

Rail Transportation Pricing Impact on Coal-fired Generation Dispatch – Is There Value to Be Shared?

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by

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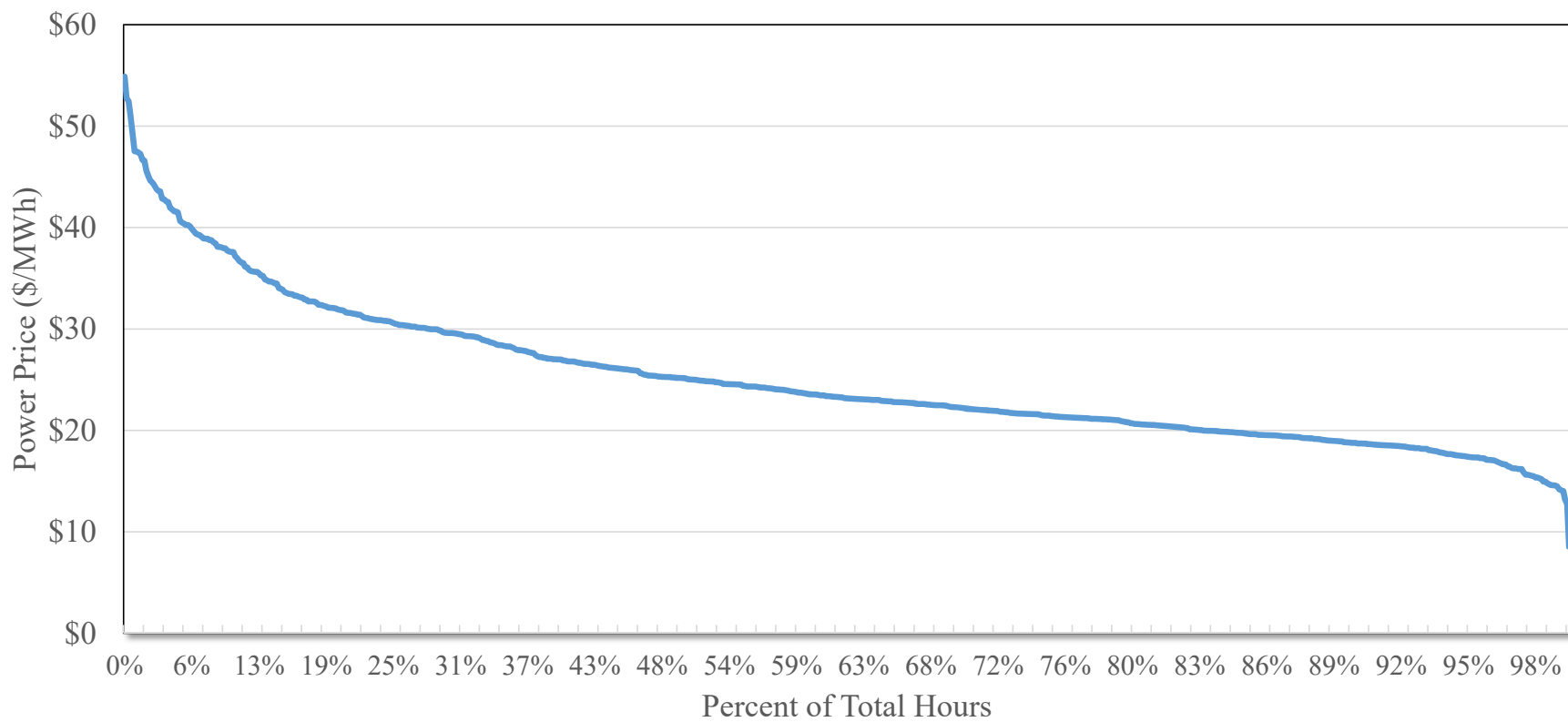
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Rail Transportation Pricing Impact on Coal-fired Generation Dispatch – Is There Value to Be Shared?

- **Use Price Duration Curves to estimate a power plant's coal consumption and power production at various dispatch costs;**
- **Identify value to generators and railroads assuming base case dispatch costs and dispatch costs that reflect a discounted rail rate; and**
- **Develop estimates of generator and railroad value with rail rate discounts and under low and high power price scenarios.**

Price Duration Curve



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Inputs and Assumptions

Power Prices = 2016 Daily On-peak and Off-peak Prices for MISO's Illinois Hub (reflected on previous slide)

Coal Prices = Assumed to be \$12/ton for PRB 8,800 Btu/lb coal

Rail Rates = Assumed to be \$25/ton

Plant Capability = 500 MW

Plant Heat Rate = 10,800 Btu/kWh

Plant Variable O&M = \$2.00/MWh

Based on inputs and assumptions, the plant's dispatch cost is \$24.70/MWh

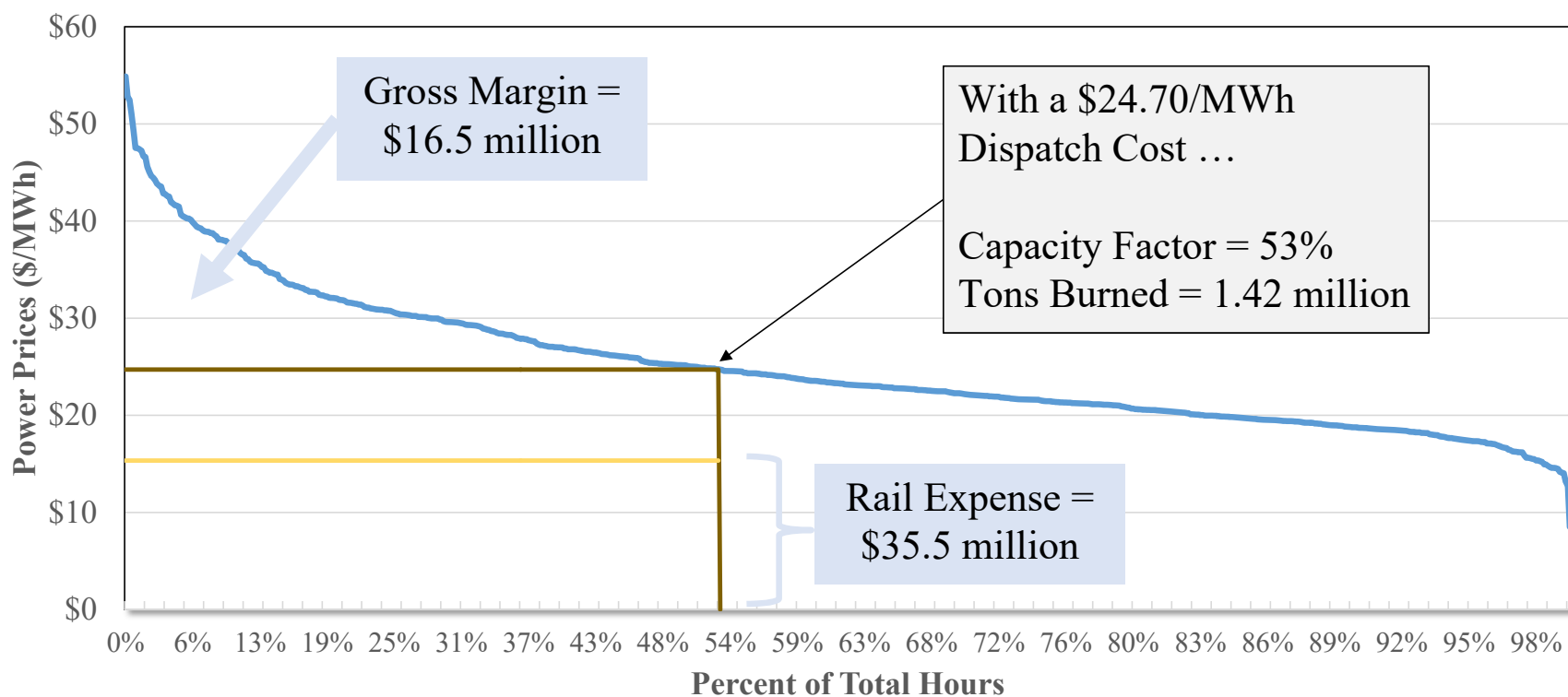
Coal Commodity = \$12/ton, \$0.682/MMBtu ($12 \div (8,800 * .002)$) and **\$7.36/MWh** ($6.82 \div 10,800 \div 1,000$)

Rail Rates = \$25/ton, \$1.42/MMBtu ($25 \div (8,800 * .002)$) and **\$15.34/MWh** ($1.42 \div 10,800 \div 1,000$)

Dispatch Cost = **\$7.36/MWh** for Coal + **\$15.34/MWh** for Rail + **\$2.00/MWh** for Variable O&M

2016 Price Duration Curve with Base Case Dispatch Cost

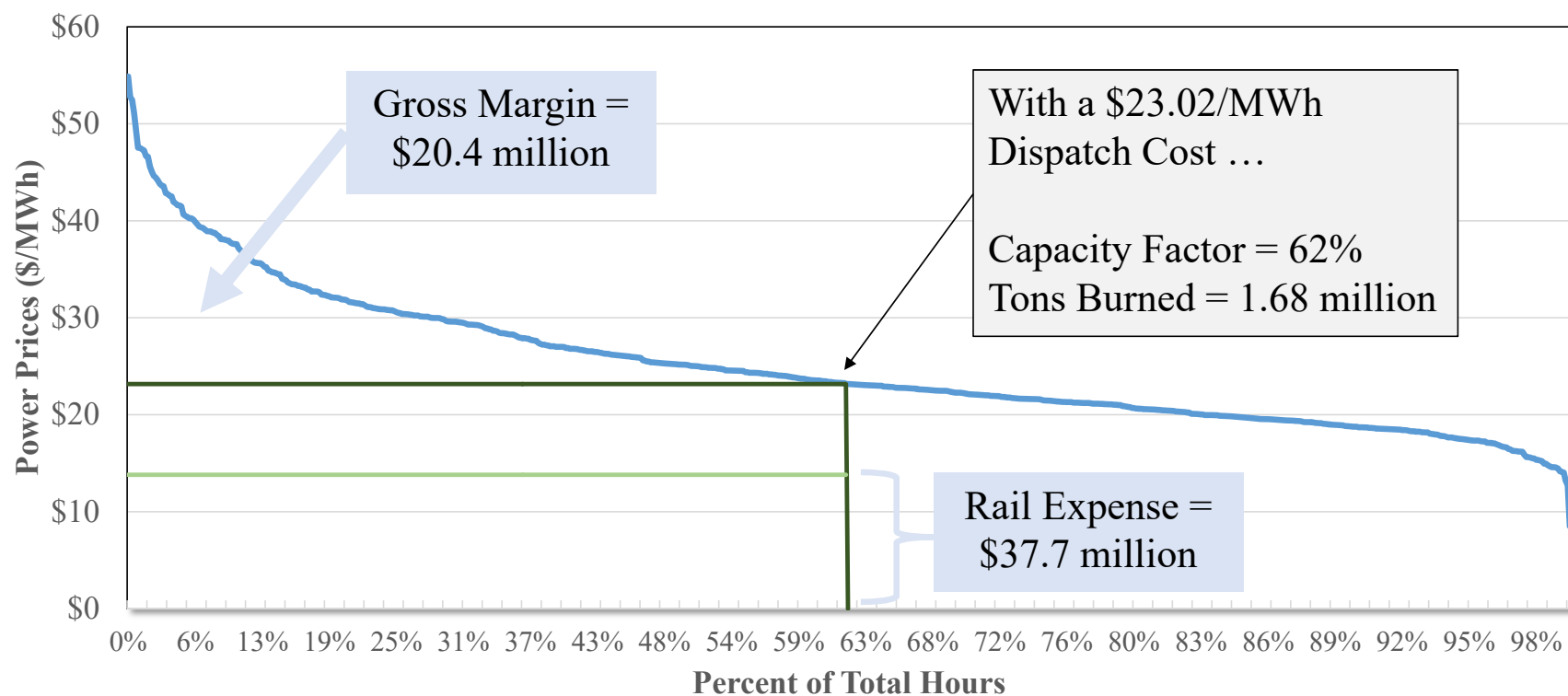
2016 Price Duration Curve - Base Case Dispatch Costs



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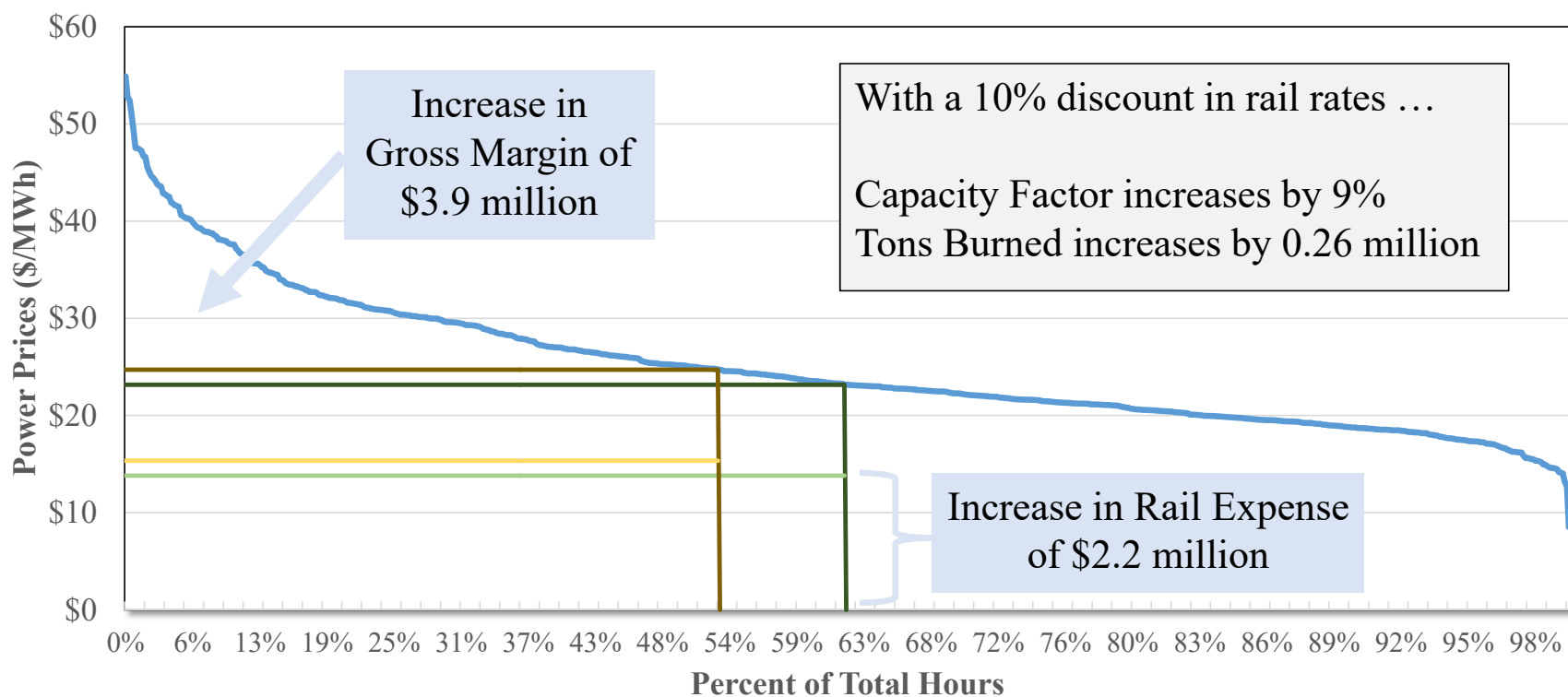
2016 Price Duration Curve with 10% Rail Rate Discount

2016 Price Duration Curve - Discounted Rail Case



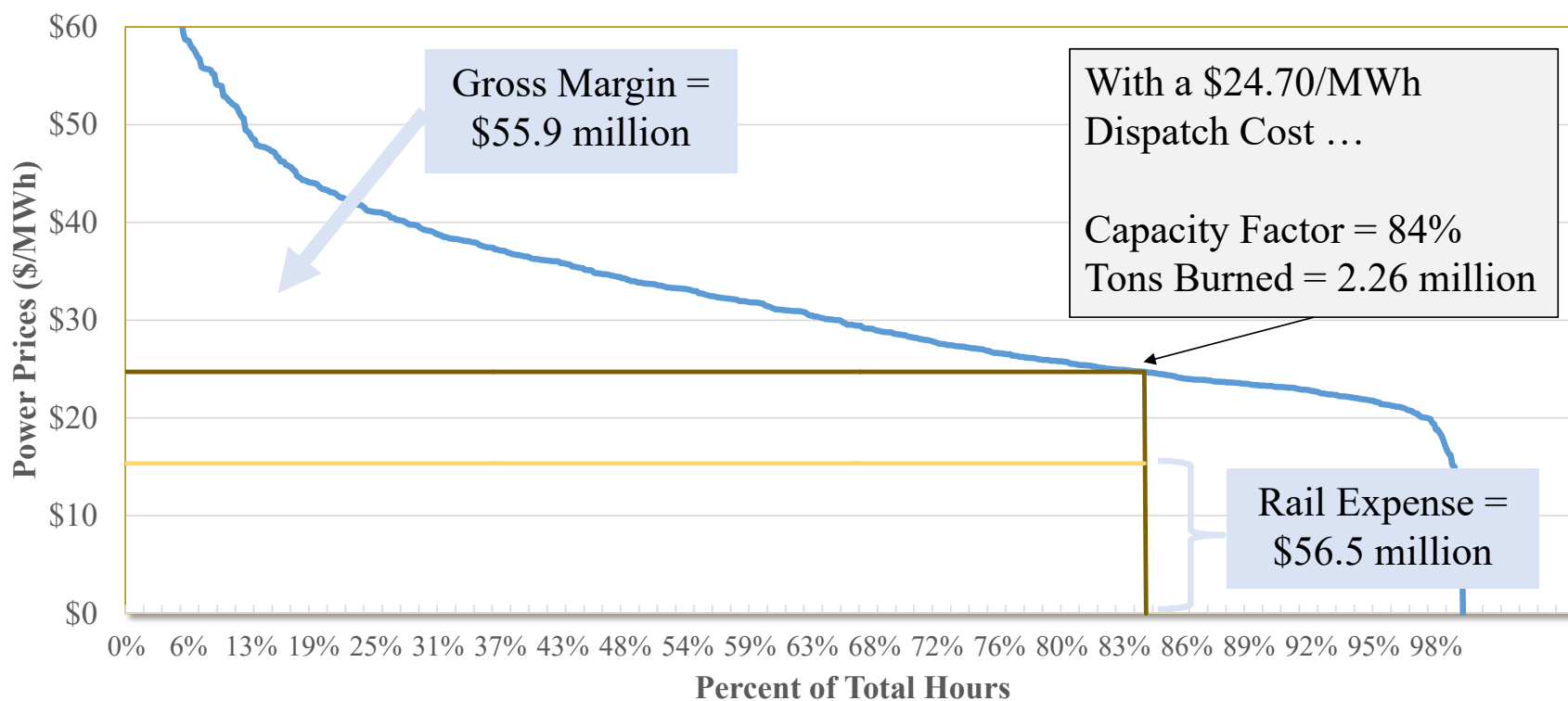
2016 Price Duration Curve with Base Case and Discount Case

2016 Price Duration Curve - Base and Discounted Rail Case



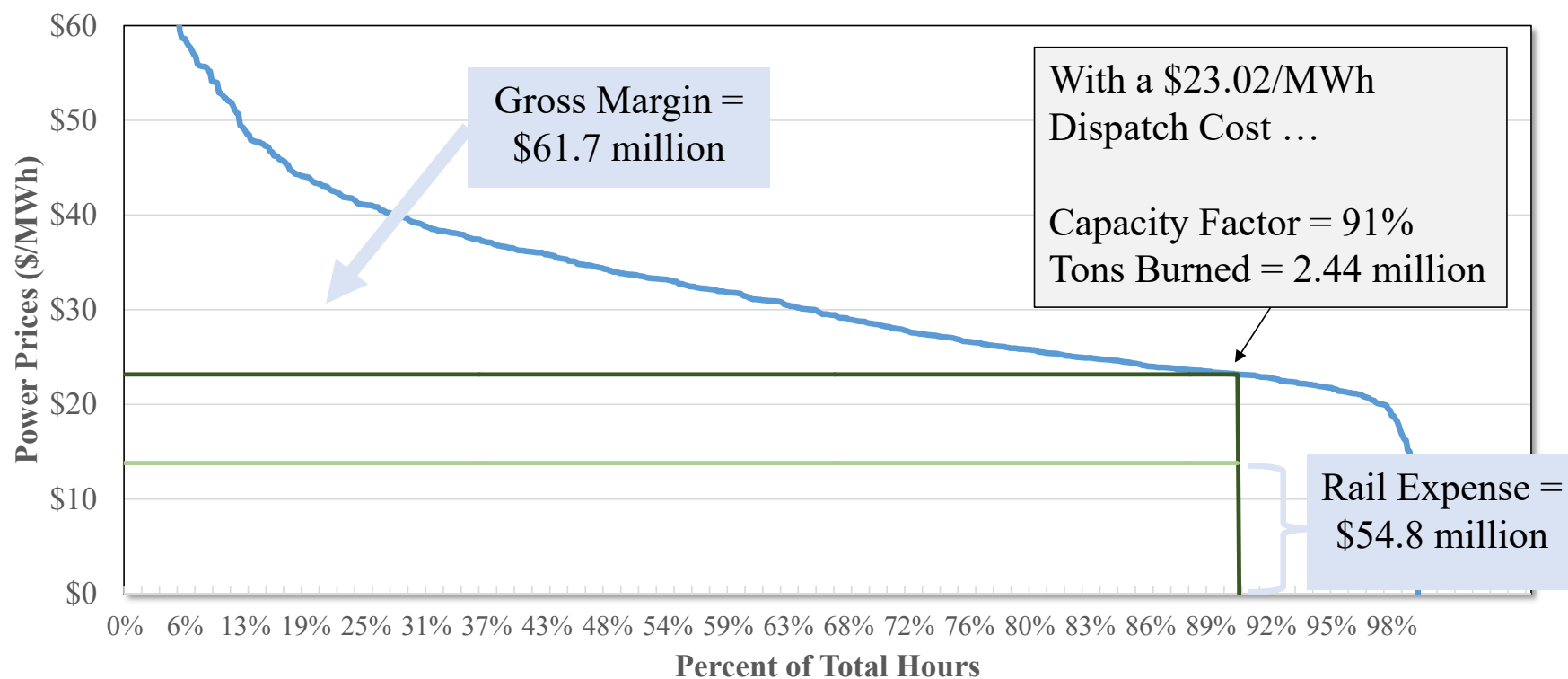
2014 Price Duration Curve with Base Case Dispatch Cost

2014 Price Duration Curve - Base Case Dispatch Costs



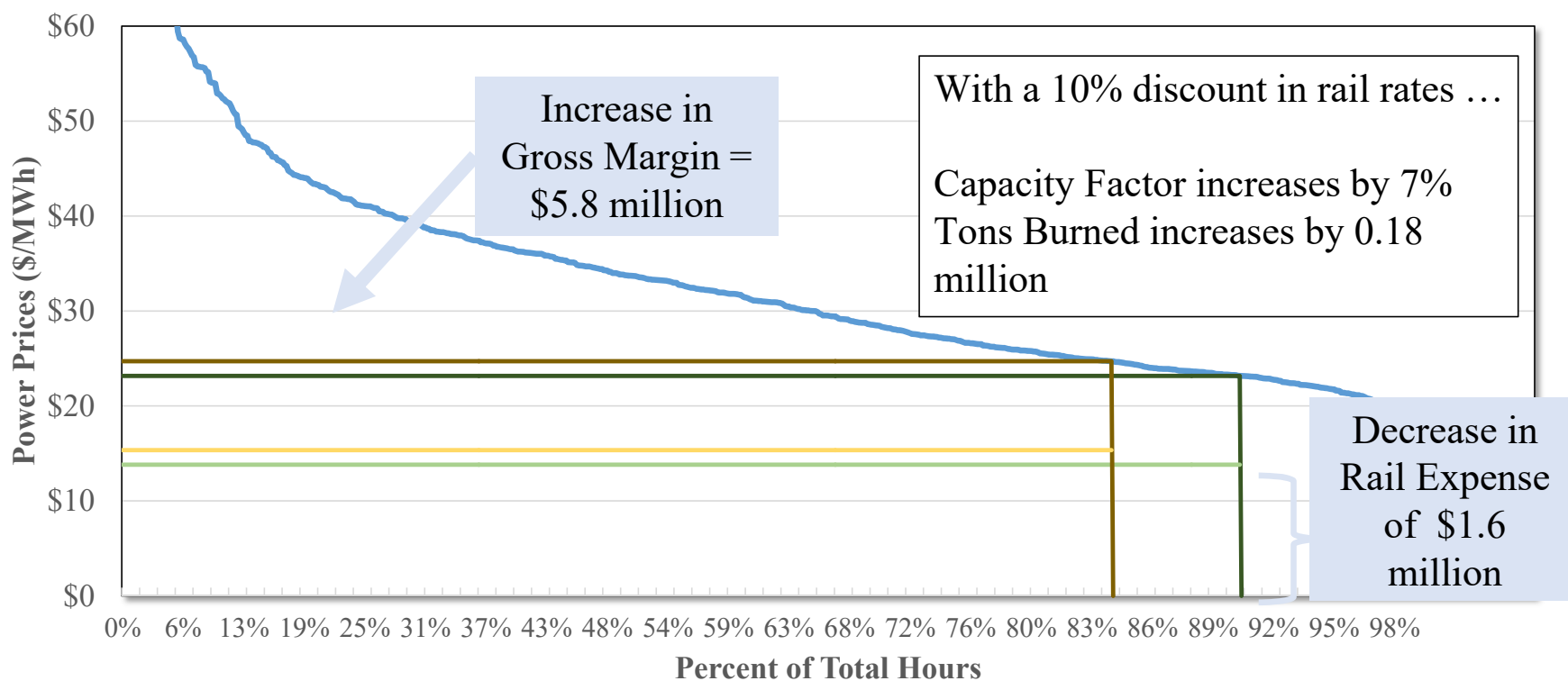
2014 Price Duration Curve with 10% Rail Rate Discount

2014 Price Duration Curve - Discounted Rail Case



2014 Price Duration Curve with Base Case and Discount Case

2014 Price Duration Curve - Base and Discounted Rail Case



Comparison of Results

Item	No Rail Discount	With Discount	Difference
(1)	(2)	(3)	(4)
<u>A. Based on 2016 Price Duration Curve</u>			
1. Tons Burned (millions)	1.42	1.68	0.26
2. Electricity Produced (millions of MWh's)	2.32	2.73	0.42
3. Plant Capacity Factor	53%	62%	9%
4. Generators Margin (millions)	\$16.5	\$20.4	\$3.9
5. Rail Expense (millions)	\$35.5	\$37.7	\$2.2
<u>B. Based on 2014 Price Duration Curve</u>			
1. Tons Burned (millions)	2.26	2.44	0.18
2. Electricity Produced (millions of MWh's)	3.68	3.97	0.29
3. Plant Capacity Factor	84%	91%	7%
4. Generators Margin (millions)	\$55.9	\$61.7	\$5.8
5. Rail Expense (millions)	\$56.5	\$54.8	(\$1.6)

Comparison of Generator's and Railroad's Margins

Item	No Rail Discount	With Rail Discount	Difference
(1)	(2)	(3)	(4)
<u>A. Generator's Margin (millions)</u>			
1. Based on 2016 Price Duration Curve	\$16.5	\$20.4	\$3.9
2. Based on 2014 Price Duration Curve	\$55.9	\$61.7	\$5.8
<u>B. Railroad's Margin</u>			
1. Rate Charged per Ton	\$25.00	\$22.50	(\$2.50)
2. Jurisdictional Threshold 1/	1.80	n/a	n/a
3. Railroad Variable Cost per Ton (B.1 ÷ B.2)	\$13.89	\$13.89	\$0.00
4. Railroad Margin per Ton (B.1 - B.3)	\$11.11	\$8.61	(\$2.50)
5. Railroad Margin (millions)			
a. Based on 2016 Price Duration Curve	\$15.8	\$14.4	(\$1.4)
b. Based on 2014 Price Duration Curve	\$35.7	\$35.2	(\$0.5)
<u>C. Total Incremental Margin to be Shared</u>			
1. Based on 2016 Price Duration Curve	xxx	xxx	\$2.5
2. Based on 2014 Price Duration Curve	xxx	xxx	\$5.4

1/ Allowable ratio of revenues to variable costs.

Conclusions

- Additional value becomes available by lowering dispatch costs through rail rate discounts;
- Rail rate discounts would need to be factored into dispatch costs so more generation is achieved; and
- Railroads would likely see a reduction in margin even with higher power prices, thus sharing of margins would need to occur.

Question: How to share margins?