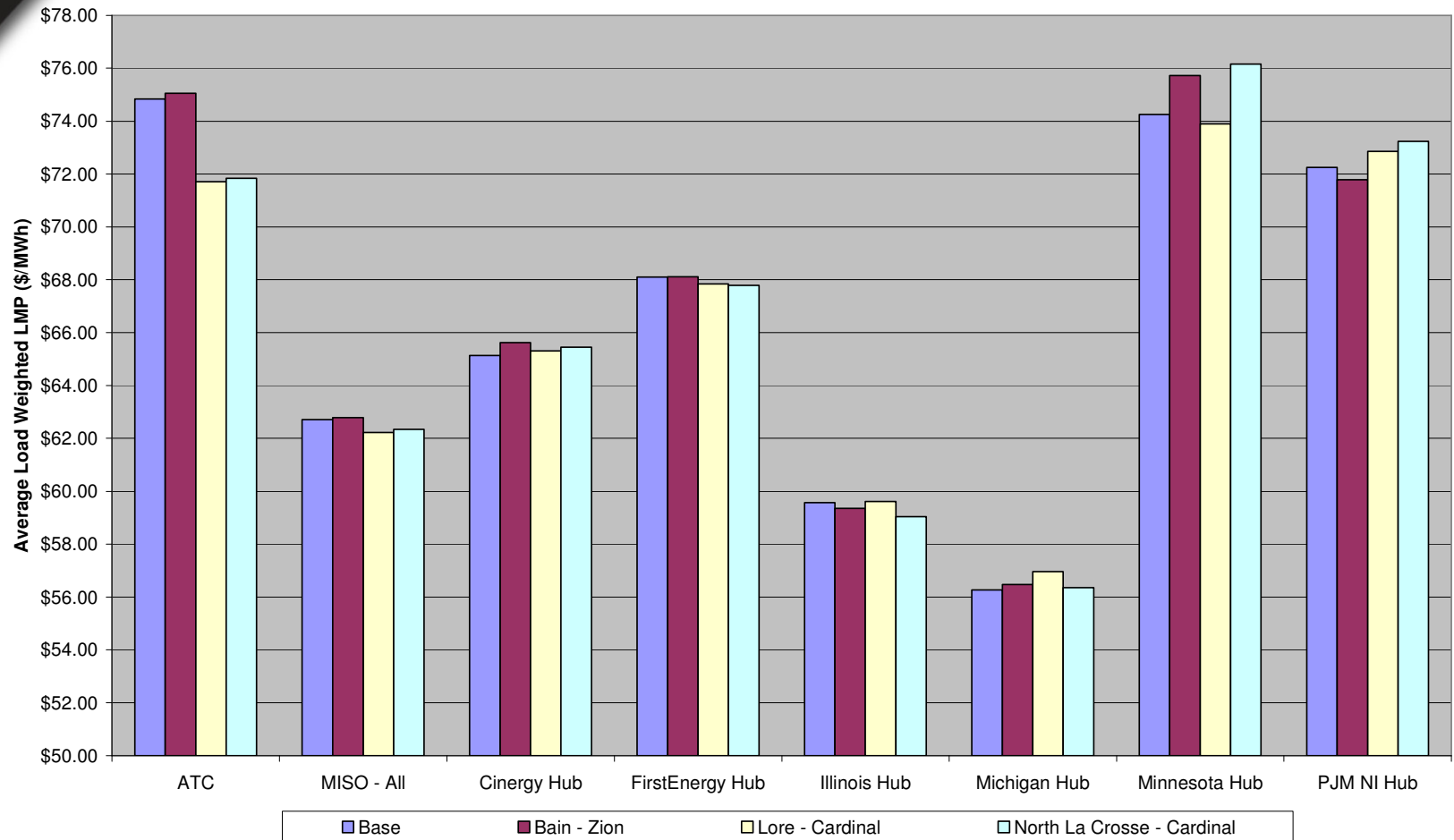
MISO Area & Hub LMPs



¹ Utilizes the MISO Reference Transmission Overlay

MISO Area & Hub LMPs

2024 20% Wind Future - Area and Hub LMPs²

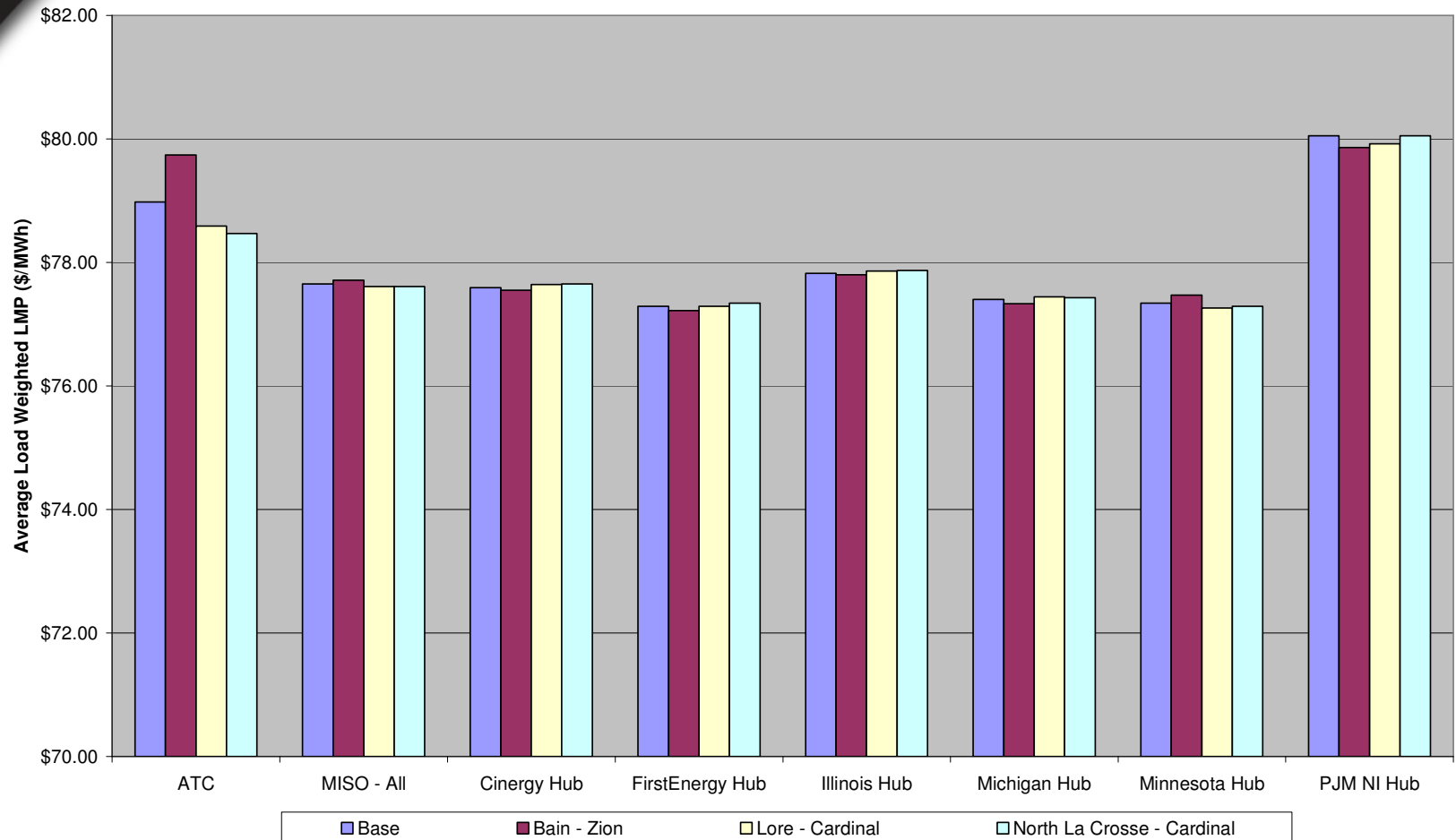


² Utilizes the MISO Wind Transmission Overlay



MISO Area & Hub LMPs

2024 Fuel and Investment Limitation Future - Area and Hub LMPs¹



¹ Utilizes the MISO Reference Transmission Overlay

Questions?

ATC Economic Planning

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