



STEP

Economic Study Updates

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California ISO Grid Planning

May 27, 2004



Overview

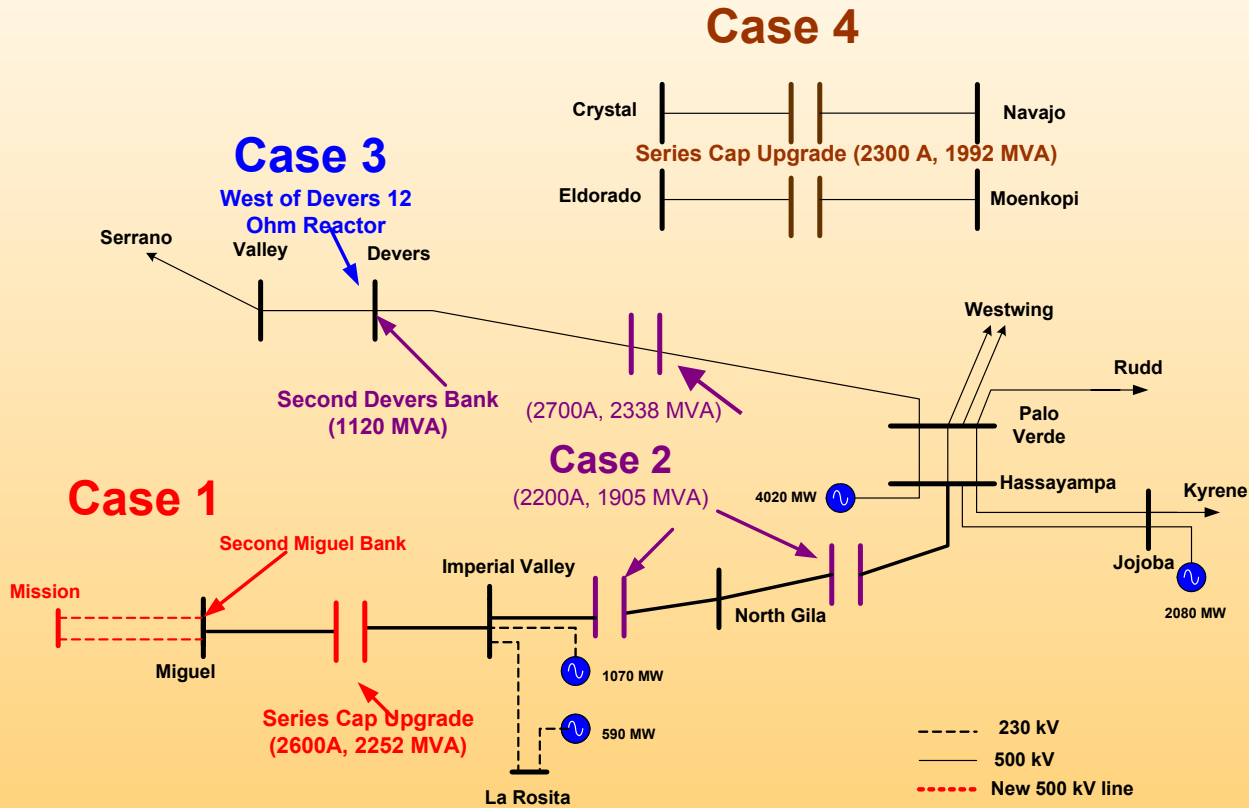
- Part 1: Short-term Upgrades
- Part 2: New Line Into San Diego
Second Palo Verde – Devers Line
- Part 3: Sensitivity Results
 - S1: Jojoba – Kyrene
 - S2: Market Place – Adelanto
 - S3: El Centro Bank
 - S4: Jim Hsu Option
 - S5: Navajo Transmission Project
 - S6: SCIT Limit



Part I: Short-term Upgrades



Short-term Upgrades





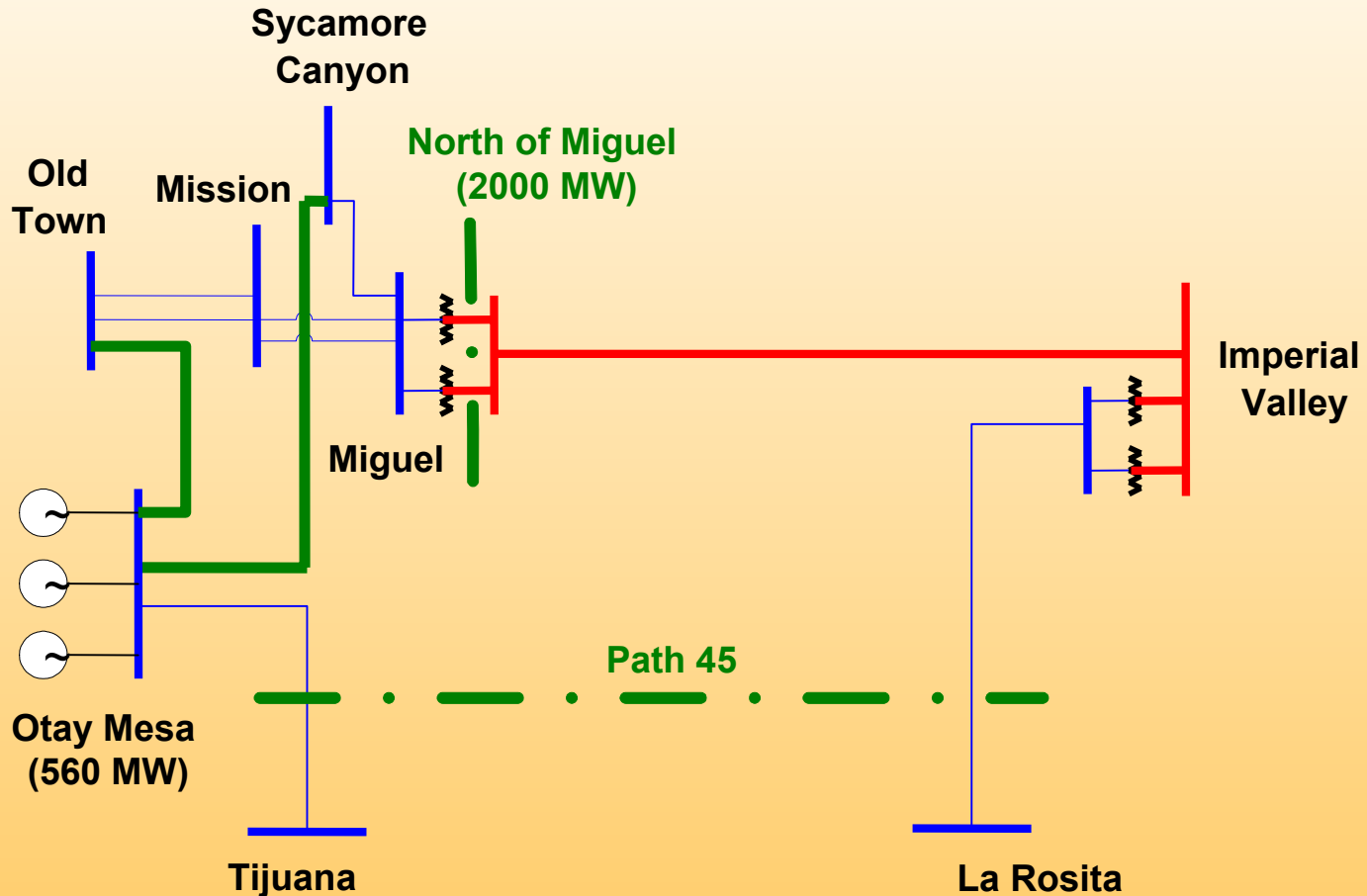
Update on Input Assumptions

	EOR	SCIT	WOR
Cases 1&2	7,550 MW	18,886 MW	10,118 MW
Cases 3&4	$7,550 + 505 = 8,055$ MW	$18,886 + 505 = 19,391$ MW	$10,118 + 505 = 10,623$ MW

- Enforcing new thermal rating of the series capacitors which will be upgraded.

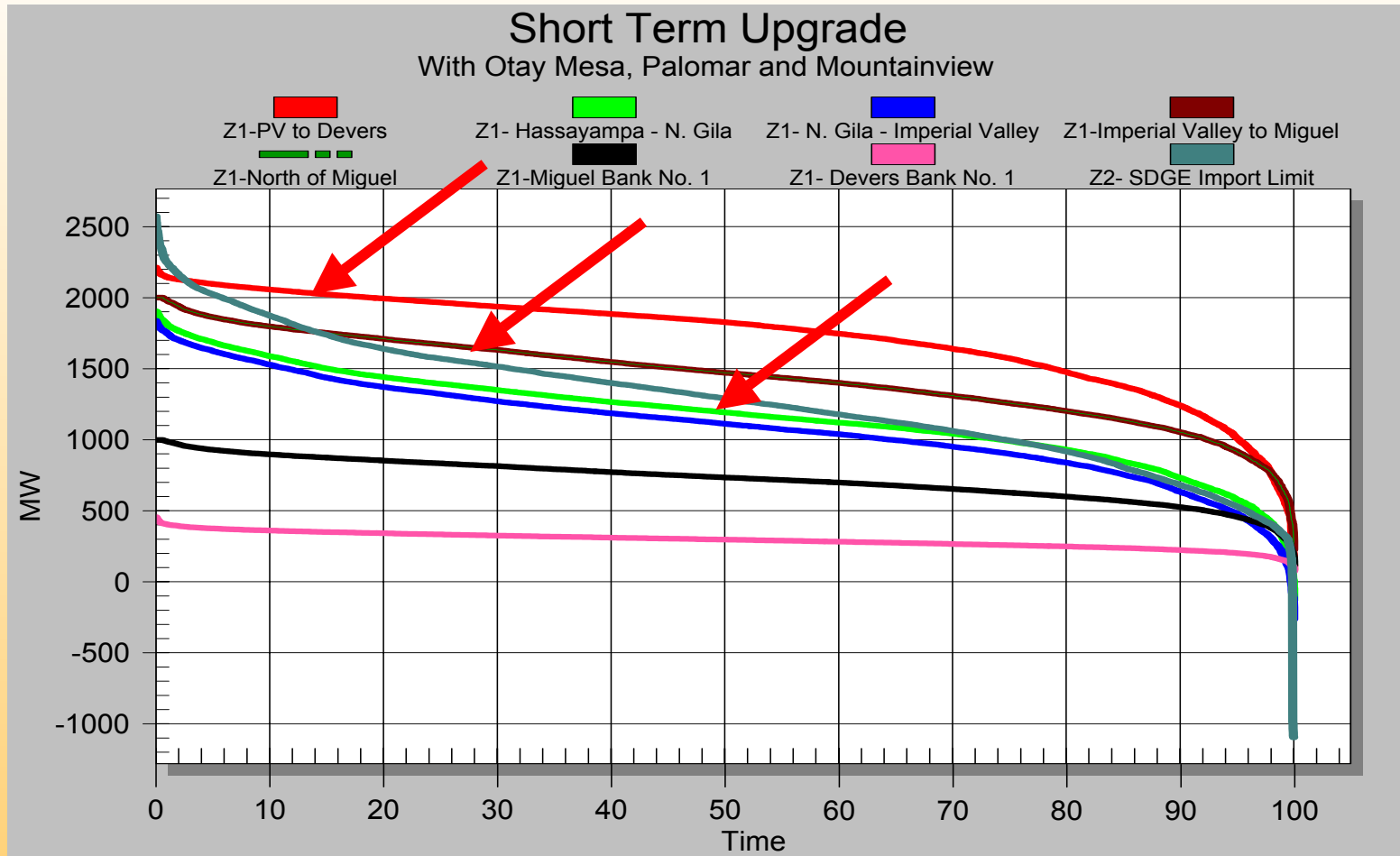


Update on Input Assumptions Otay Mesa Interconnection Configuration



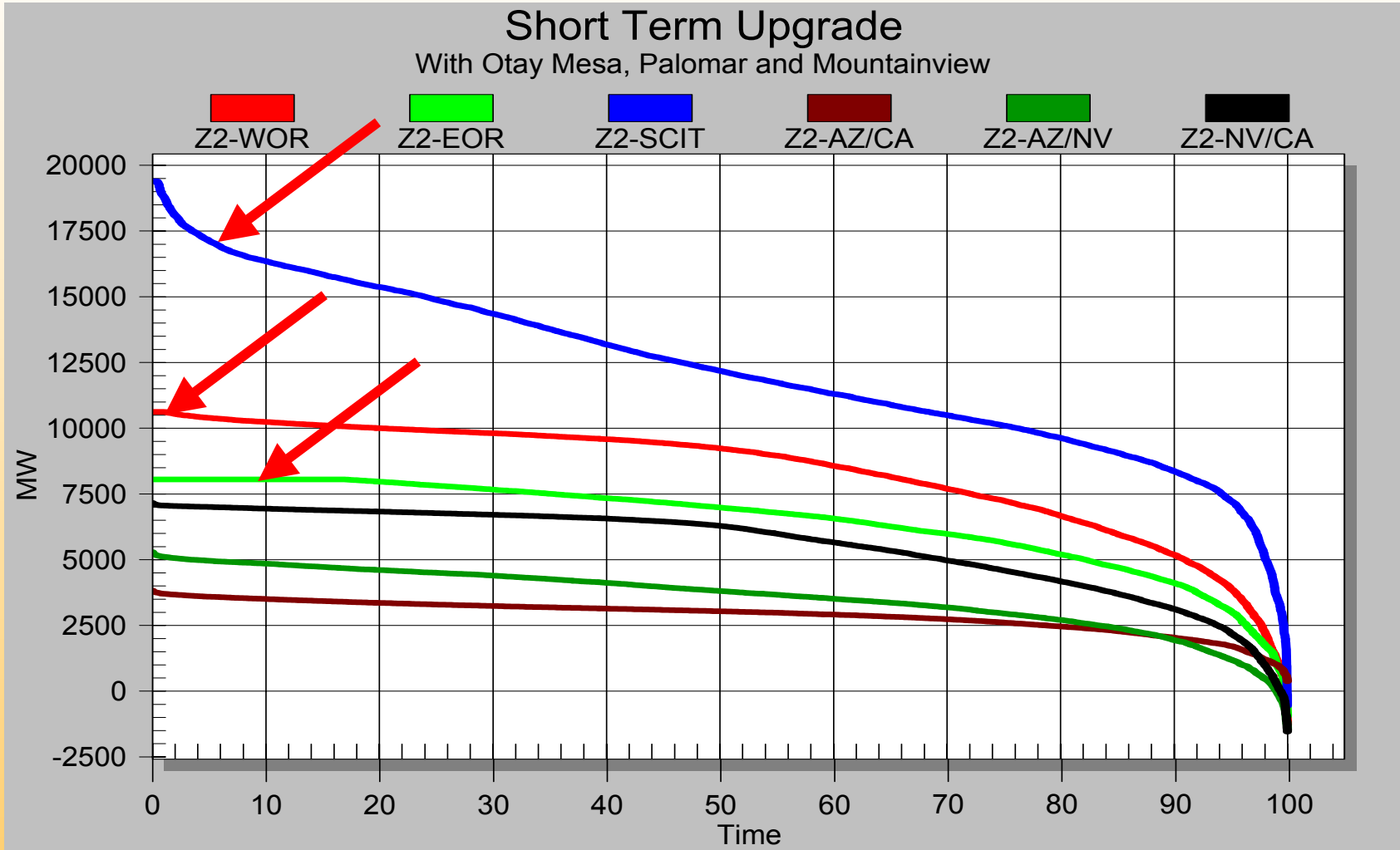


Short-term Upgrades



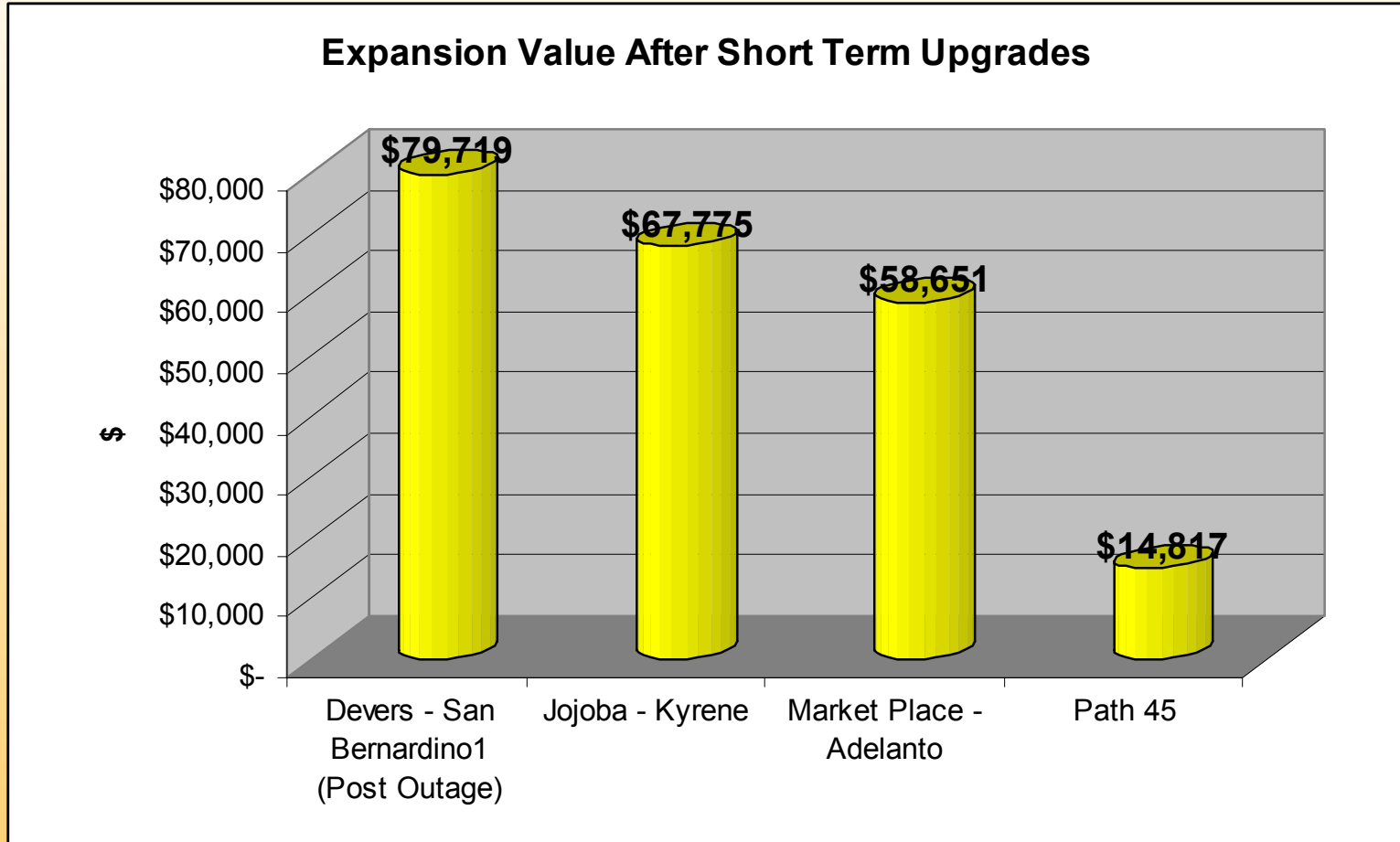


Short-term Upgrades



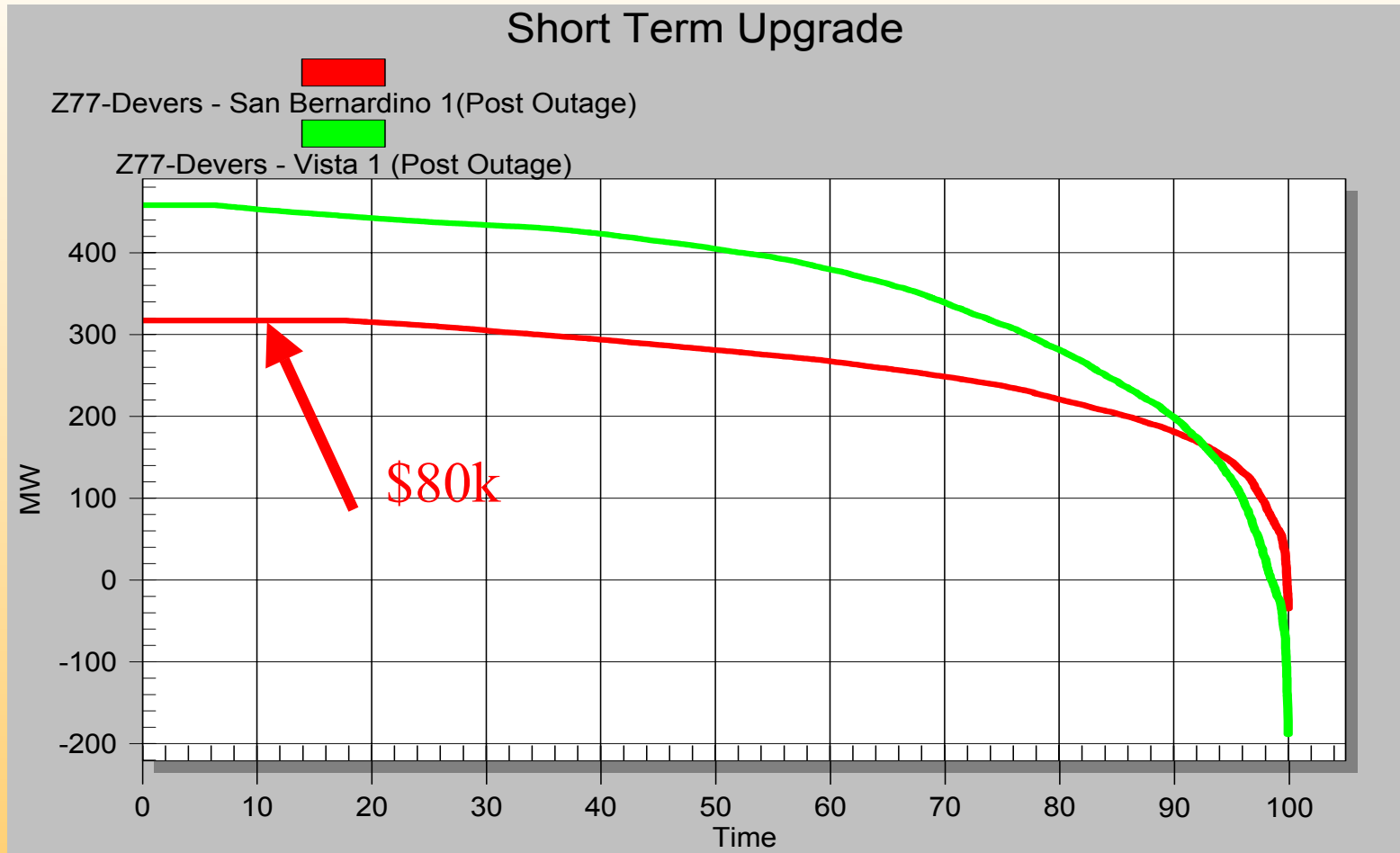


Short-term Upgrades



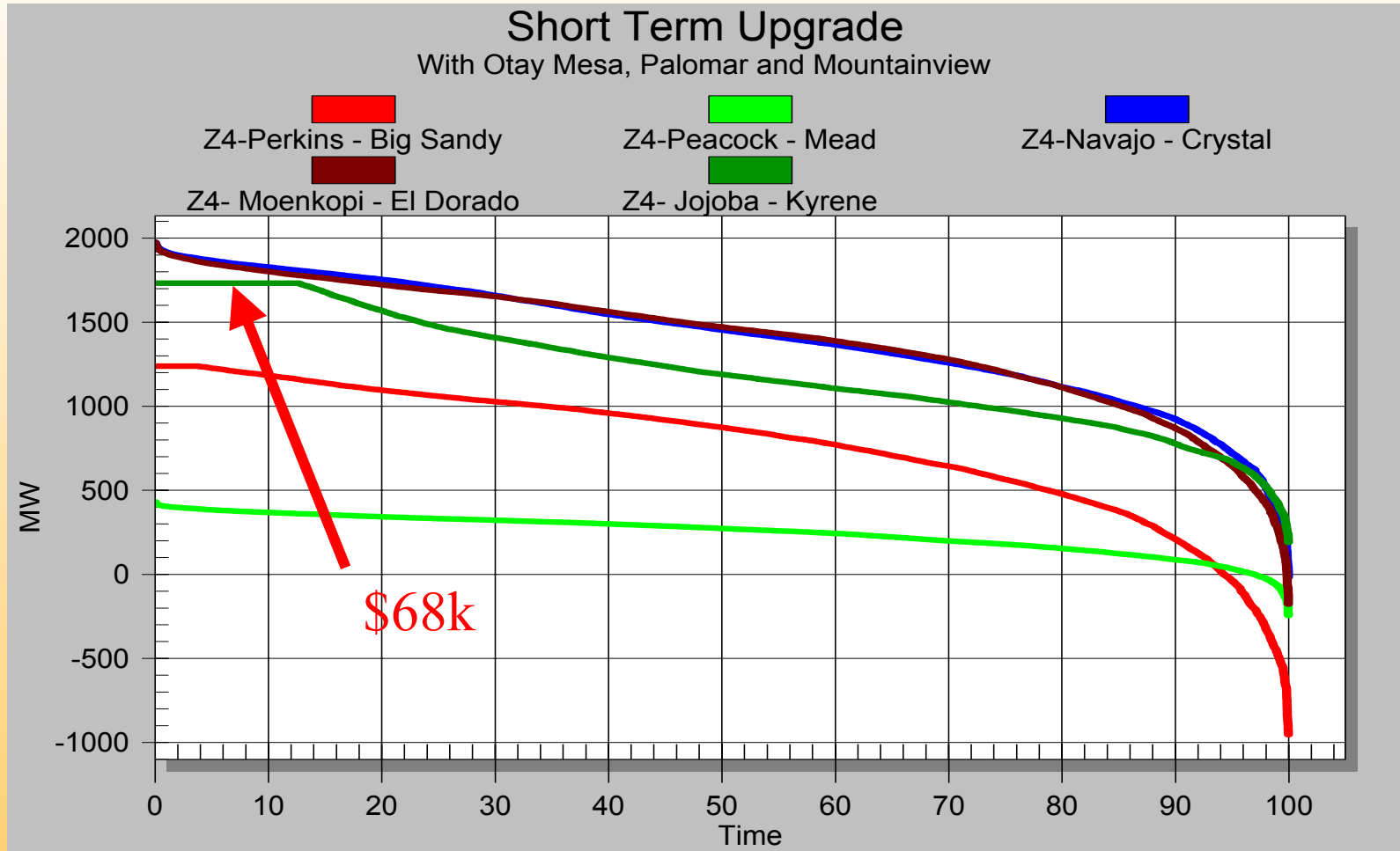


Short-term Upgrades



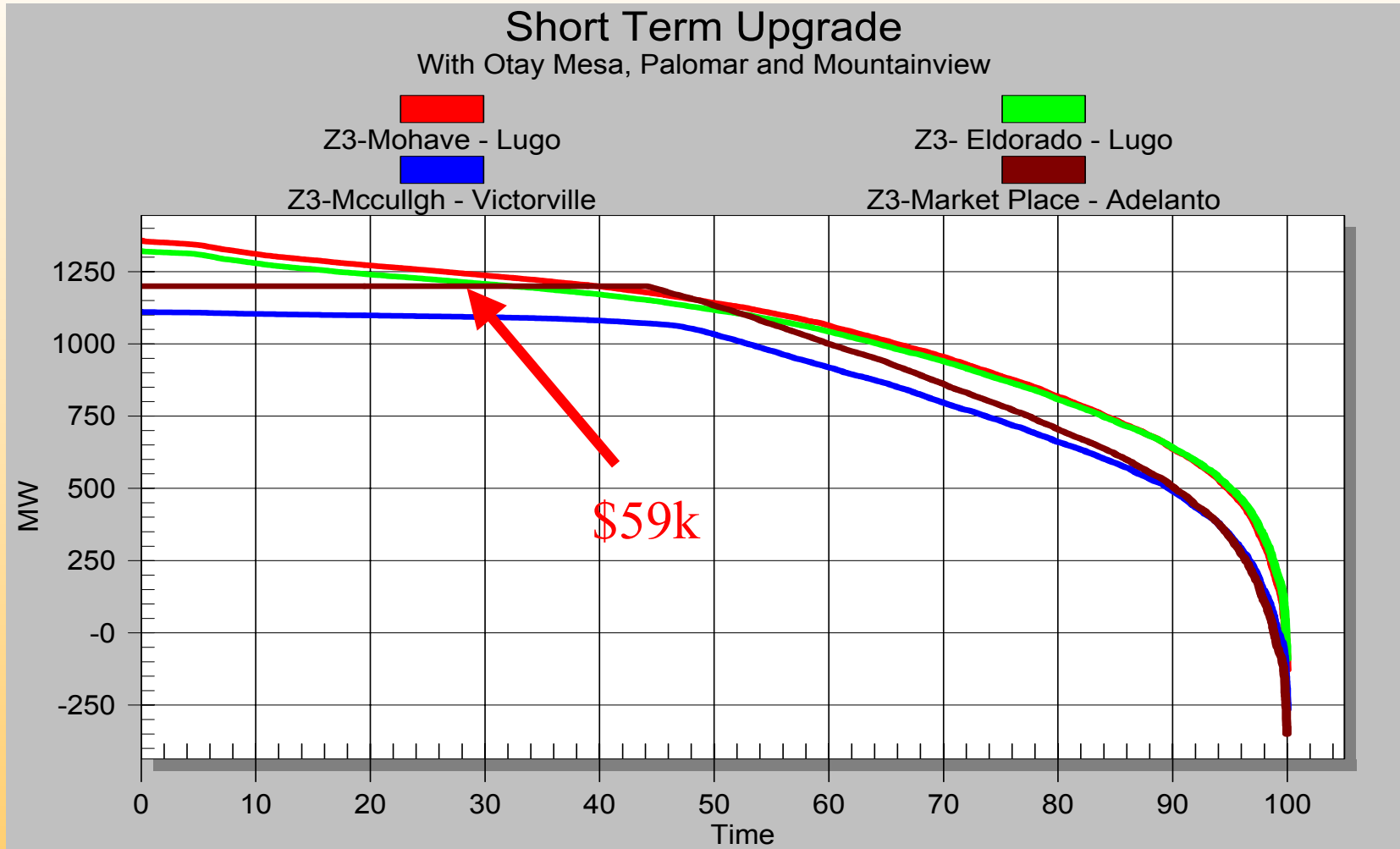


Short-term Upgrades





Short-term Upgrades





Benefit Calculations

- Societal Test
 - Focused on the overall benefit across the entire interconnection
 - Measured by the change in production cost across the entire WECC
- Participant Test
 - Focused on the benefits that would accrue just to those entities funding the upgrade.

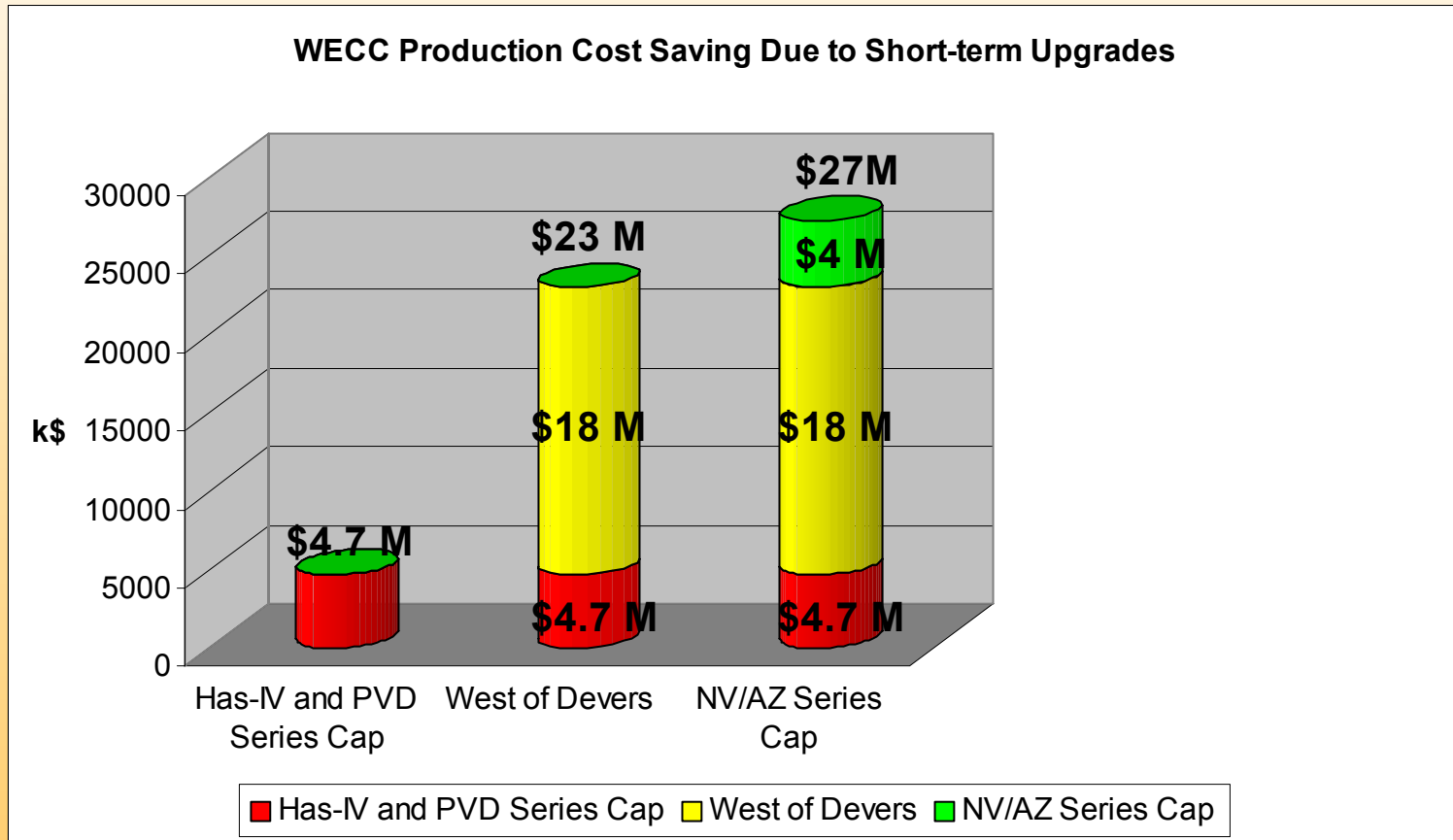


Participant Benefit

- Equals the sum of the following:
 - + Consumer Surplus (change in price of power to consumers)
 - + Producer Surplus (change in revenue for customer owned generation)
 - + change in congestion revenue
- The ISO believes that this test should be the primary criteria governing project approval



Short-term Upgrades Societal Test



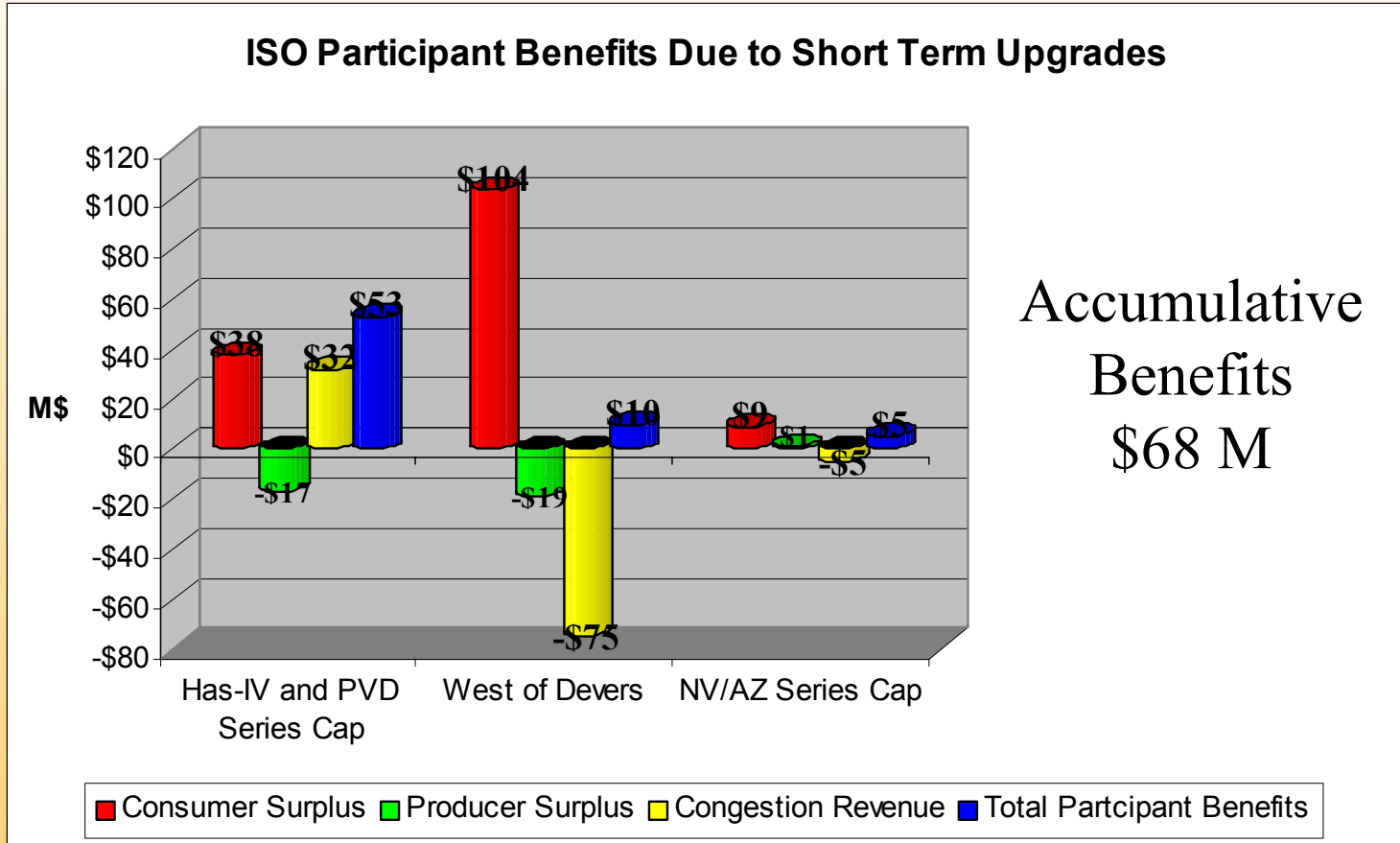


Benefit Cost Ratio Based on Societal Test

- Project cost: \$122 M
- Annual carrying charge: \$21.6 M (17.5%)
- Annual Benefit (in 2008): \$27 M
- Benefit/Cost ratio: 1.25



Short-term Upgrades Participants Test



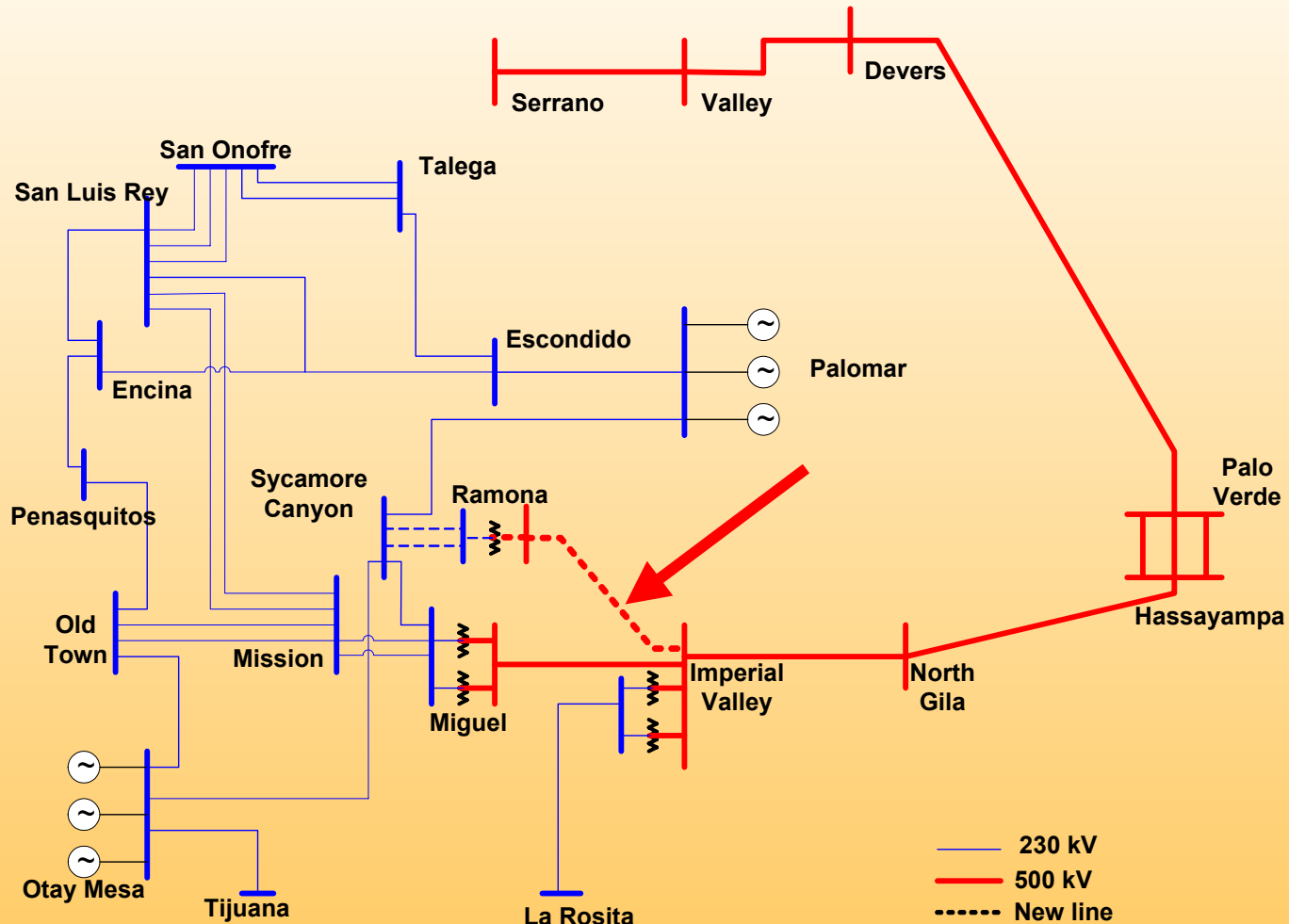


Part II:

- 1. New Line Into San Diego**
- 2. Palo Verde – Devers #2**

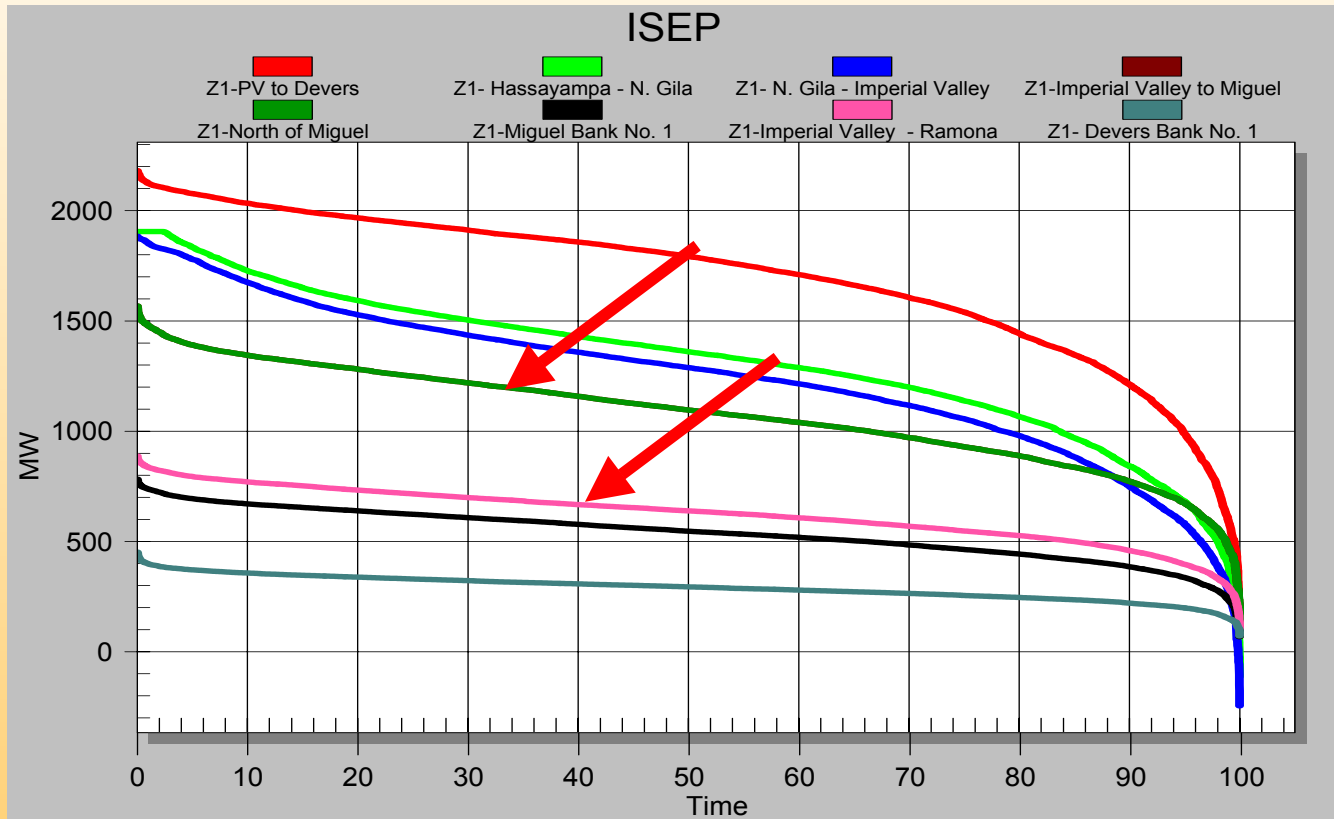


Imperial Valley – San Diego Expansion Project (ISEP)



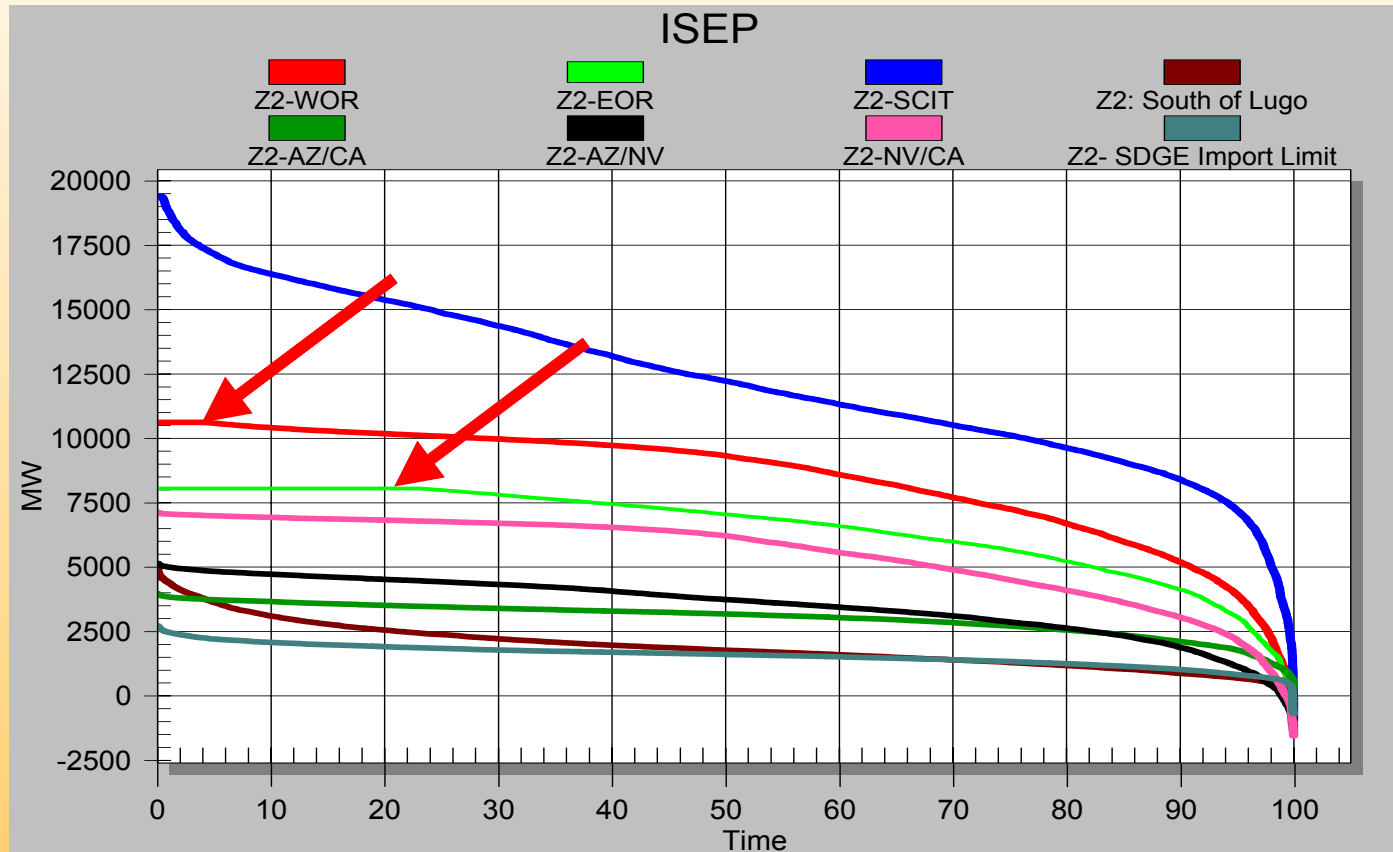


Imperial Valley – San Diego Expansion Project (ISEP)



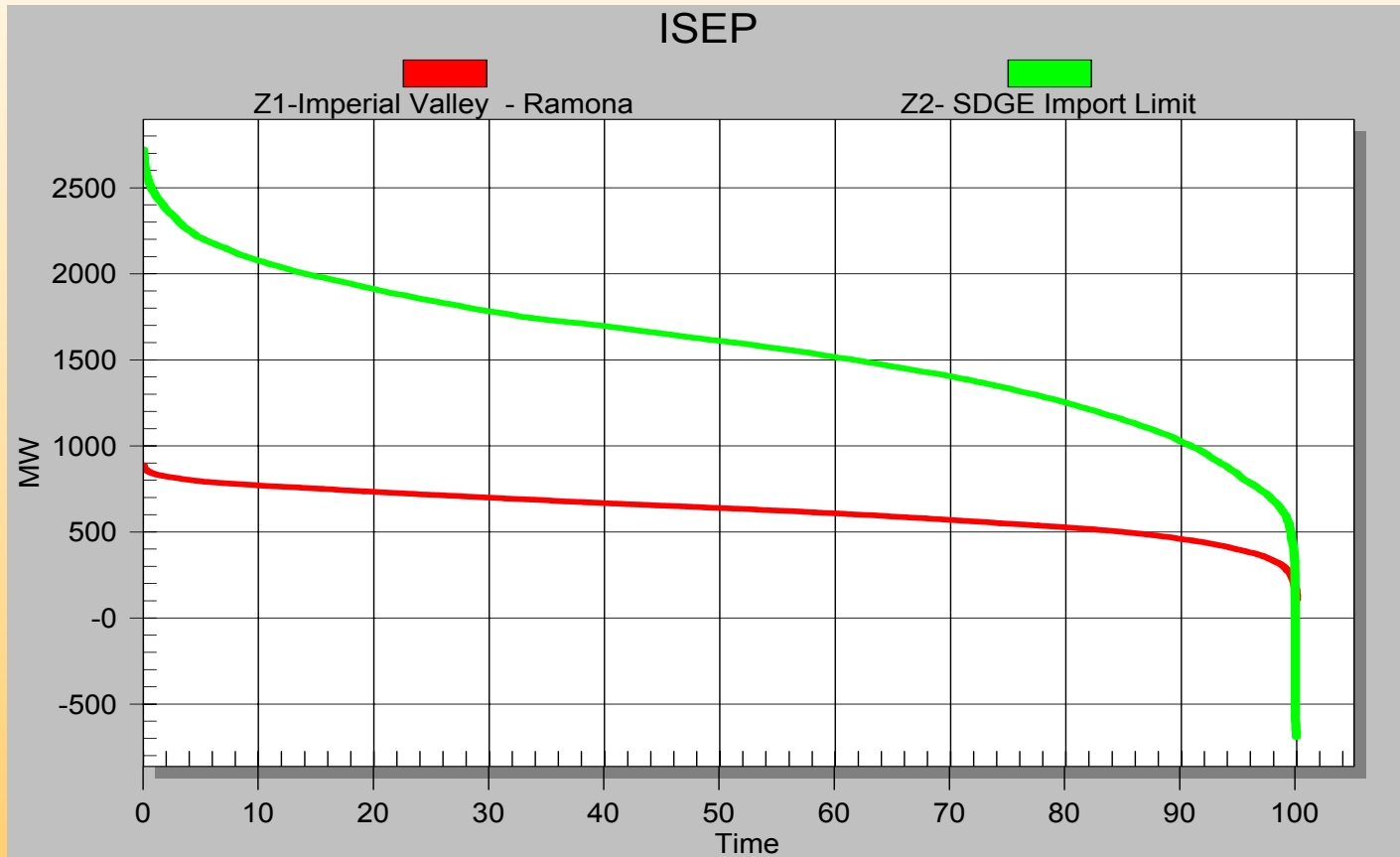


Imperial Valley – San Diego Expansion Project (ISEP)



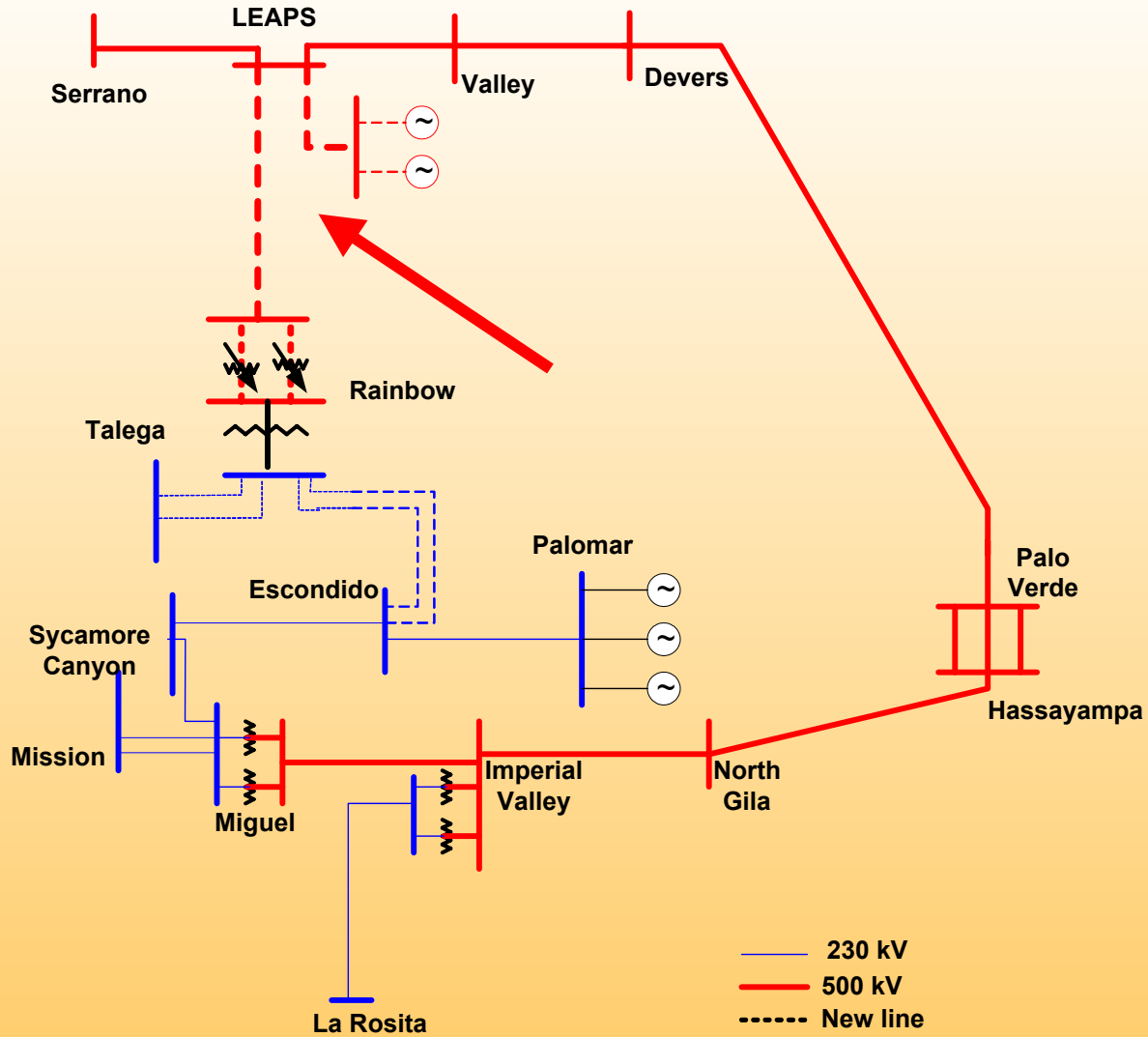


Imperial Valley – San Diego Expansion Project (ISEP)



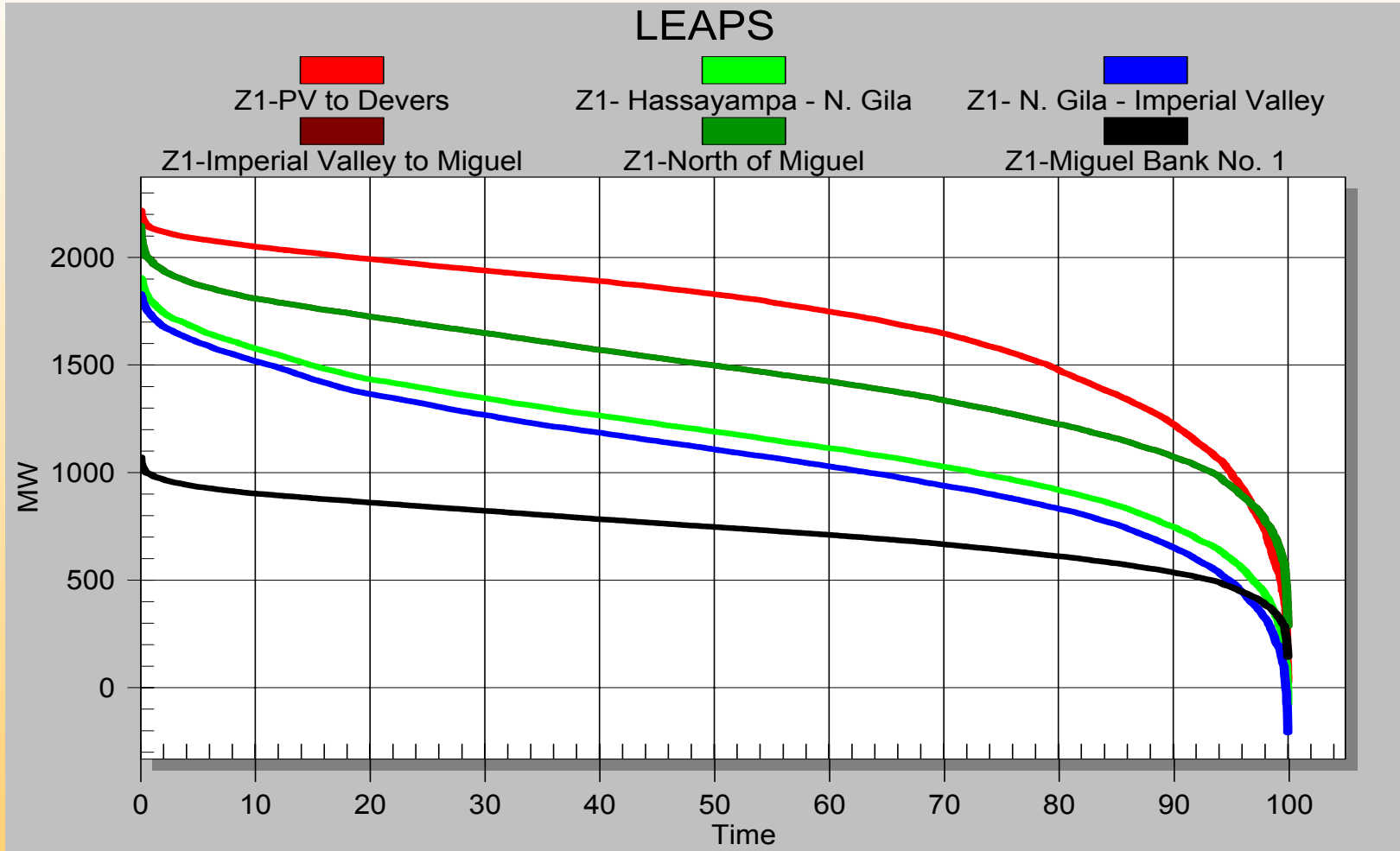


LEAPS Project



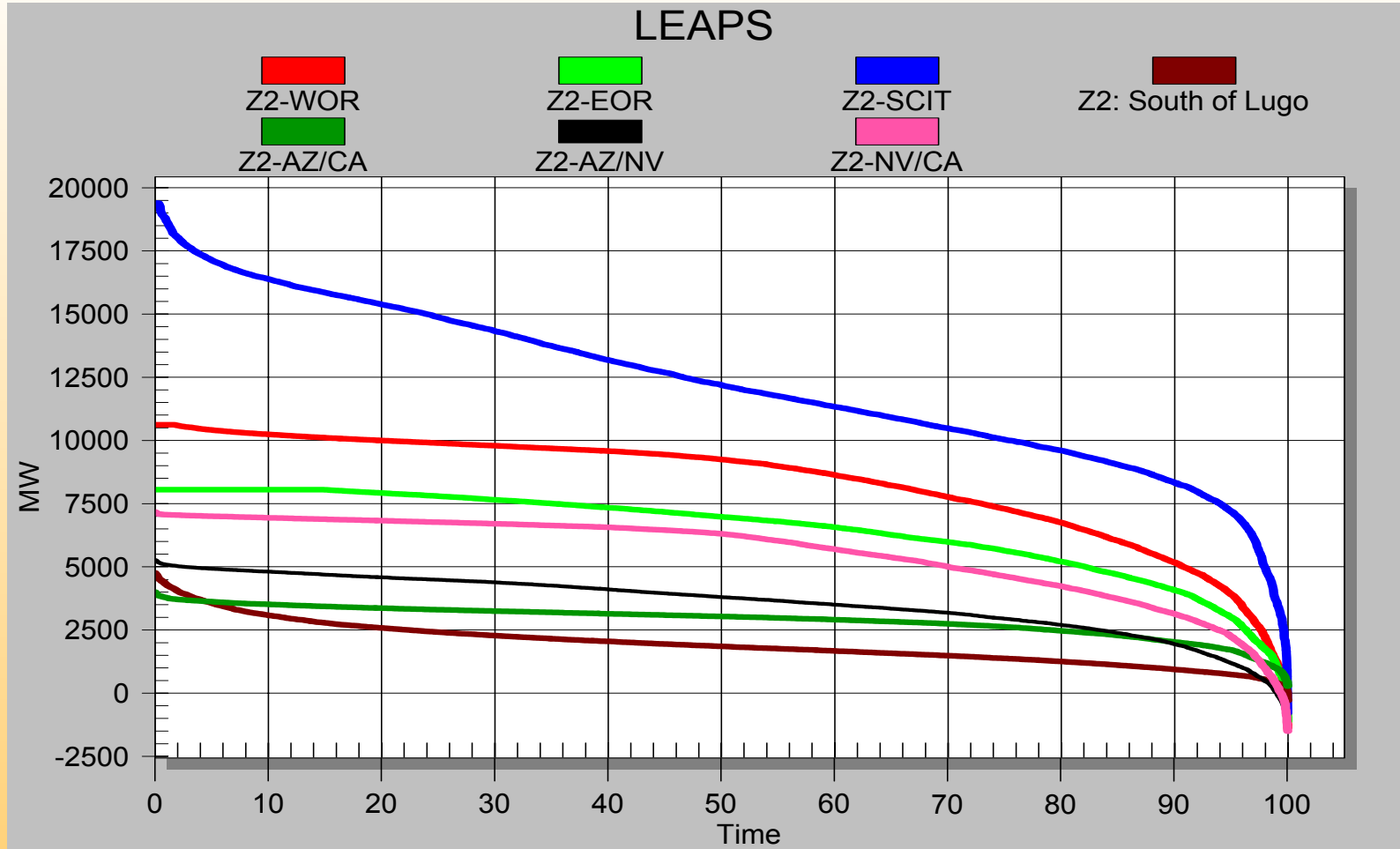


LEAPS Project Without Phase Shifters



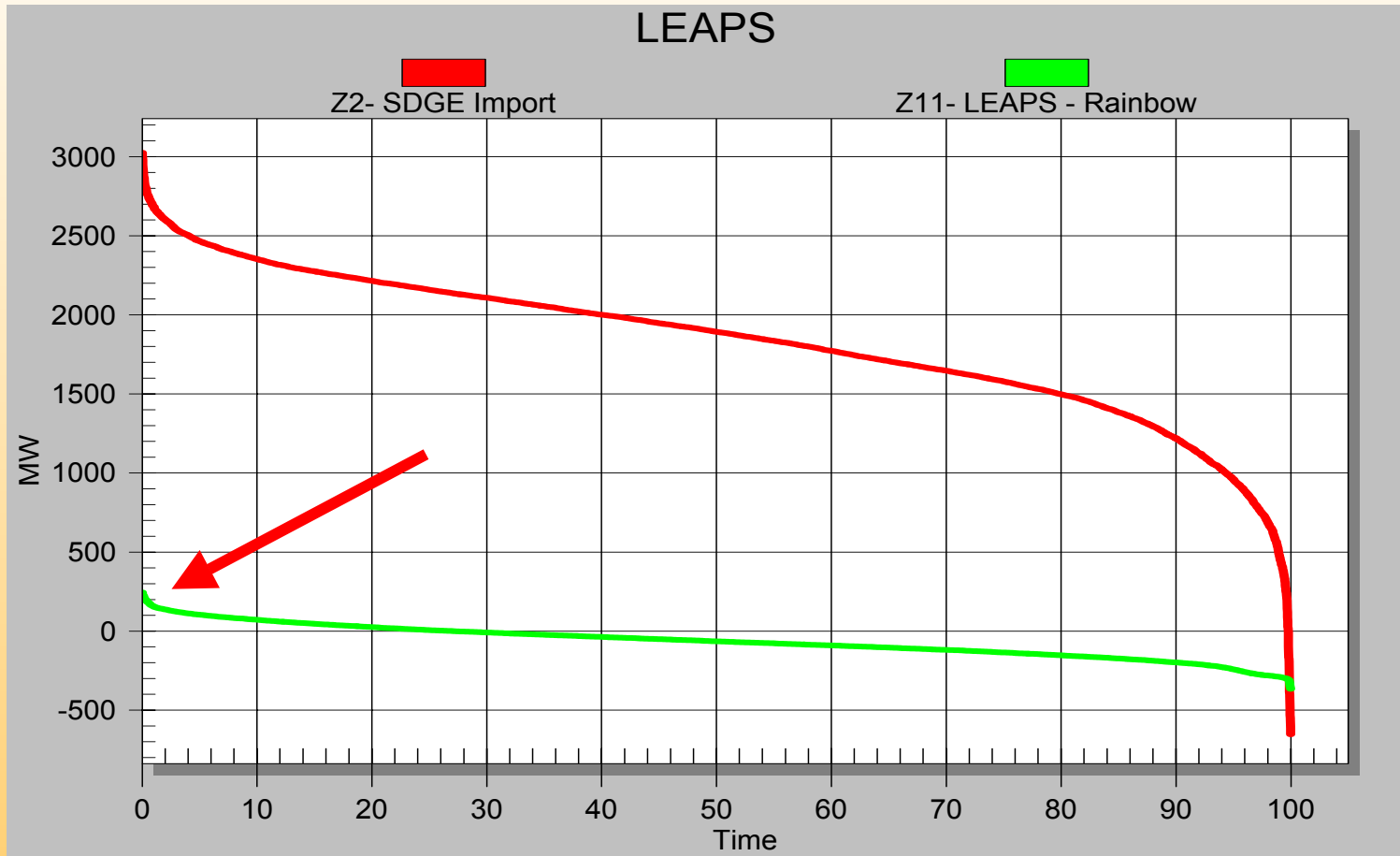


LEAPS Project Without Phase Shifters



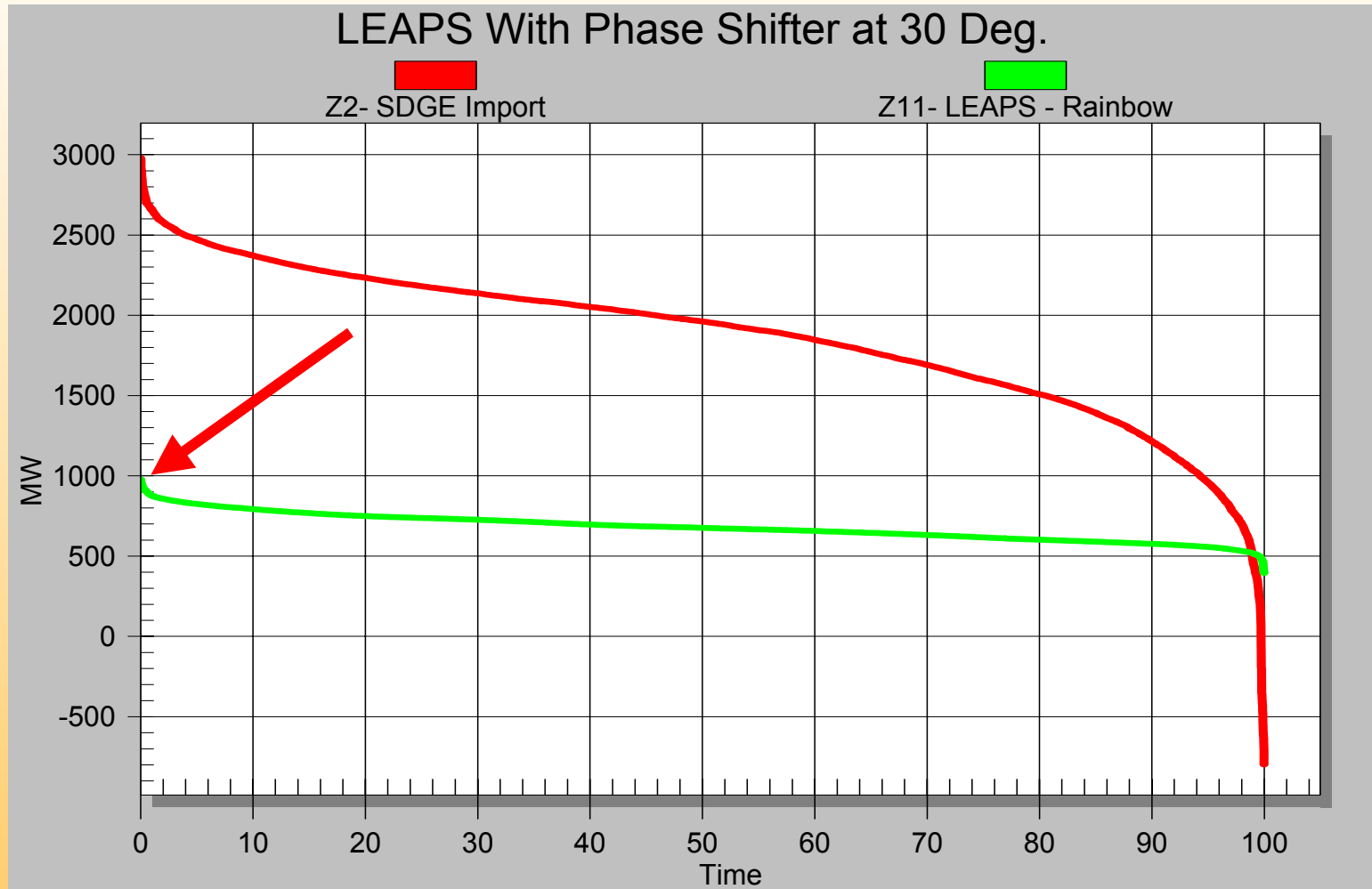


LEAPS Project Without Phase Shifters



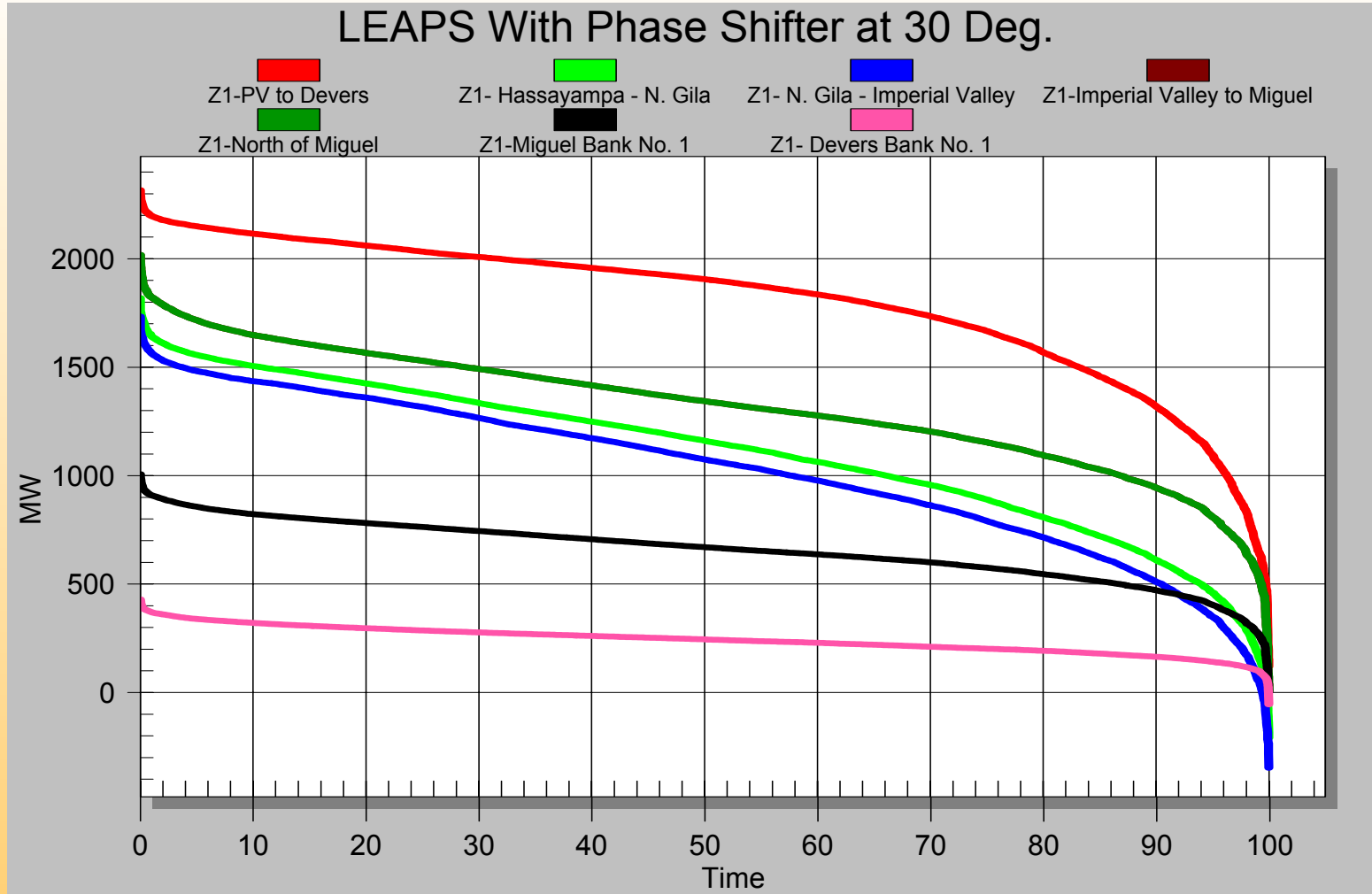


LEAPS Project WITH Phase Shifters



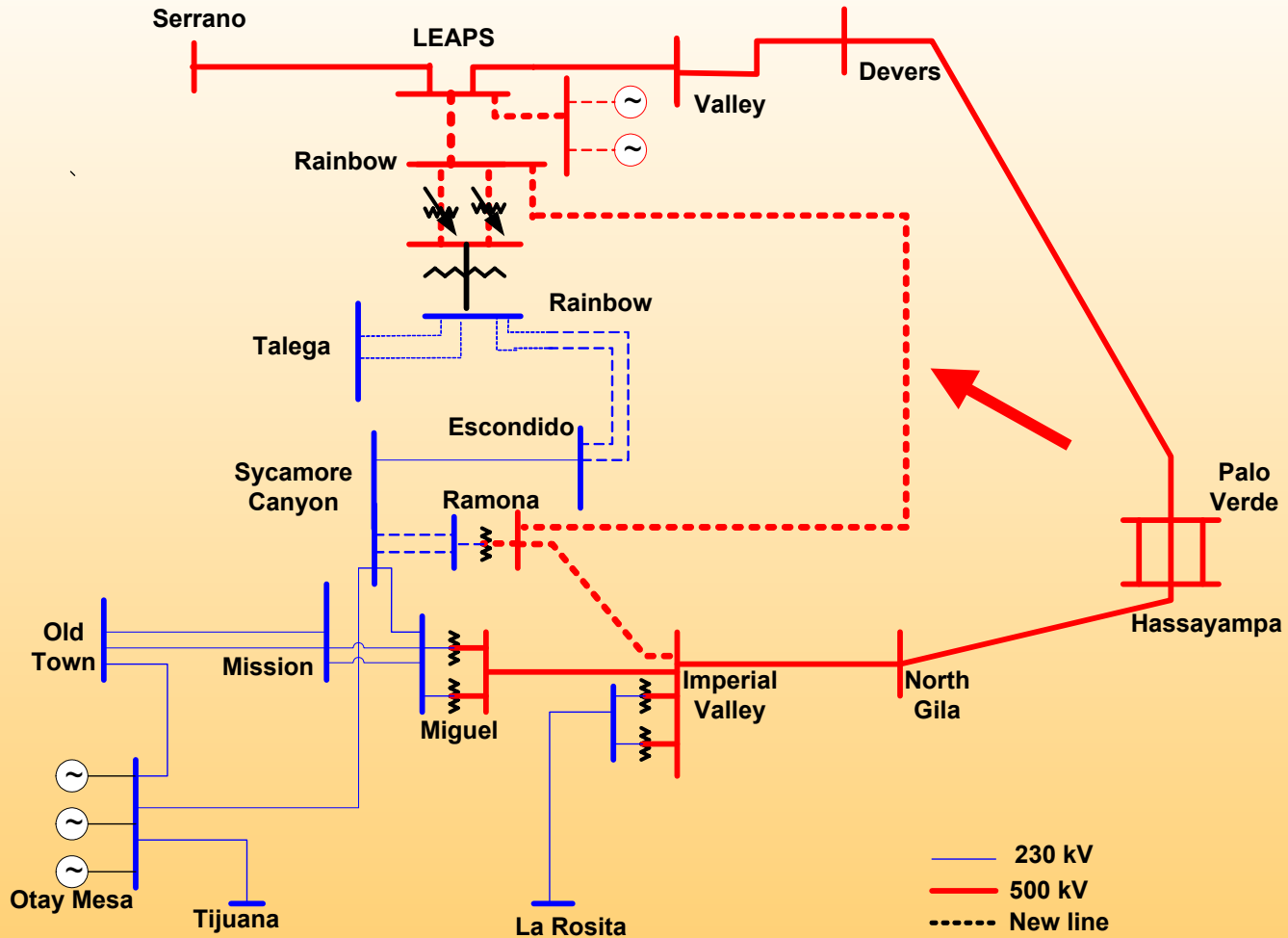


LEAPS Project



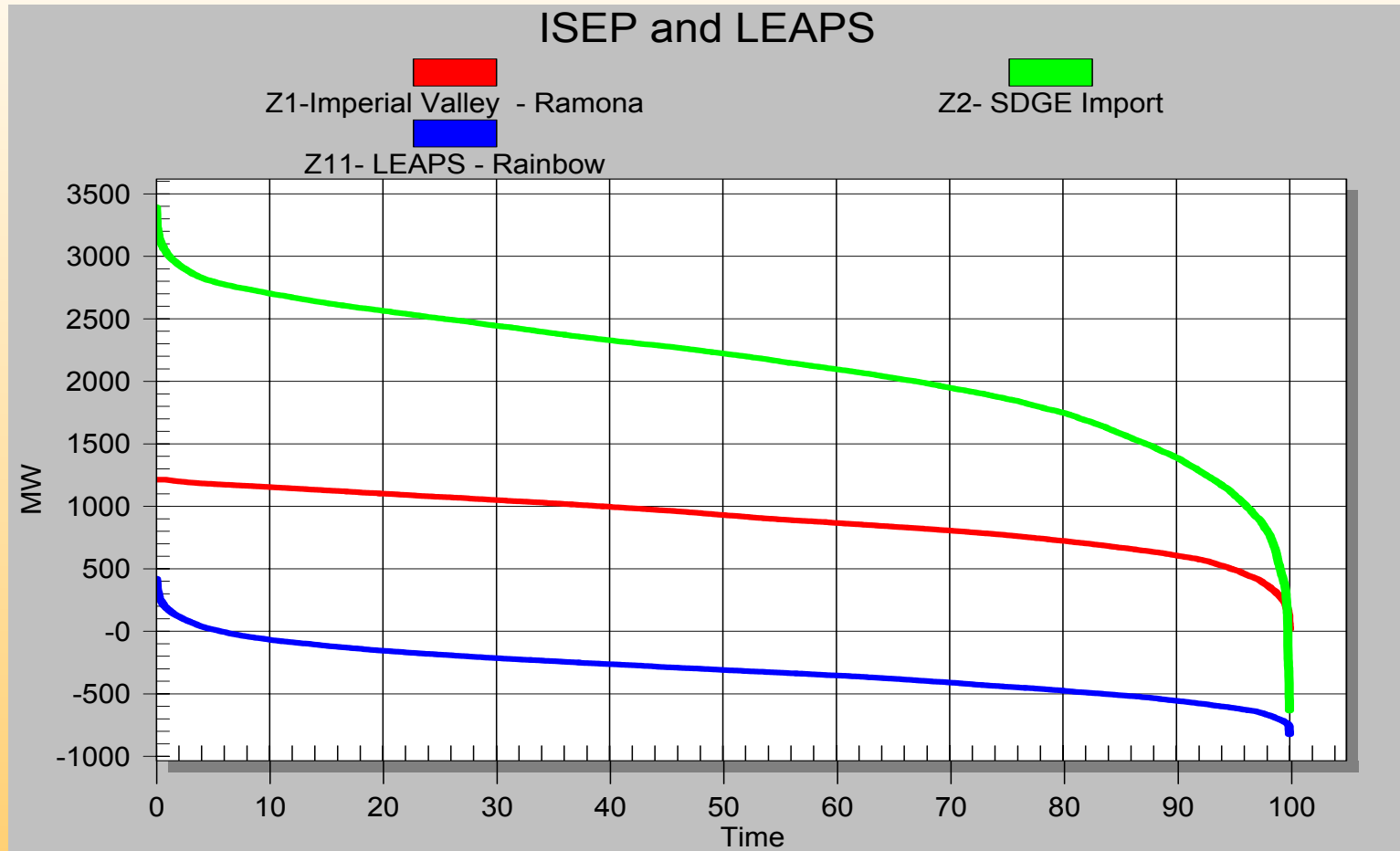


ISEP and LEAPS Combined



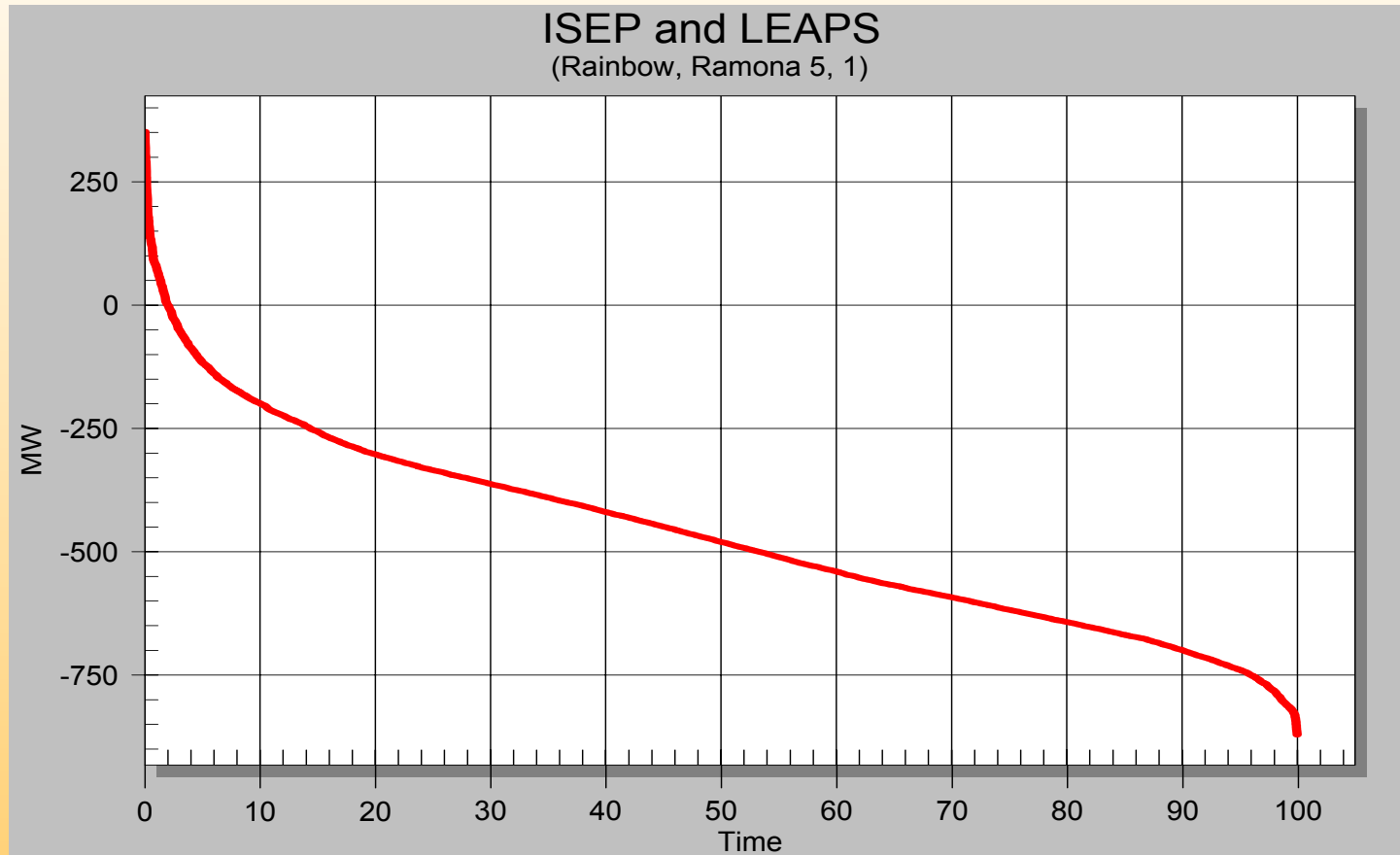


ISEP and LEAPS Combined



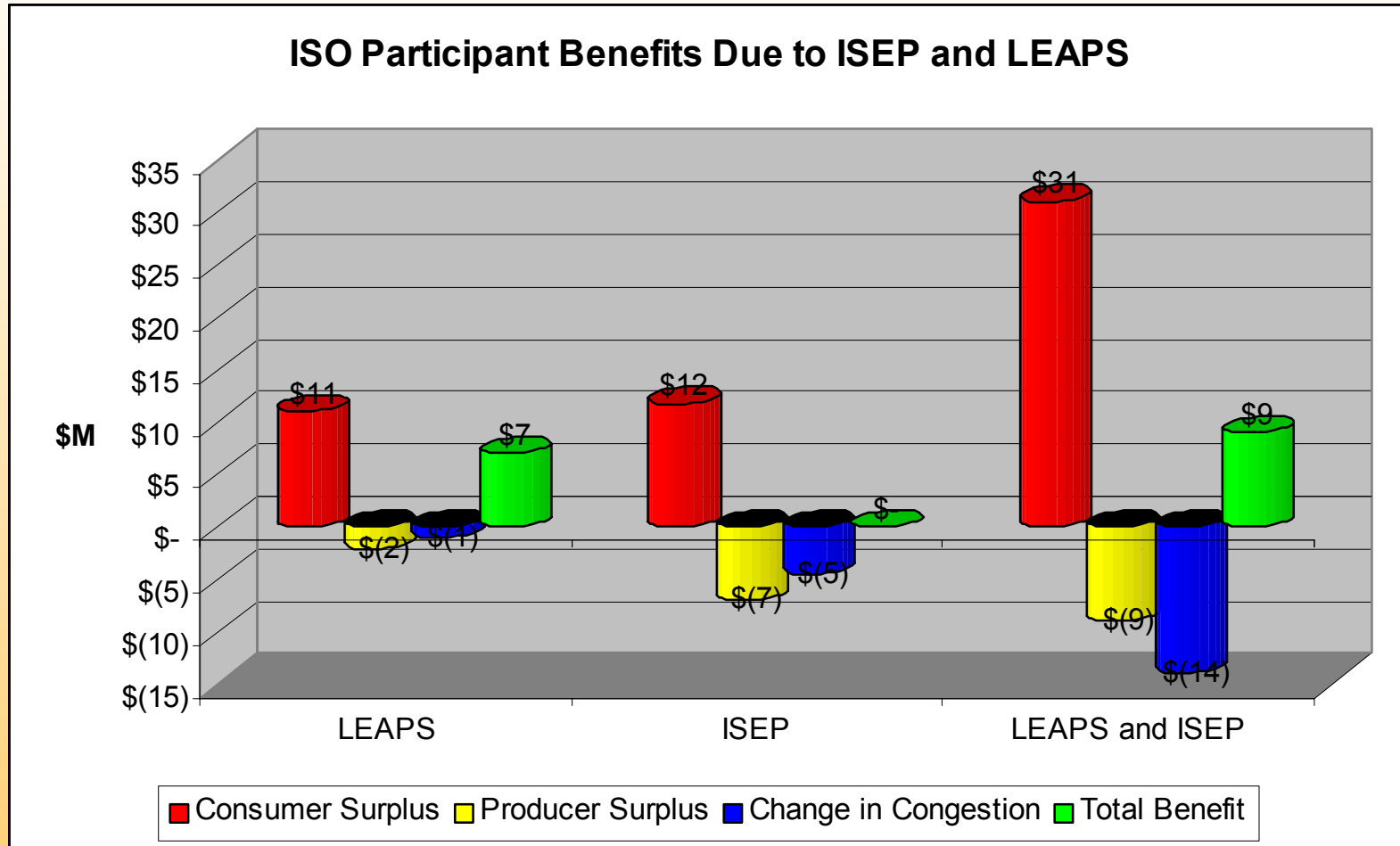


ISEP and LEAPS Combined



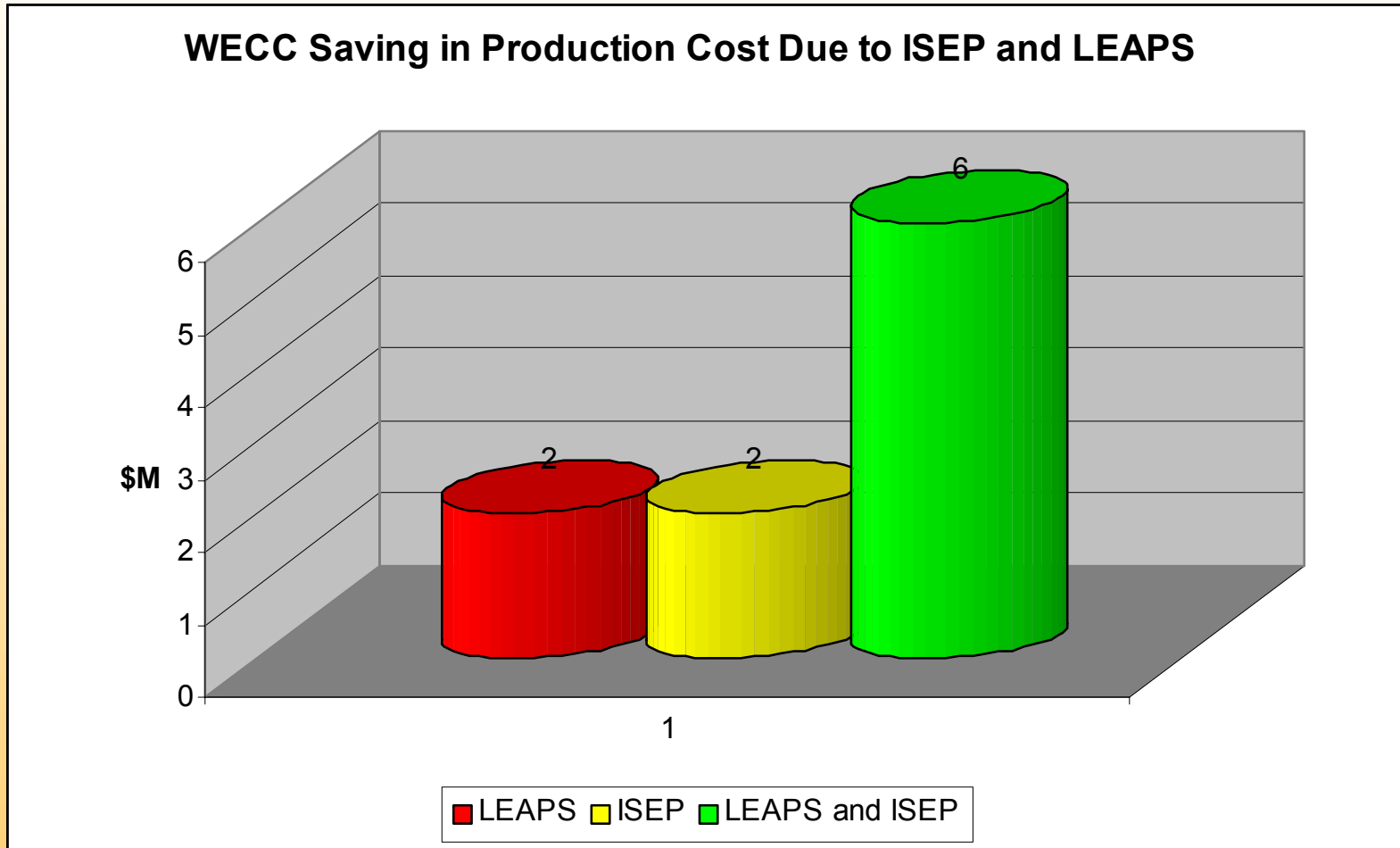


ISEP and LEAPS Combined





ISEP and LEAPS Combined

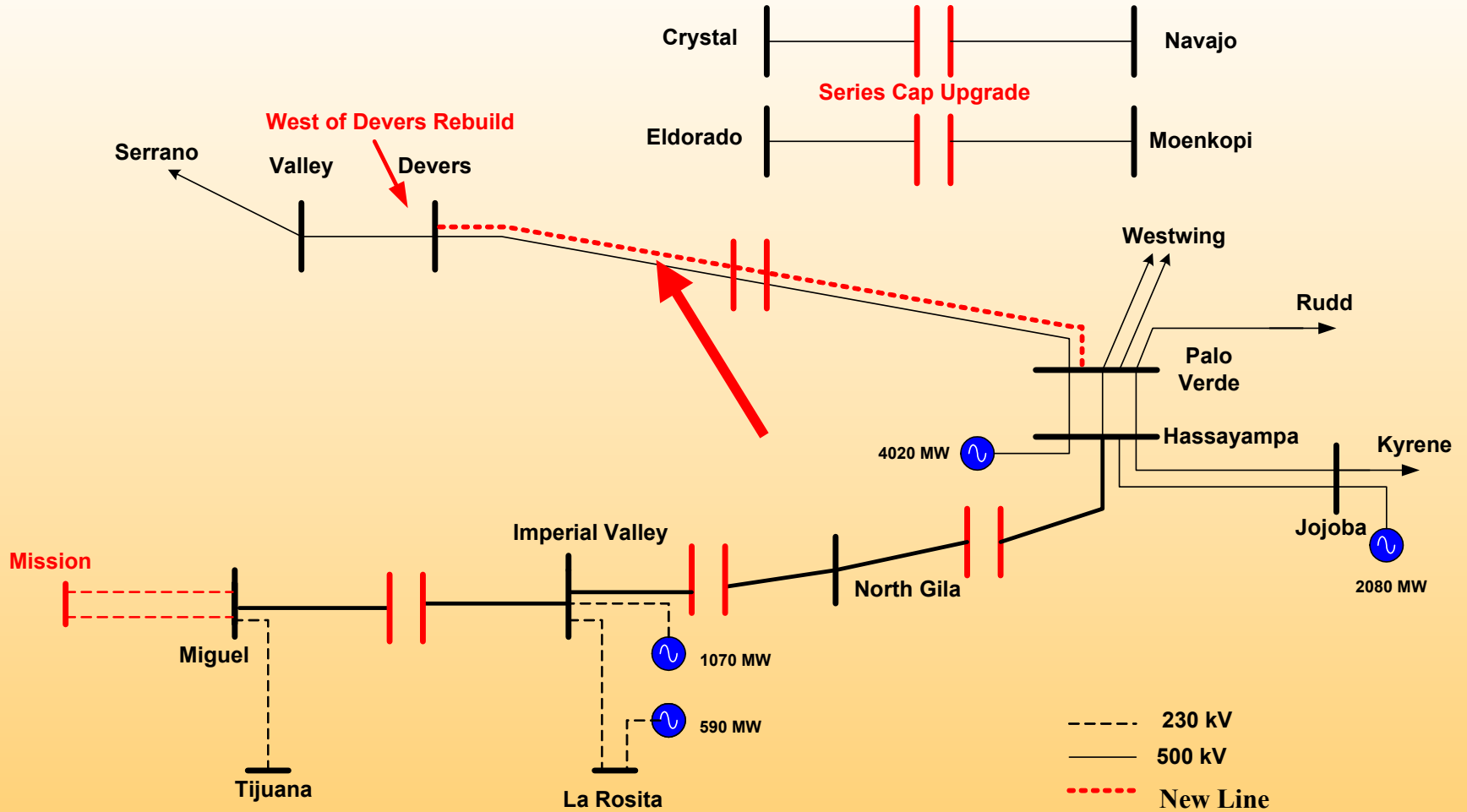




Palo Verde – Devers #2



Palo Verde – Devers #2



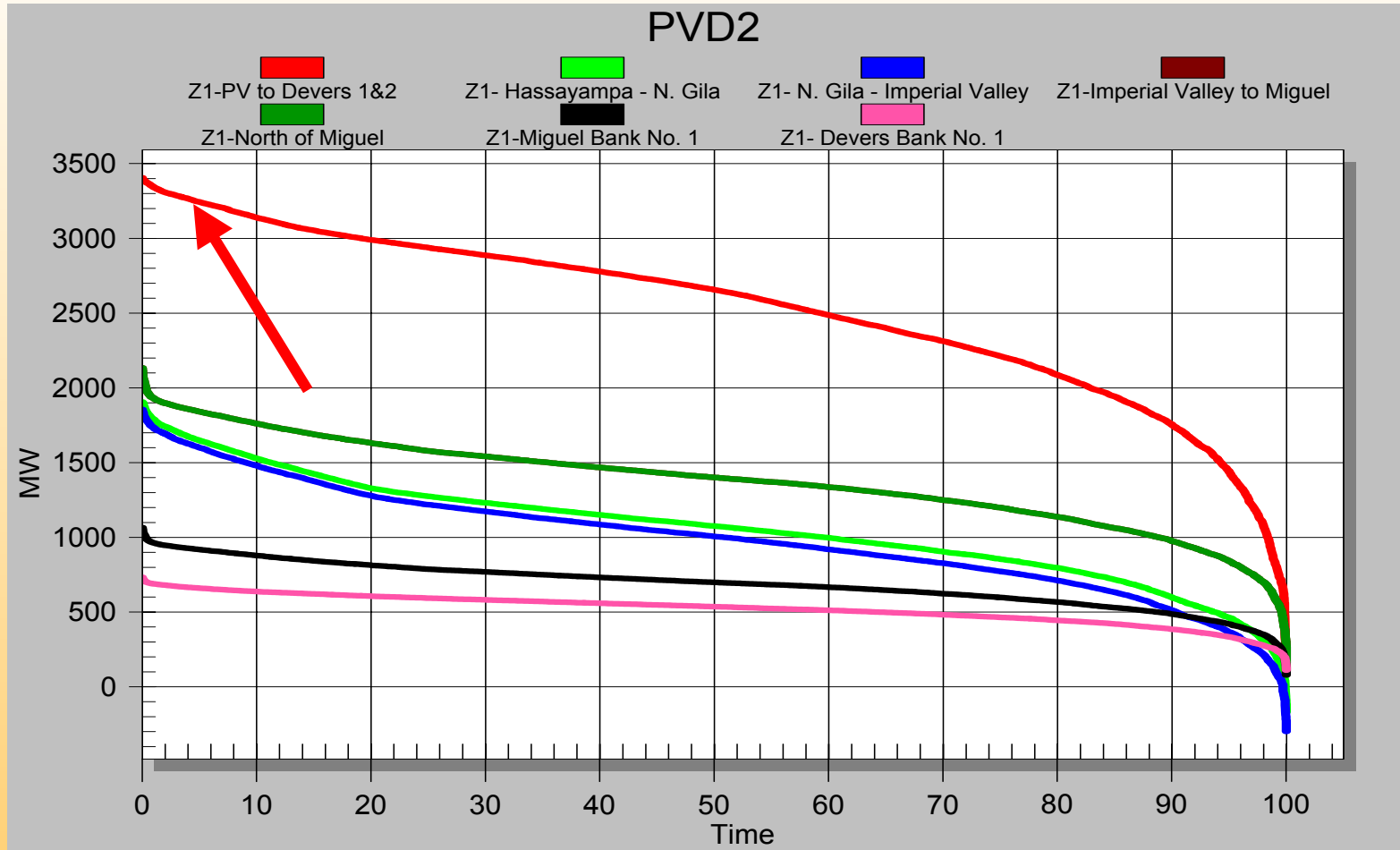


Update on Input Assumptions

	EOR	SCIT	WOR
Short-term Case	8,055 MW	19,391 MW	10,623MW
PVD2 Case	$8,055 + 1,200 = 9,255$ MW	$19,391 + 1,200 = 20,591$ MW	$10,623 + 1,200 = 11,823$ MW

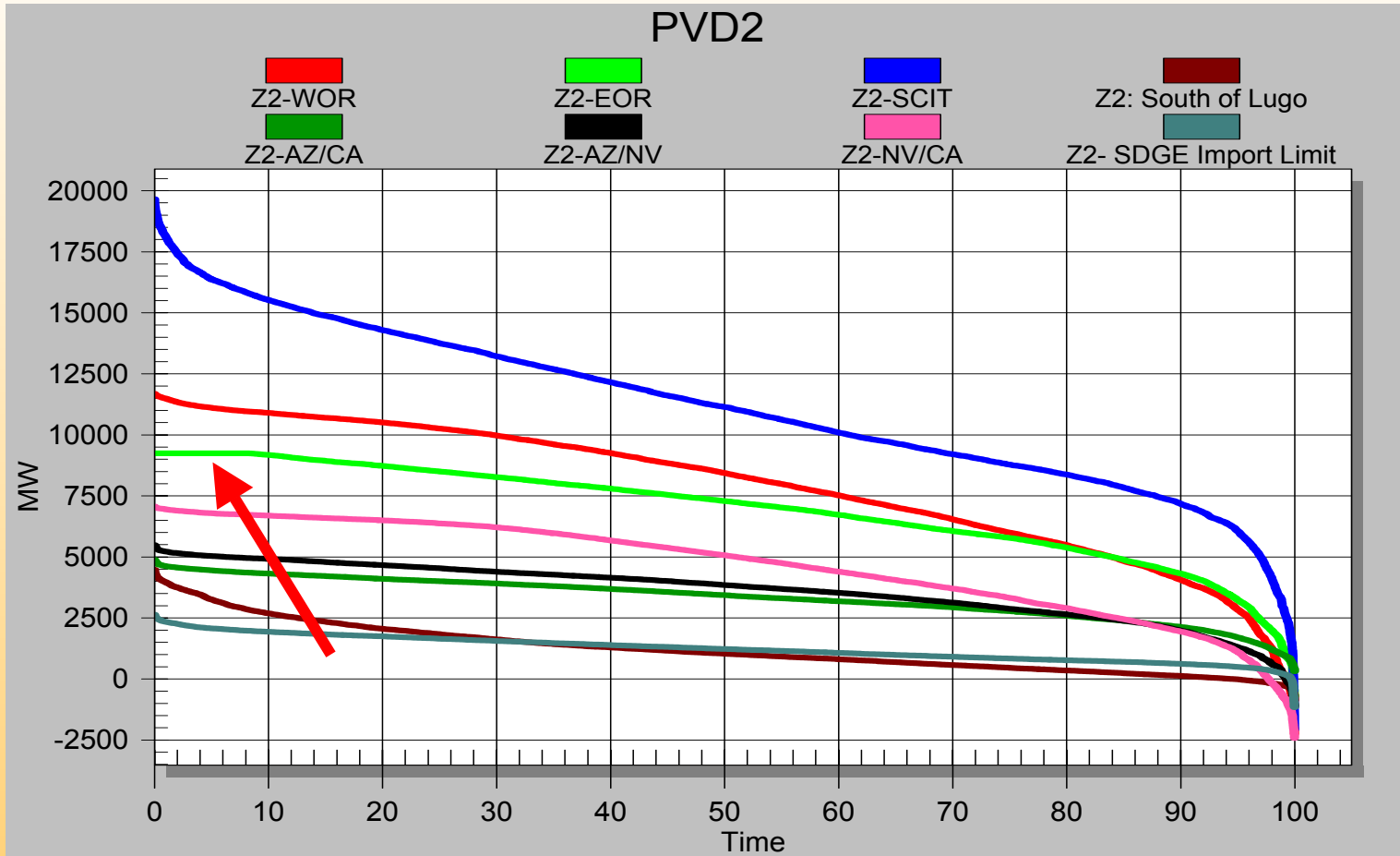


Palo Verde – Devers #2



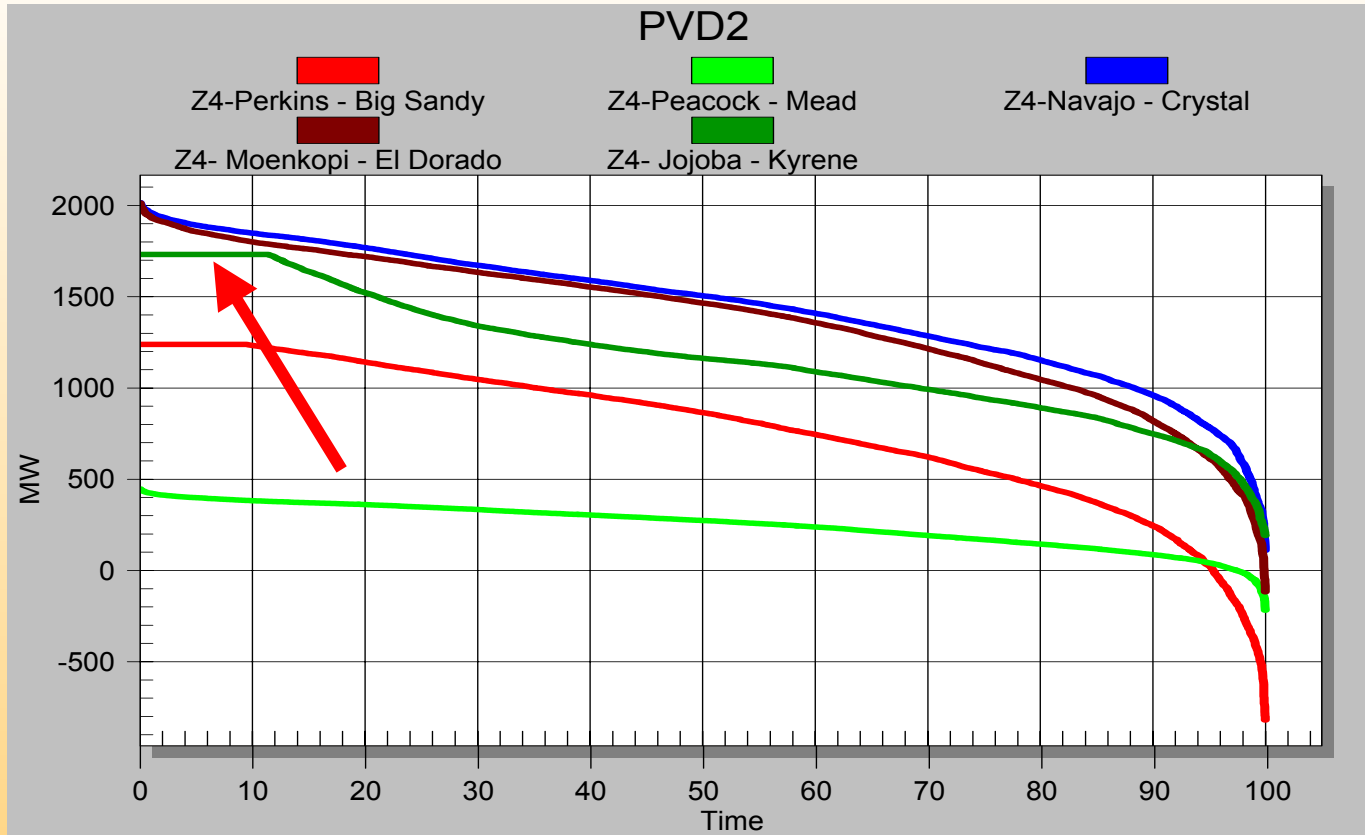


Palo Verde – Devers #2





Palo Verde – Devers #2





Palo Verde – Devers #2

ISO Participant Benefits (k\$)

Case	Change in Consumer Surplus	Change in Producer Surplus	Change in Congestion Rent	Total
Enforcing J-K	\$54,811.00	-\$11,909.44	-\$25,297.05	\$17,604.52
Without Enforcing J-K	\$53,246.00	-\$11,749.69	-\$25,782.96	\$15,713.35

WECC Reduction in Production Cost (k\$)

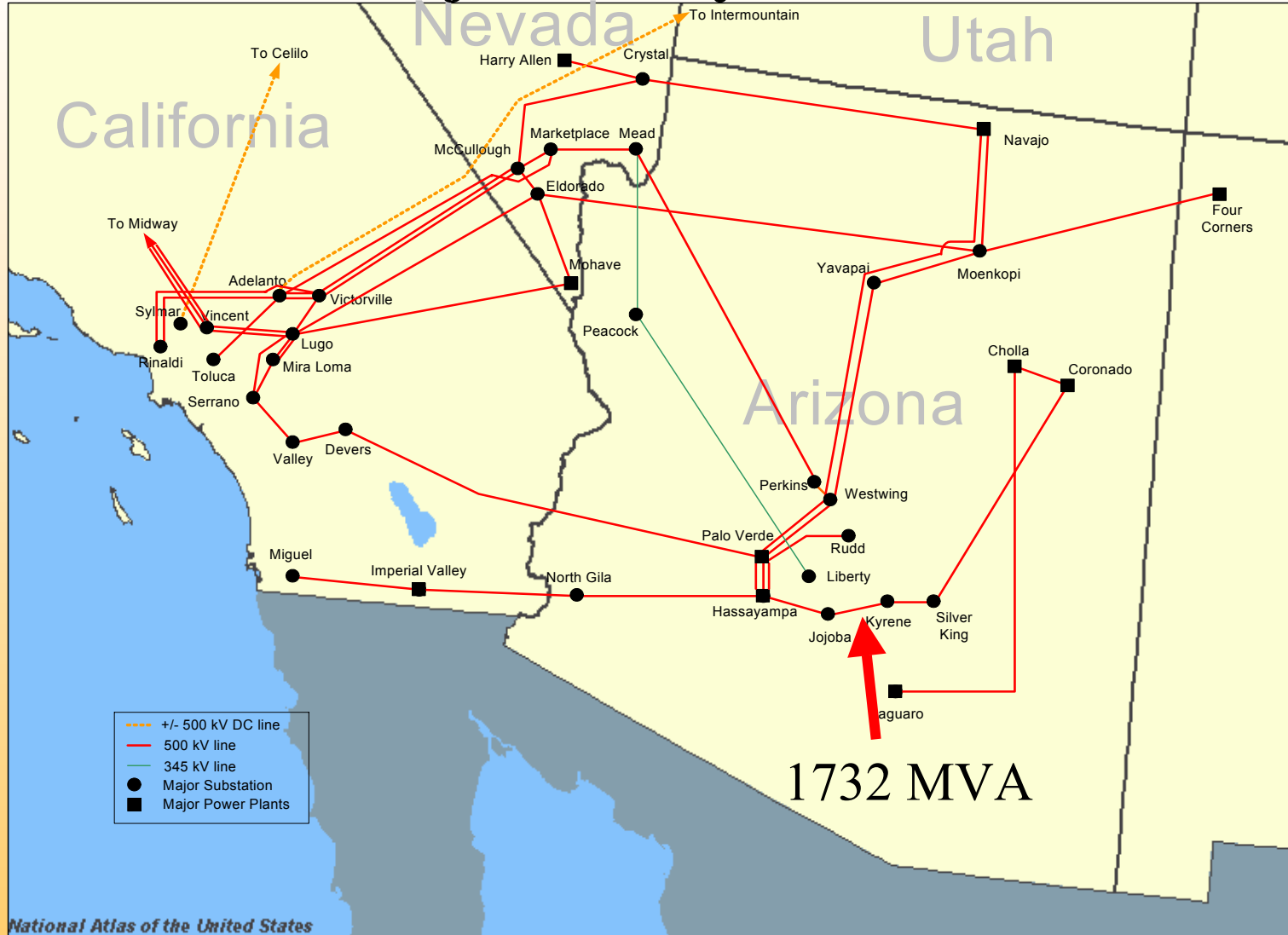
Case	PVD2	Short Term	Saving in Production Cost
Enforcing J-K	\$15,449,461.13	\$15,459,534.08	\$10,072.95
Without Enforcing J-K	\$15,439,878.67	\$15,447,678.85	\$7,800.19



Part 3: Sensitivity Results

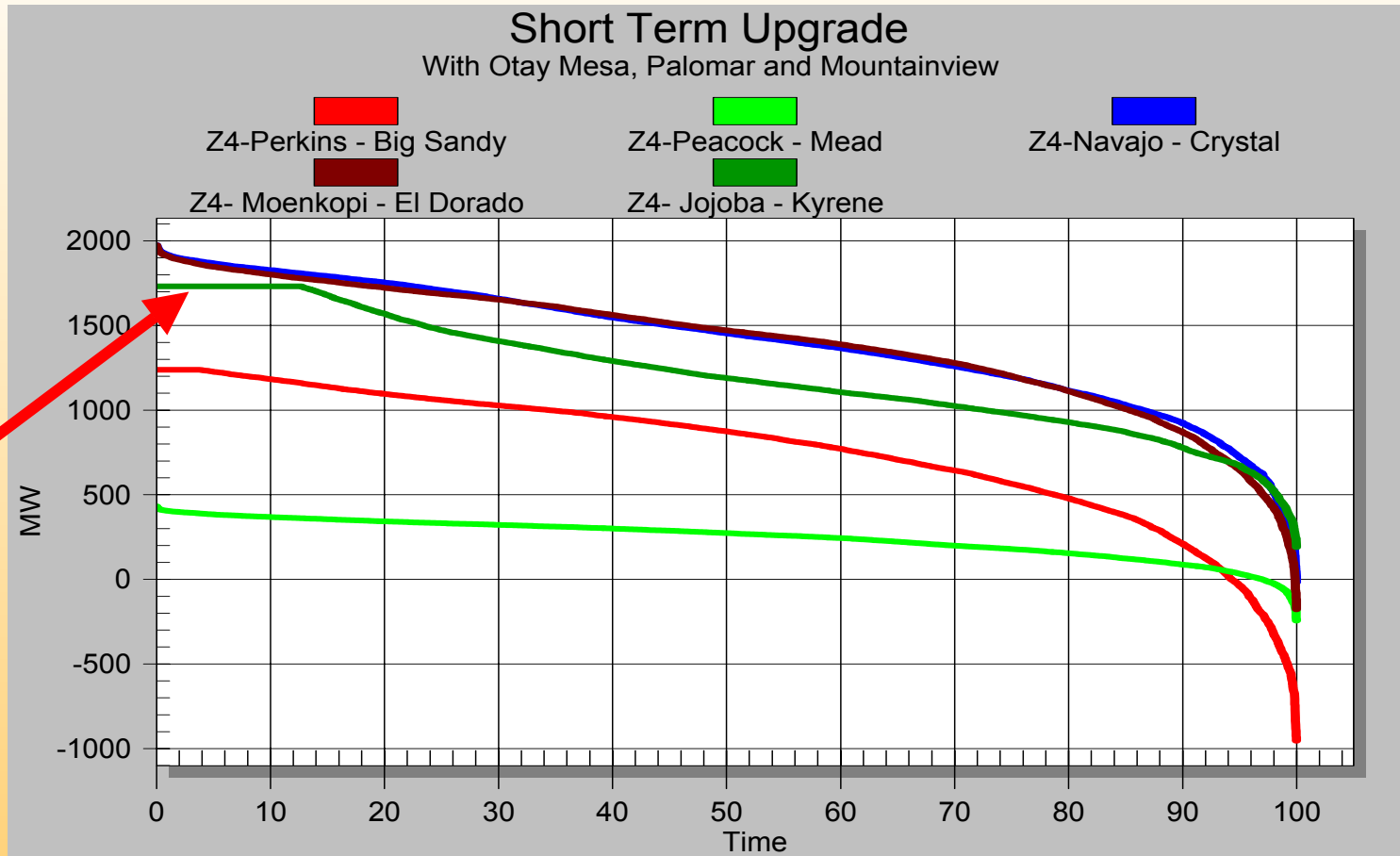


S1: Jojoba – Kyrene Limit



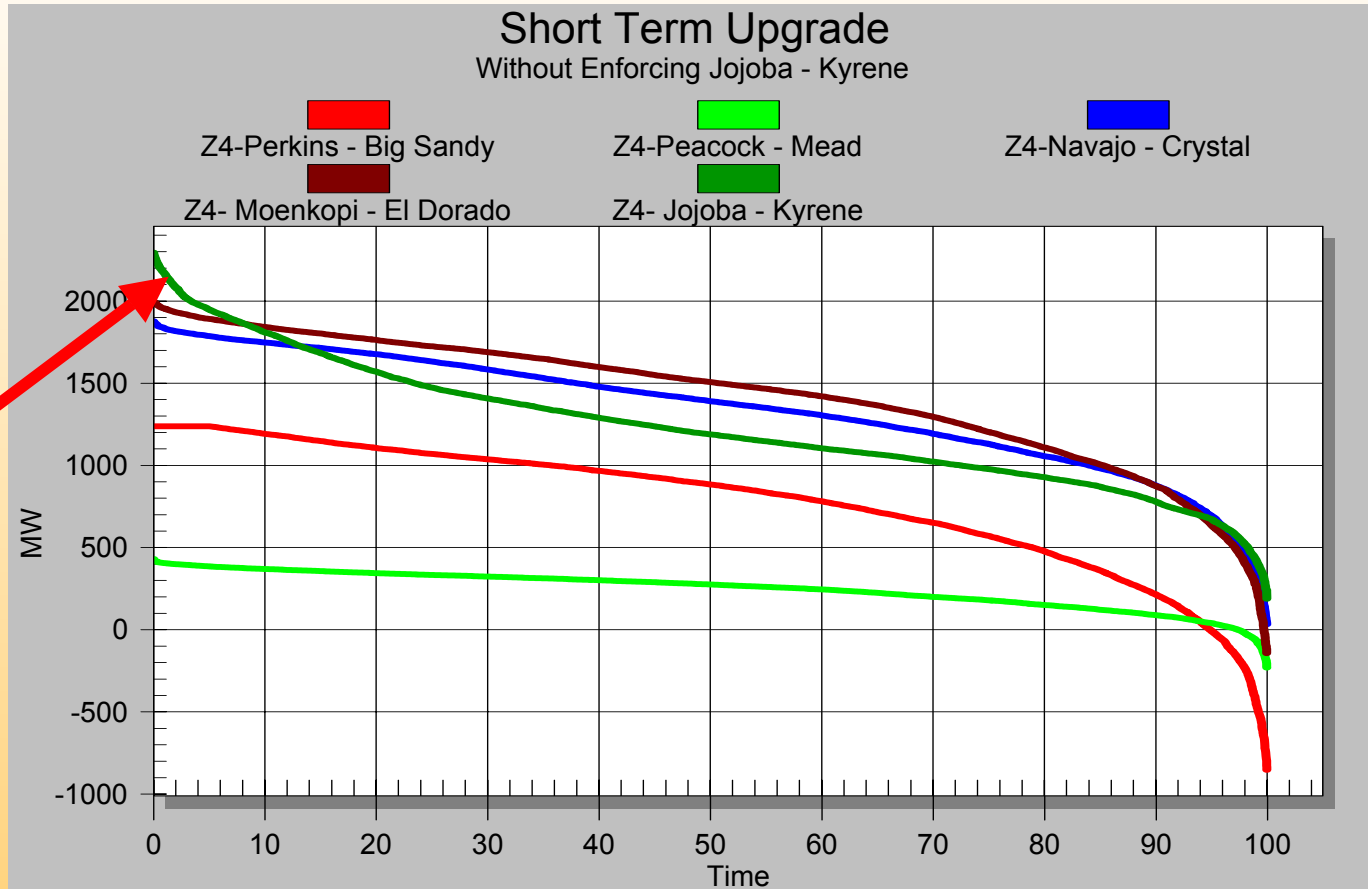


Jojoba – Kyrene Limit





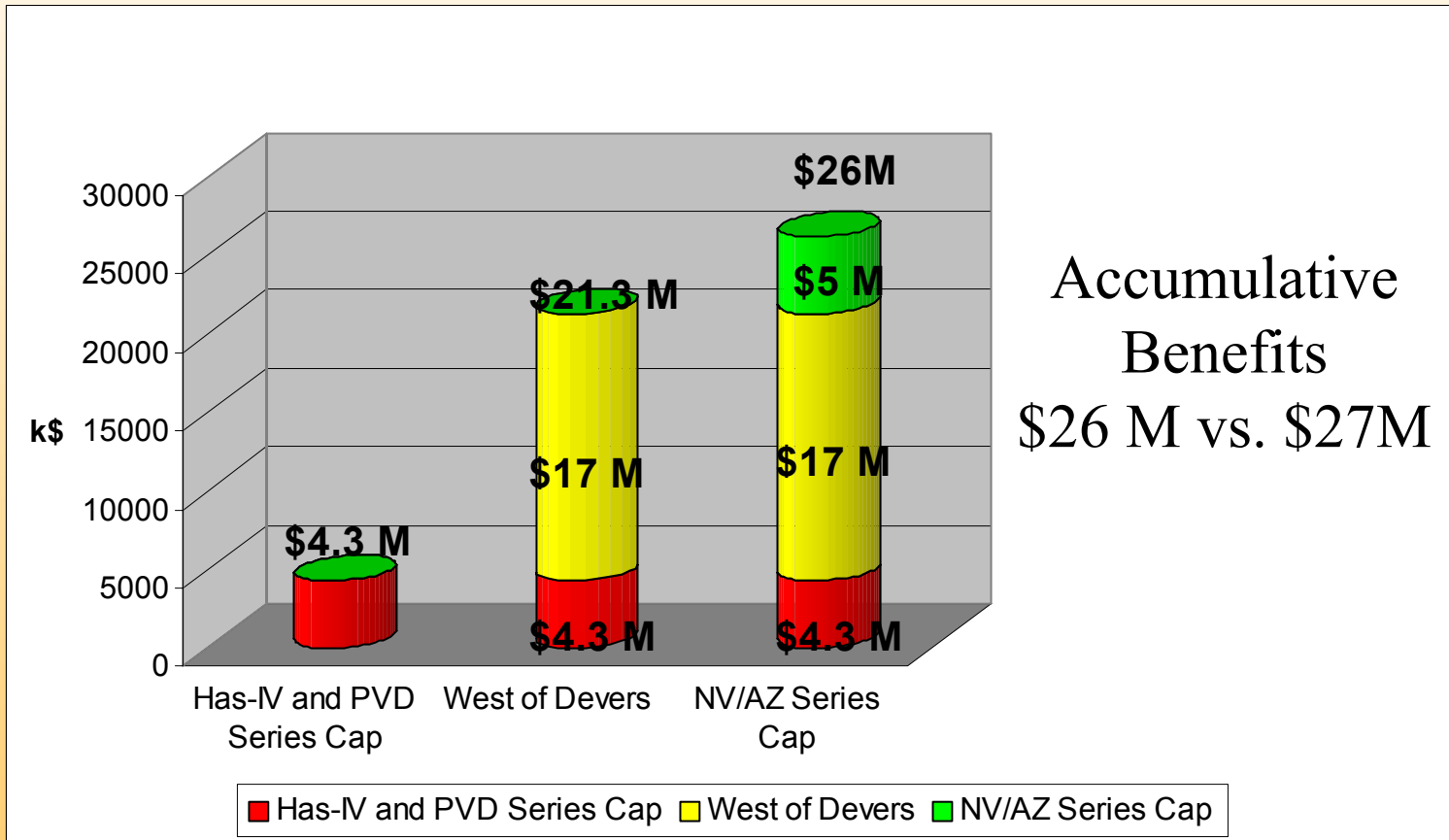
Benefits of Removing Jojoba – Kyrene Limit



WECC Saving in Production Cost is \$12-14 M

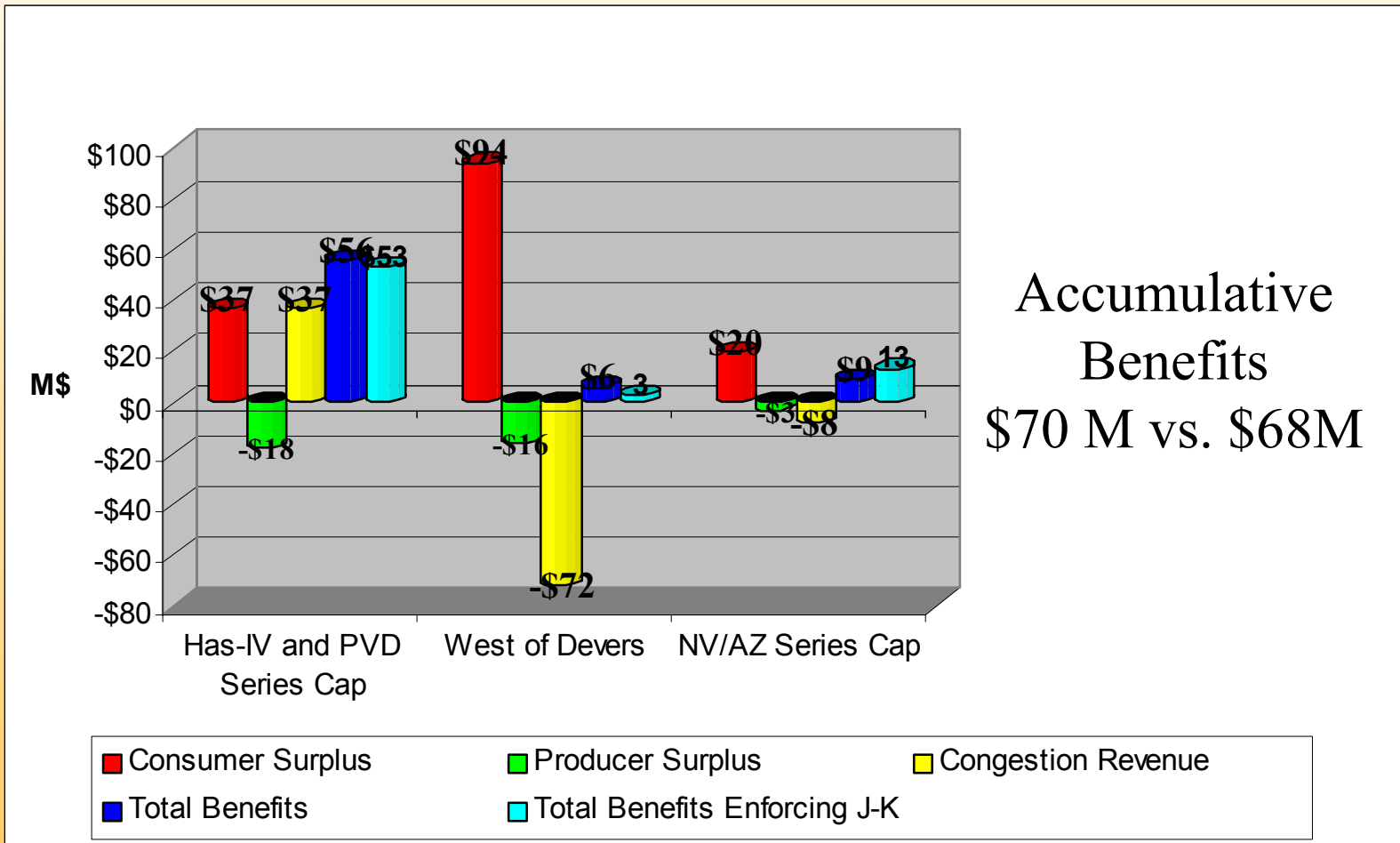


WECC Production Cost Saving Due to Short-term Upgrade Without Enforcing Jojoba – Kyrene Limit



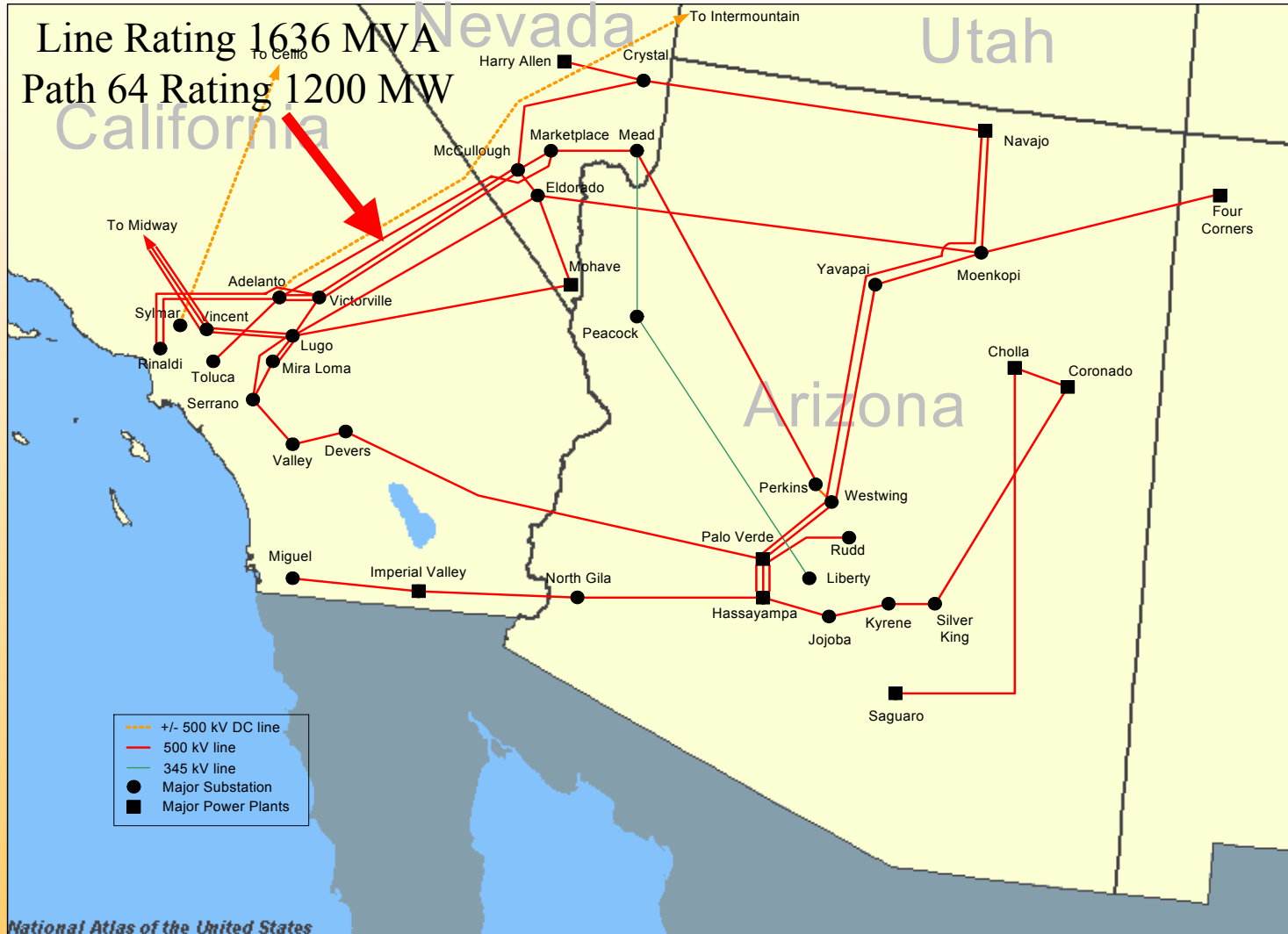


ISO Participant Benefits Due to Short-term Upgrades Without Enforcing Jojoba – Kyrene Limit



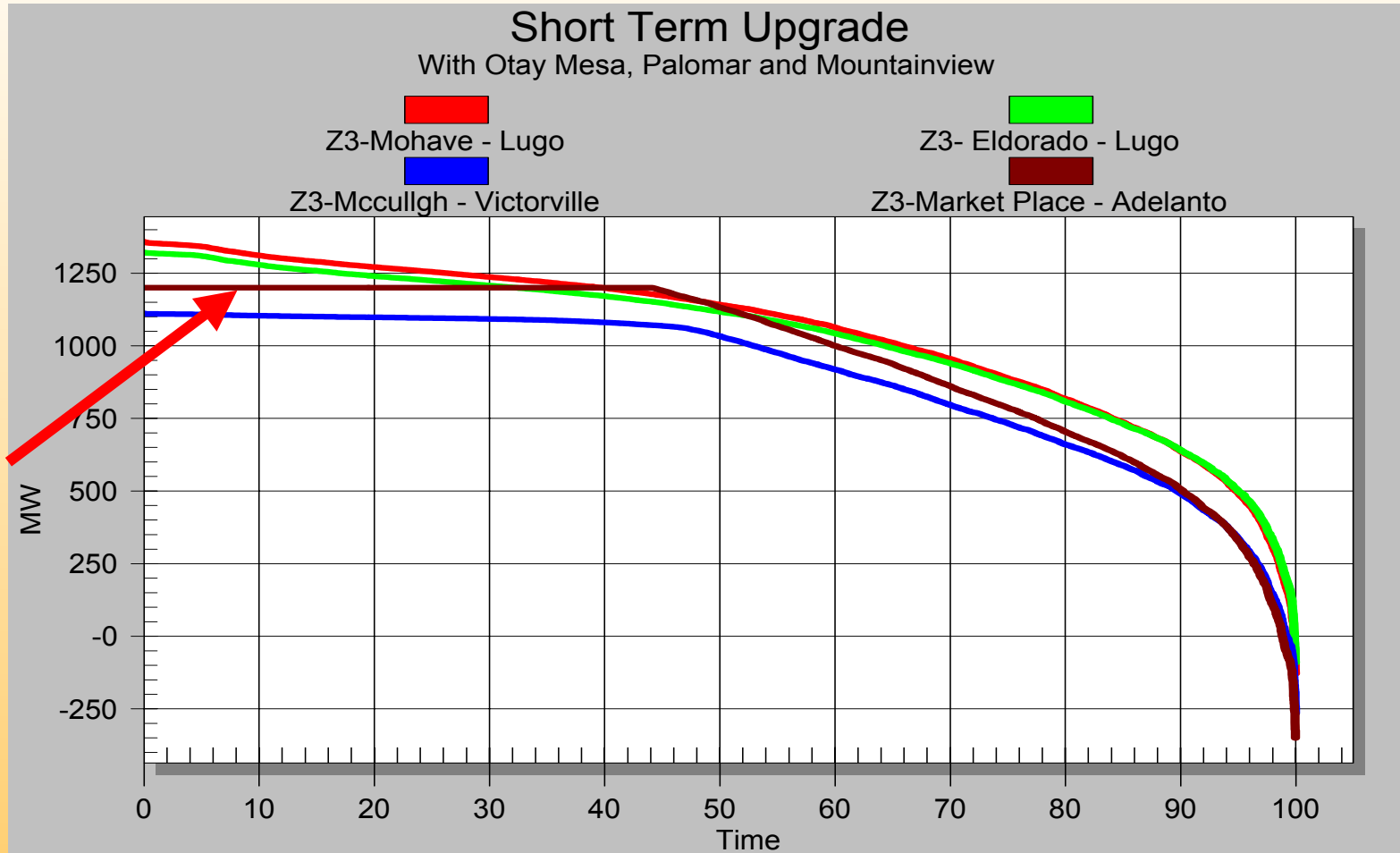


S2: Market Place – Adelanto Limit



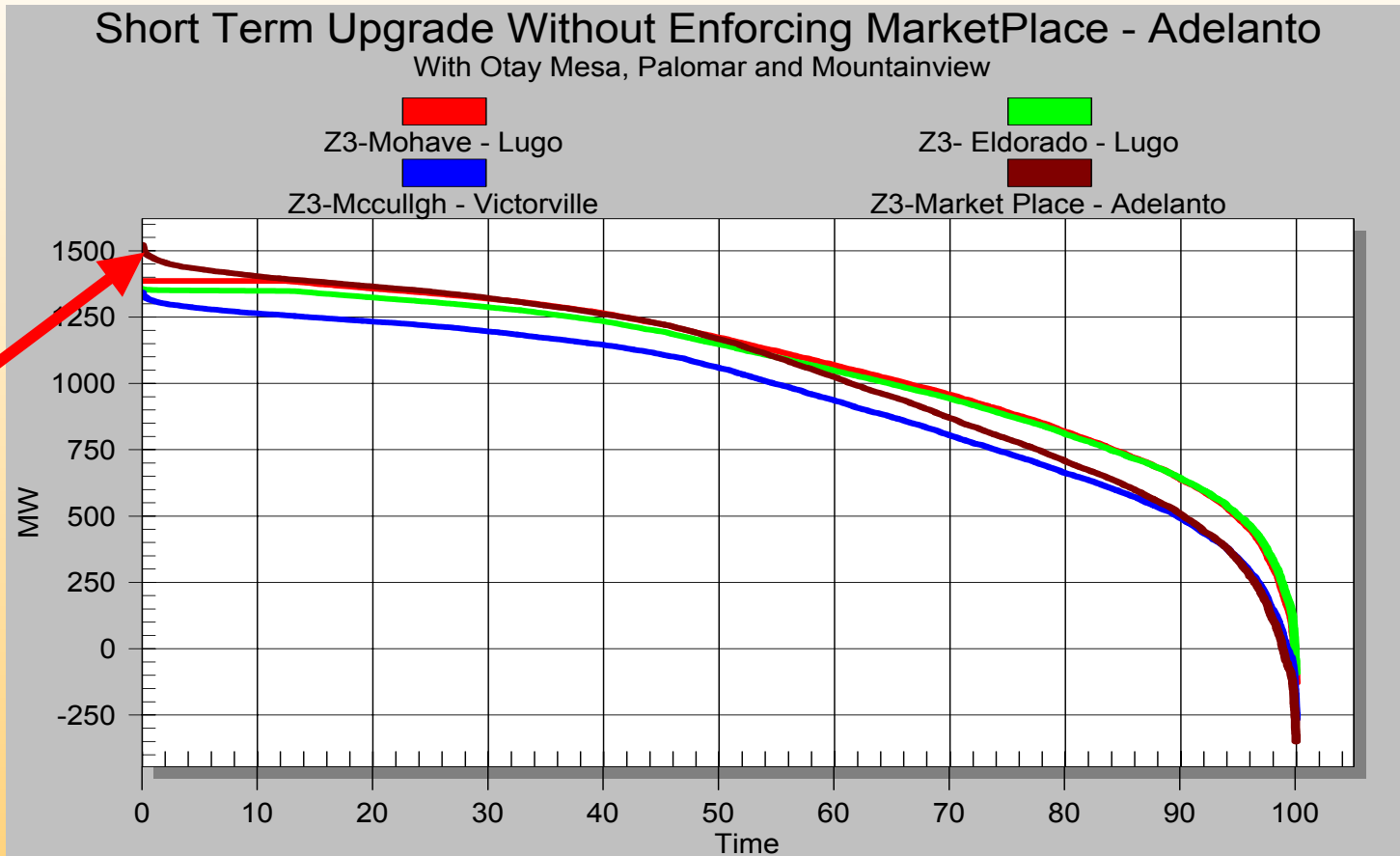


Market Place – Adelanto Limit





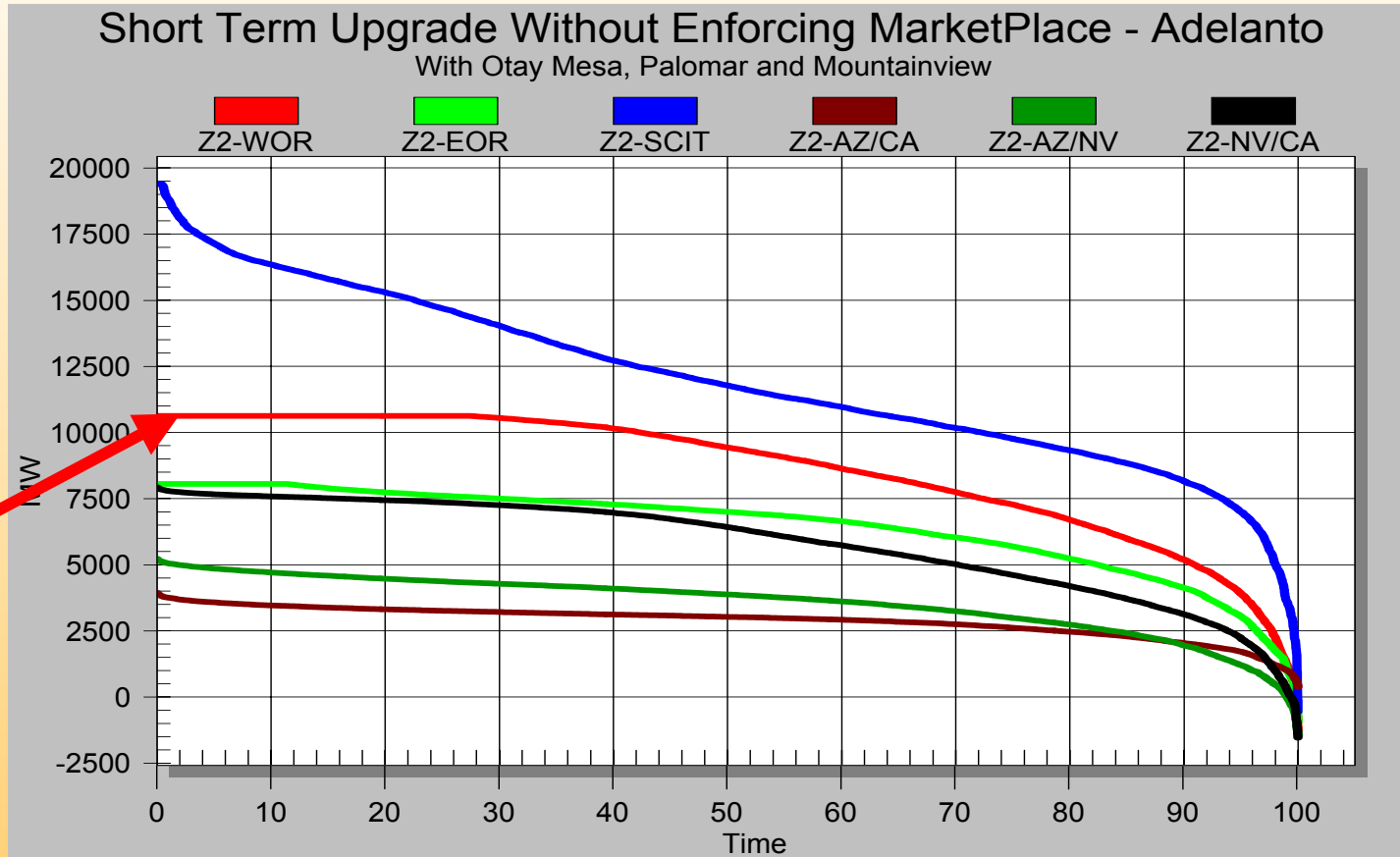
Market Place – Adelanto Limit



WECC Saving in Production Cost is \$6 M



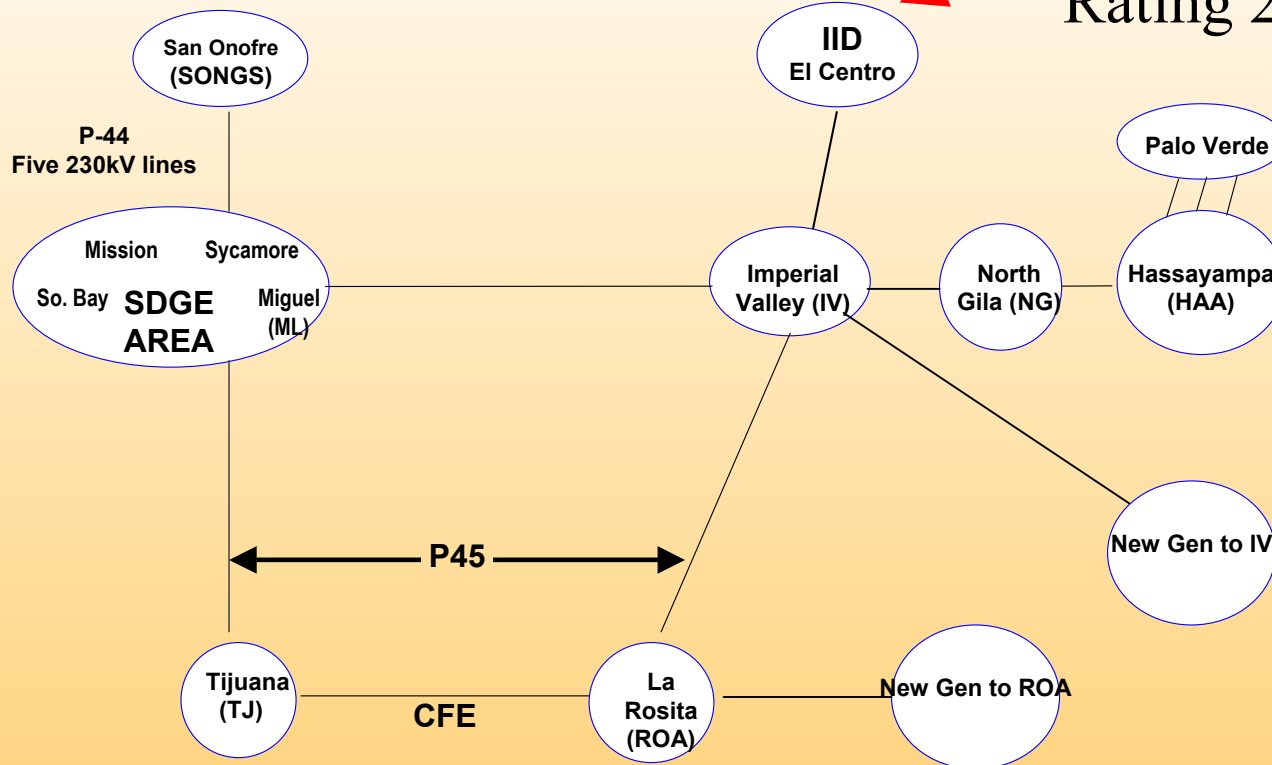
Market Place – Adelanto Limit





S3: El Centro Bank

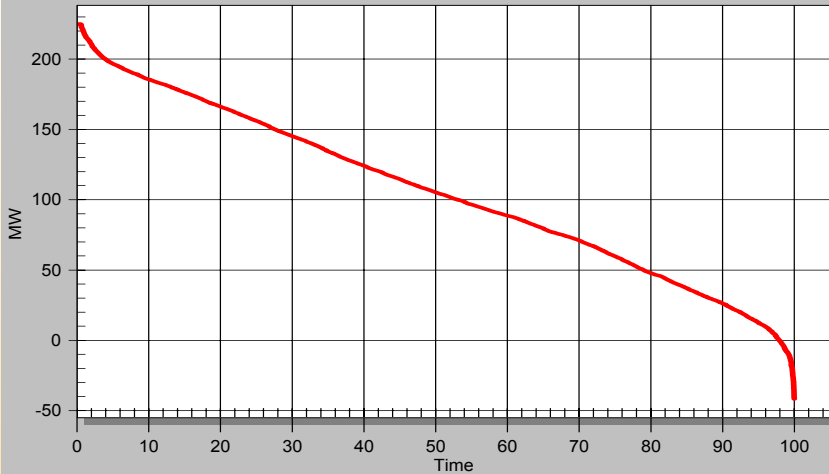
161/230 kV Bank
Rating 225/258 MVA



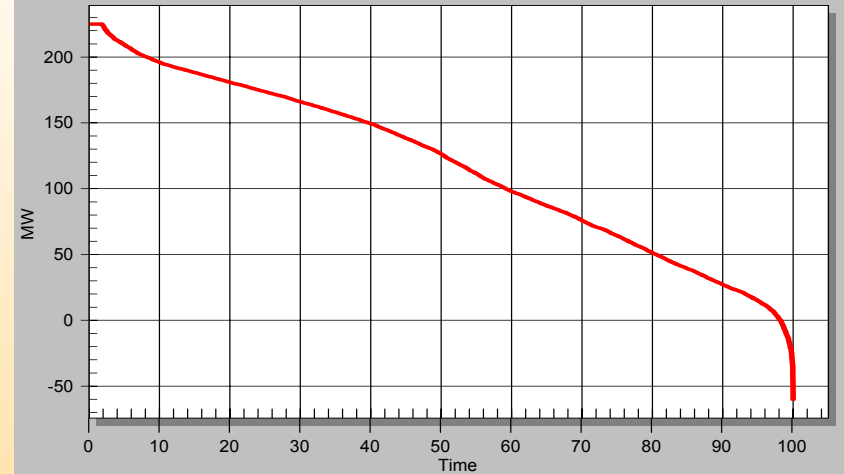


El Centro Bank

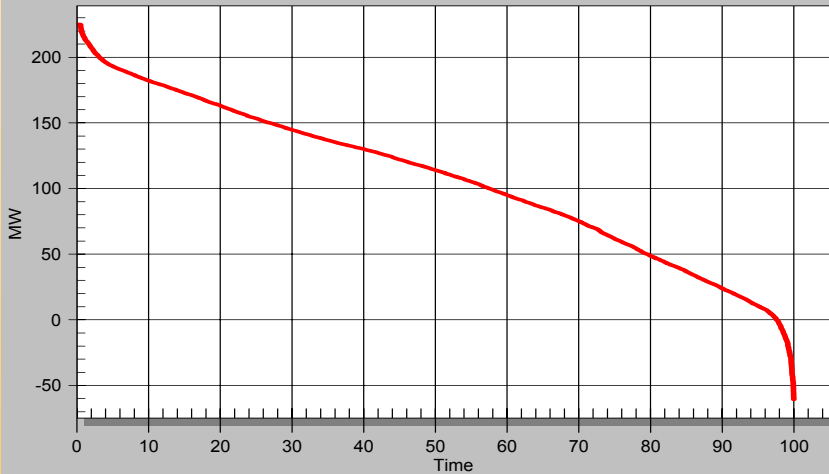
Miguel Improvements
Z1- El Centro Bank



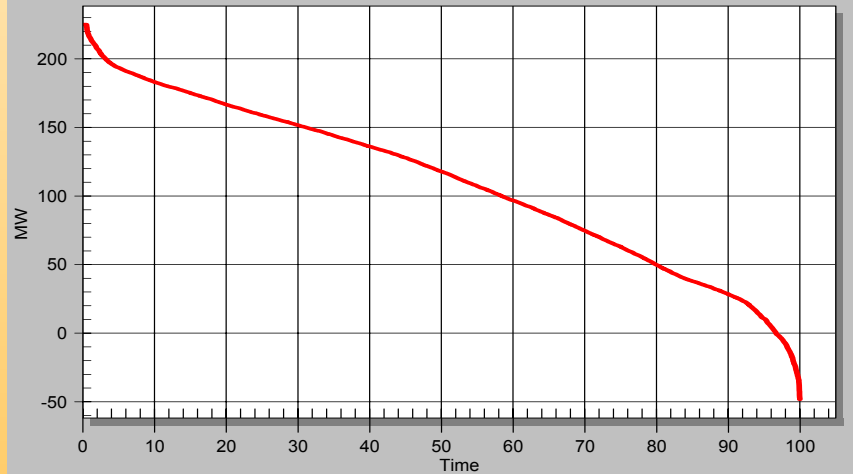
Has- IV and PVD Series Cap Upgrade
Z1- El Centro Bank



West of Devers Upgrade
Z1- El Centro Bank



Short Term Upgrade
Z1- El Centro Bank



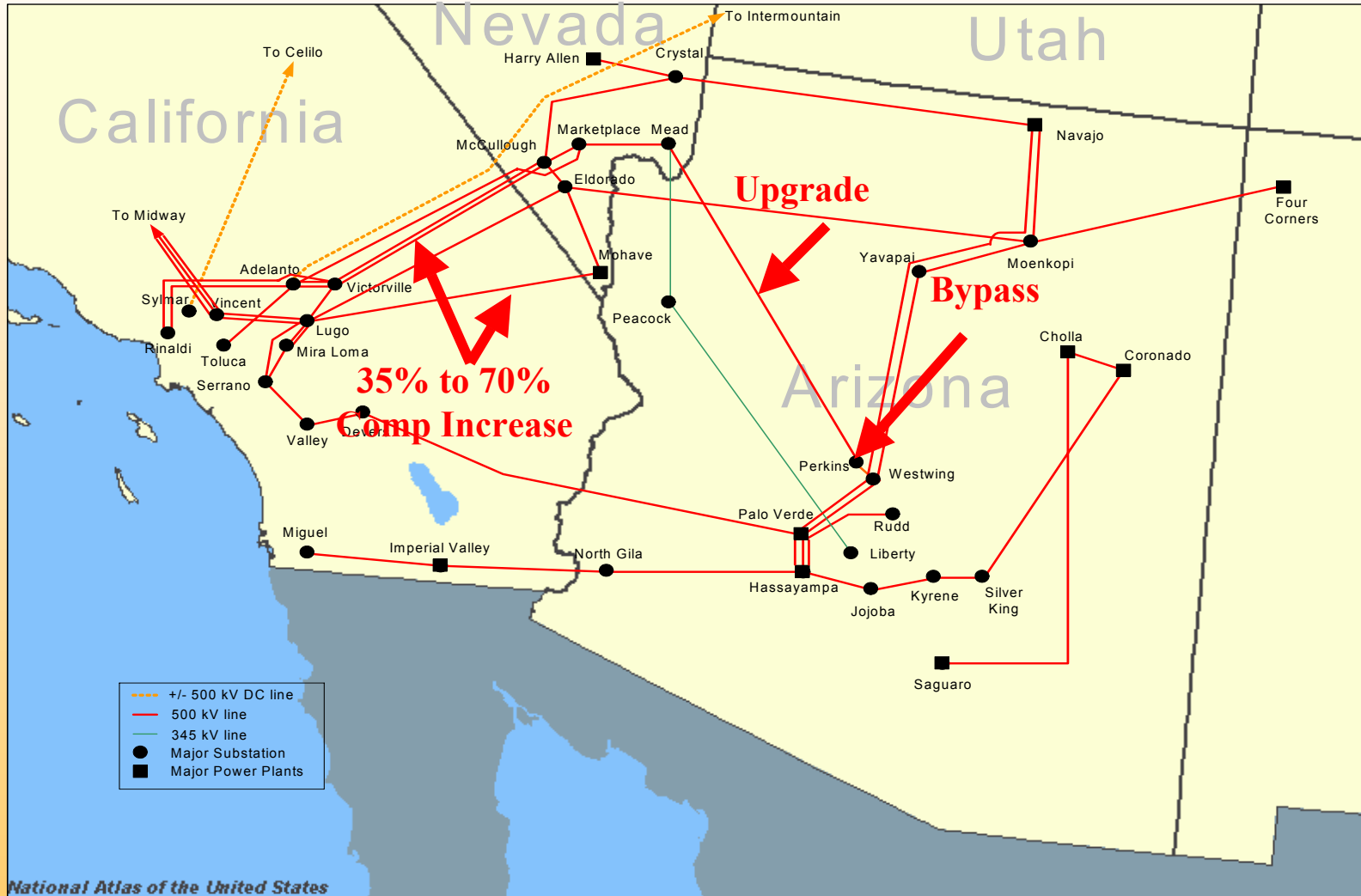


Increase in WECC Production Cost Due to El Centro Bank Congestion

Case	k\$
Miguel Improvements	\$4.08
Has- IV and PVD Series Cap Upgrade	\$24.51
West of Devers Short Term Upgrade	\$2.61
Navajo - Crystal & Moenkopi - Eldorado Series Cap Upgrade	\$3.03

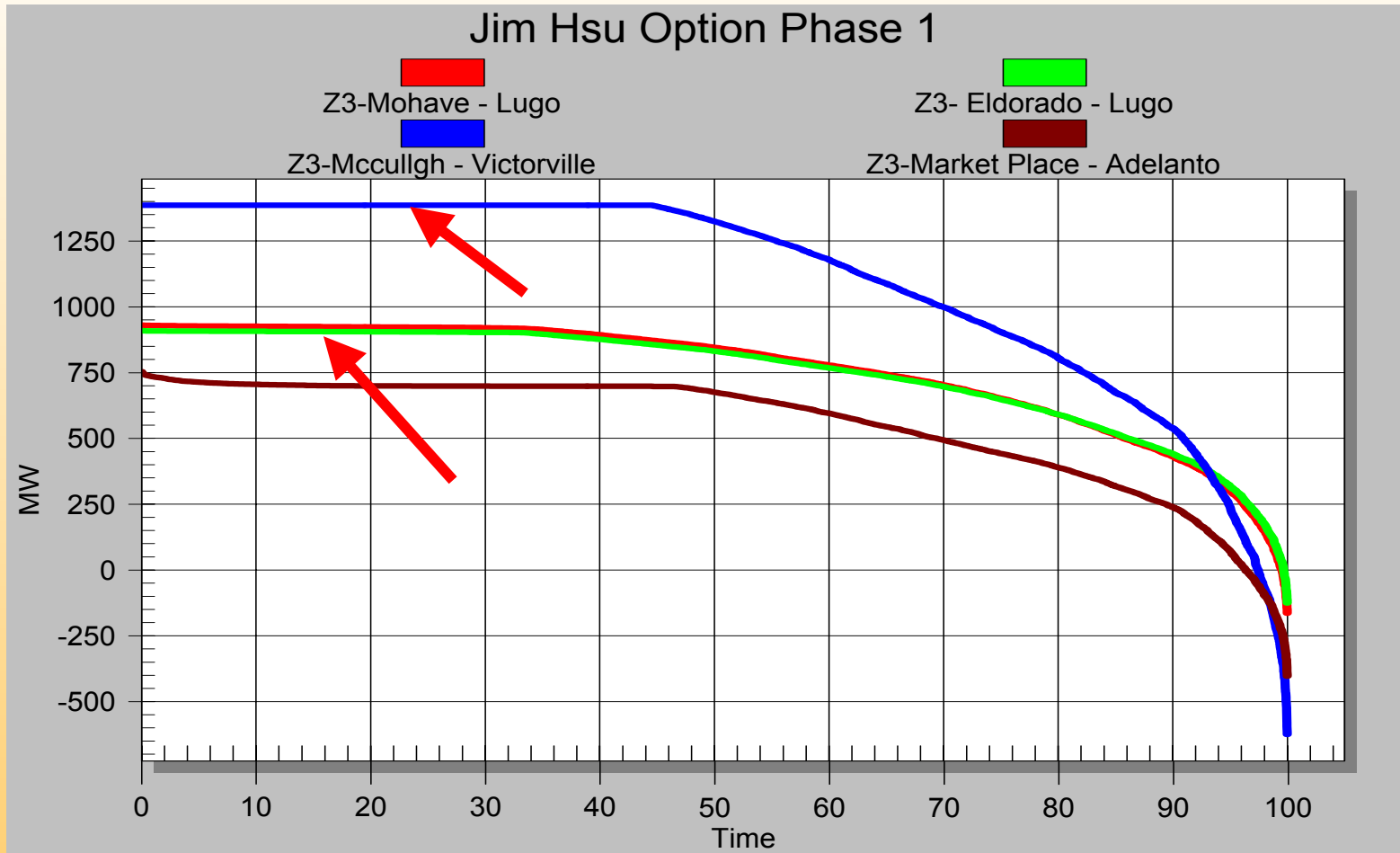


S4: James Hsu Option With Series Compensation



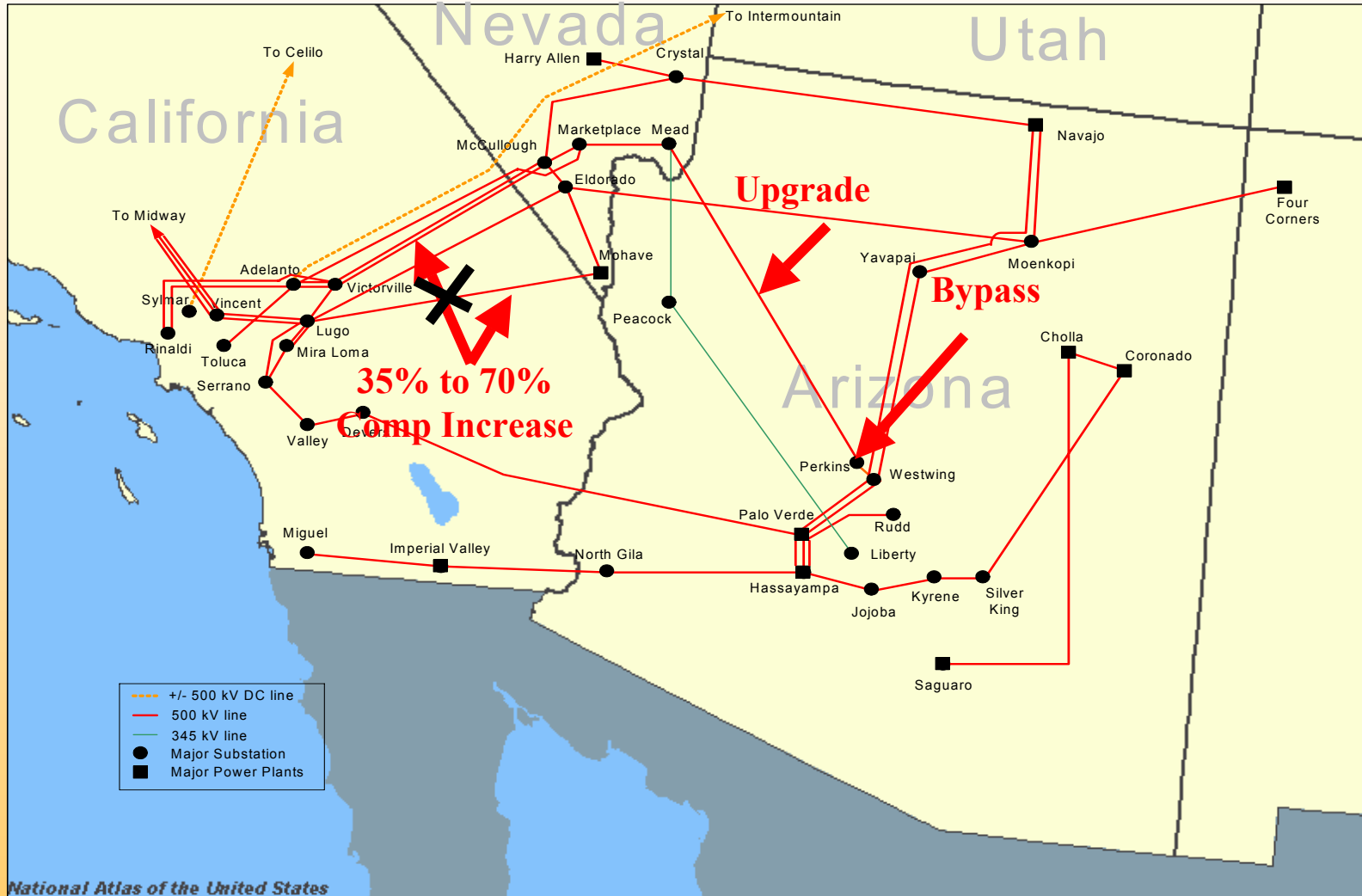


James Hsu Option With Series Compensation



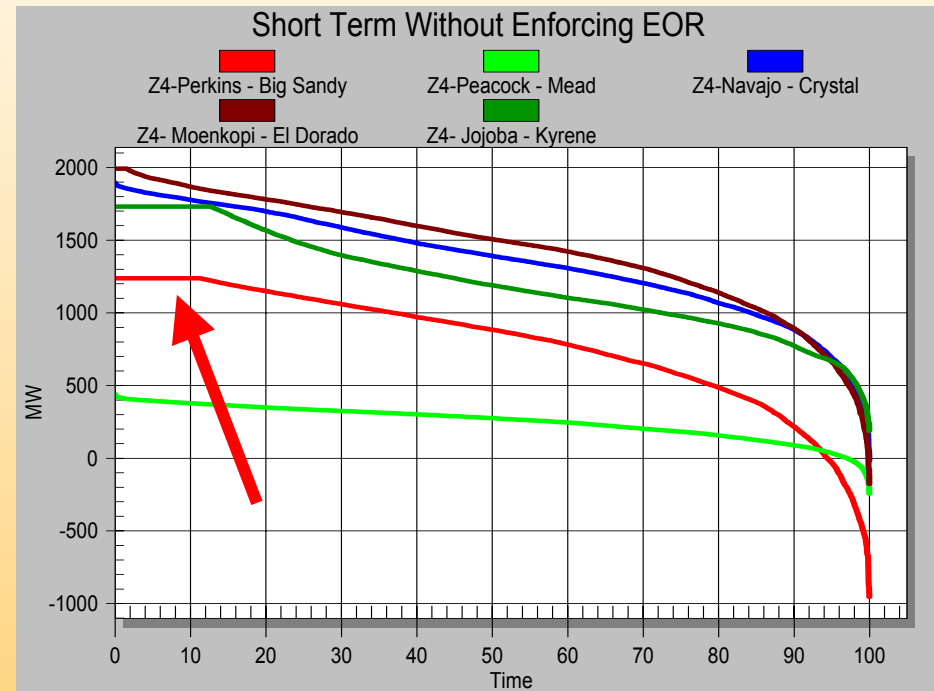
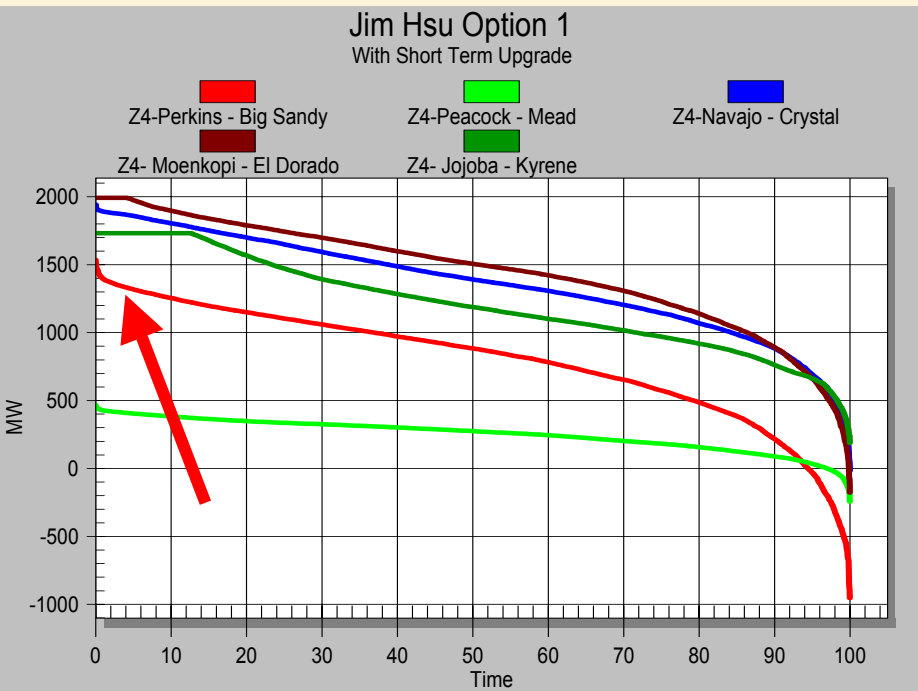


James Hsu Option Without Series Compensation



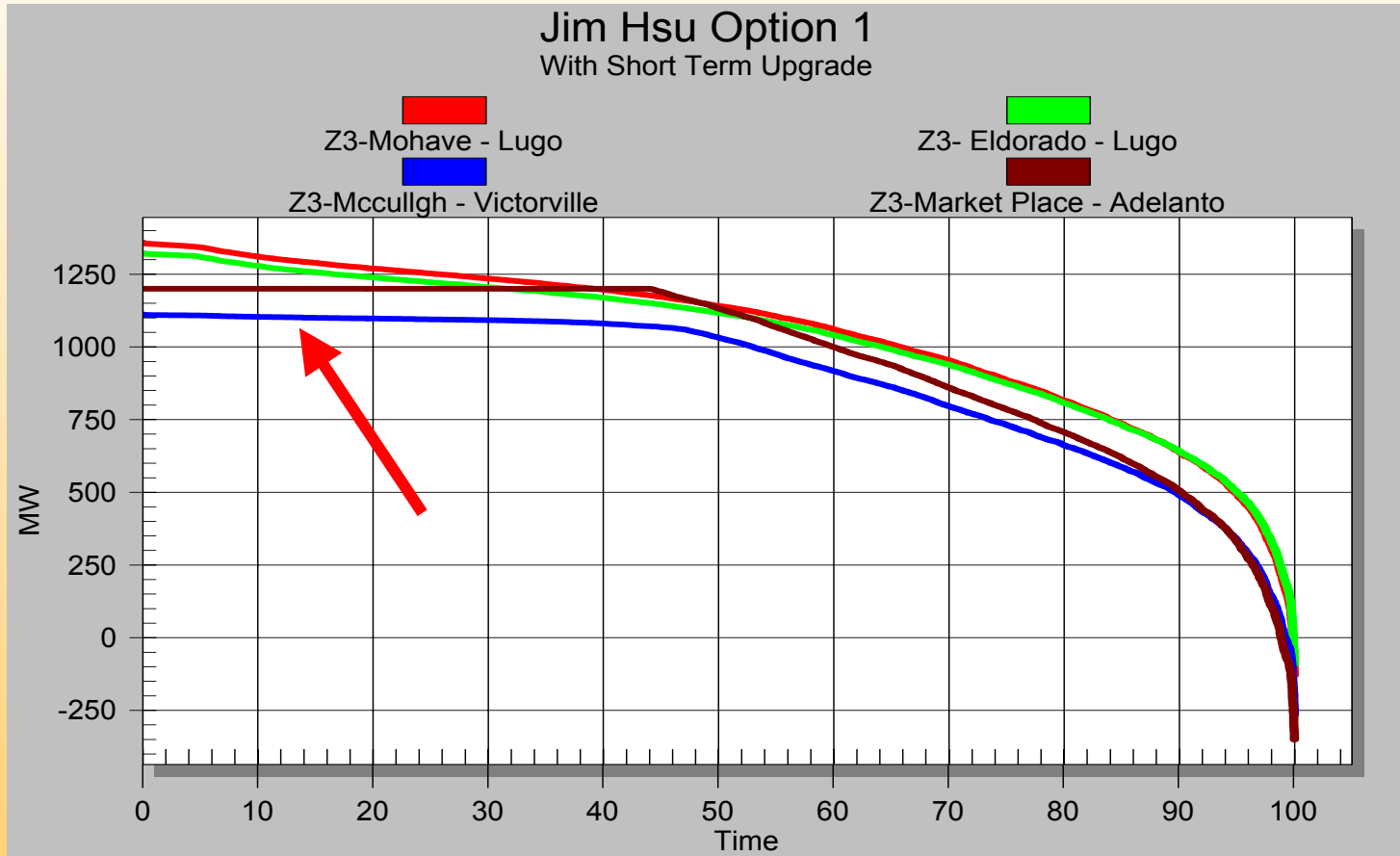


James Hsu Option Without Series Compensation



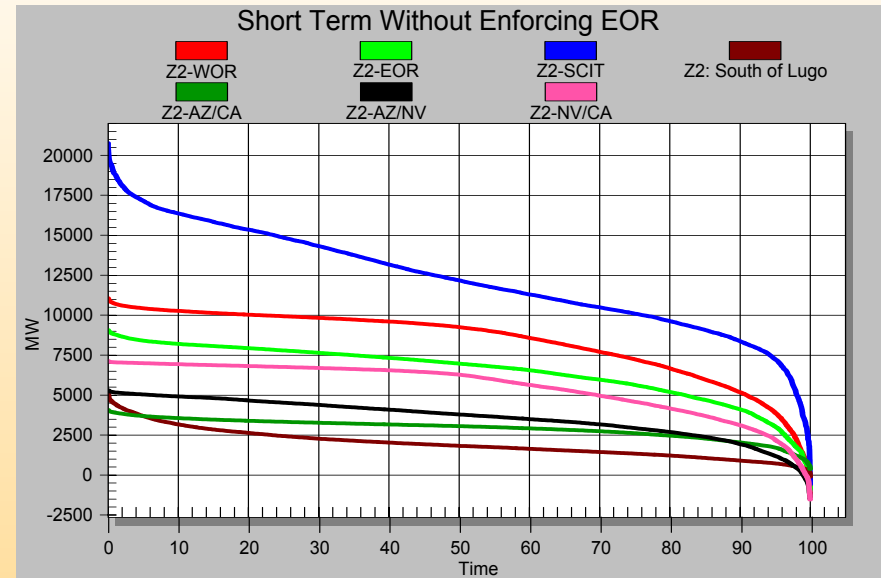
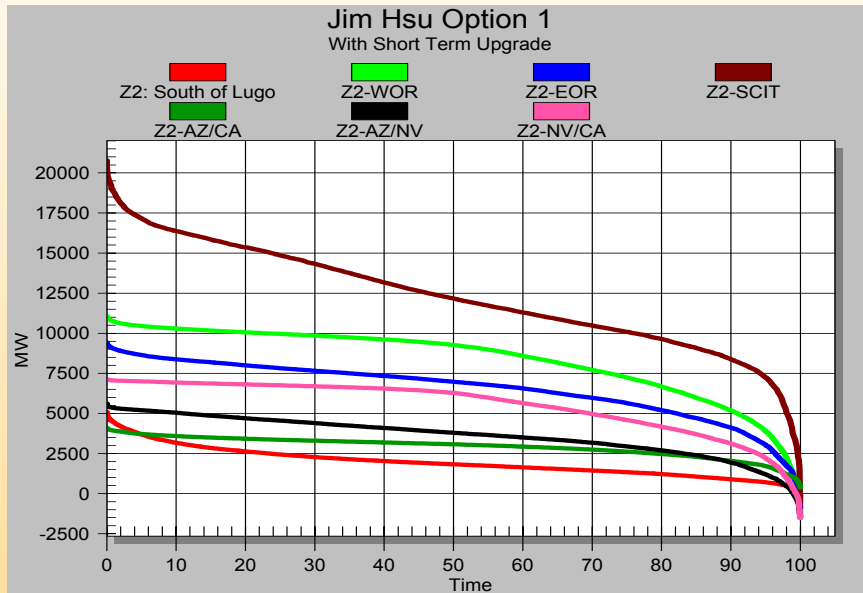


James Hsu Option Without Series Compensation





James Hsu Option Without Series Compensation



- Total WECC Consumer Surplus = \$1M
- Total WECC Production Cost Saving = \$100K
- Slight increase in EOR flow
- More studies at different compensation levels need to be done



S5: Navajo Transmission Project

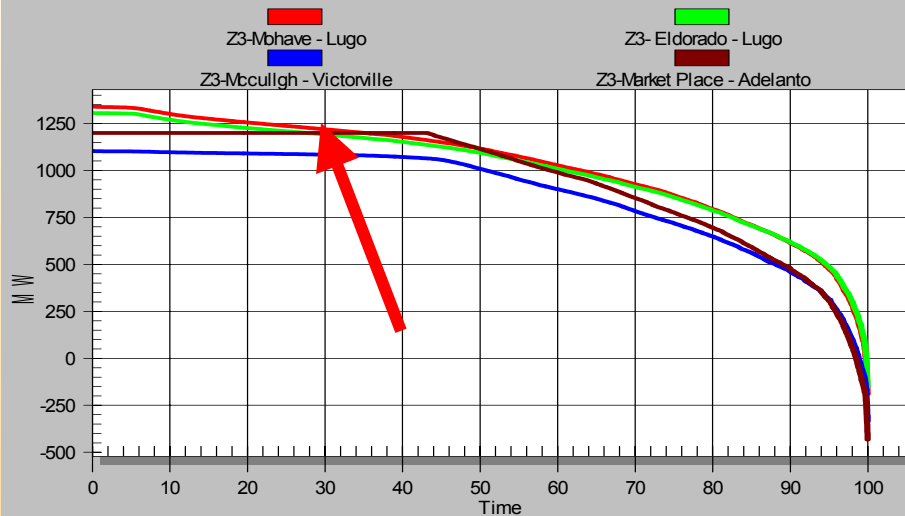
- Two new coal plants 500 MW at Four Corners 345 kV and 1000 MW at Shiprock 500 kV.
- New 500 kV line from near Four Corners to Market Place.
- Line consists of three segments, first two from Shiprock to Moenkopi and third from Moenkopi to Market Place.
- Objective of this study is to assess the economic benefits of the Moenkopi to Market Place segment of the line.



Navajo Transmission Project

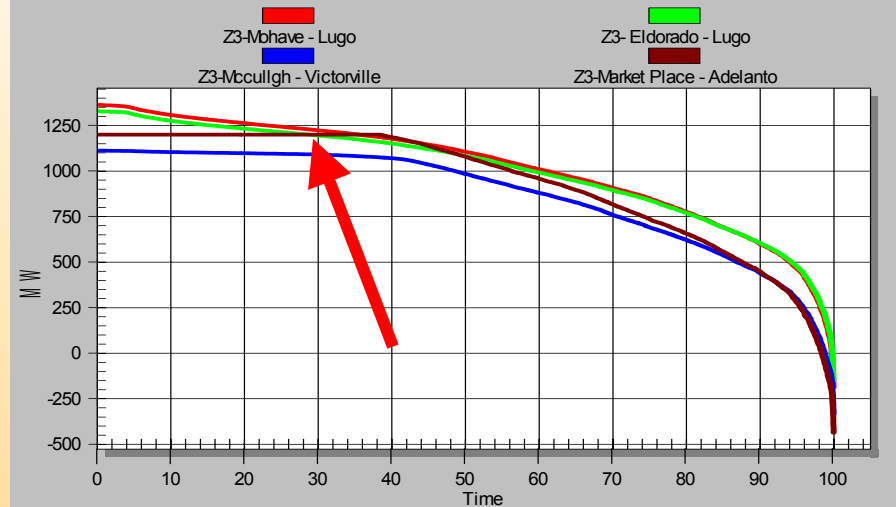
Short Term Upgrade with Navajo South Project

With Moenkopi - Market Place without Enforcing Line Limit



Short Term Upgrade with Navajo South Project

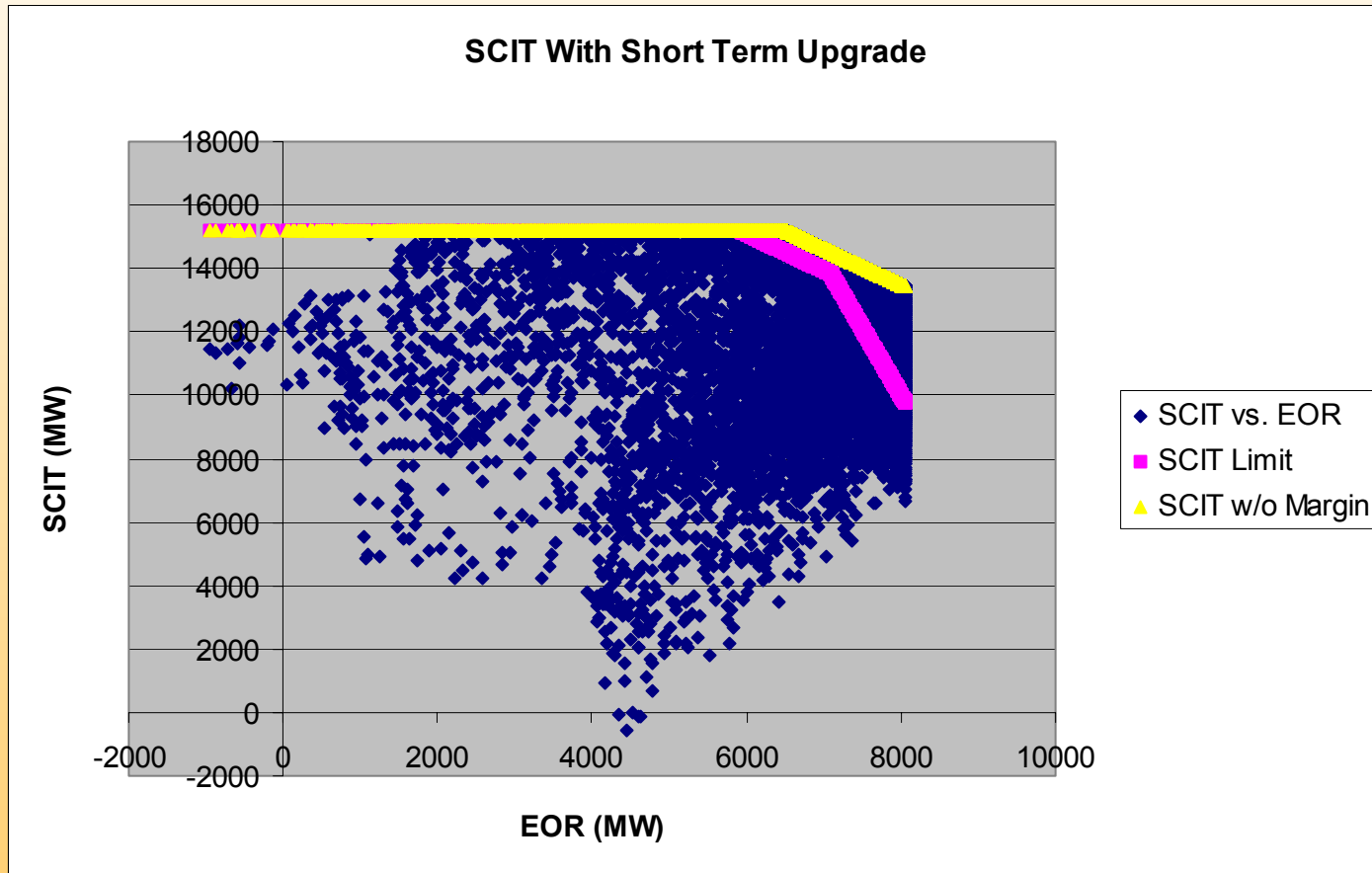
Without Moenkopi - Market Place



Case	Without Moenkopi - Market Place	With Moenkopi - Market Place Unlimited	Line Benefits in k\$
Miguel Improvements	\$15,178,499.69	\$15,114,516.23	\$63,983.46
Has - IV and PVD Series Cap Upgrade	\$15,176,222.24	\$15,109,198.56	\$67,023.68
Short Term	\$15,085,142.84	\$15,086,568.02	-\$1,425.18

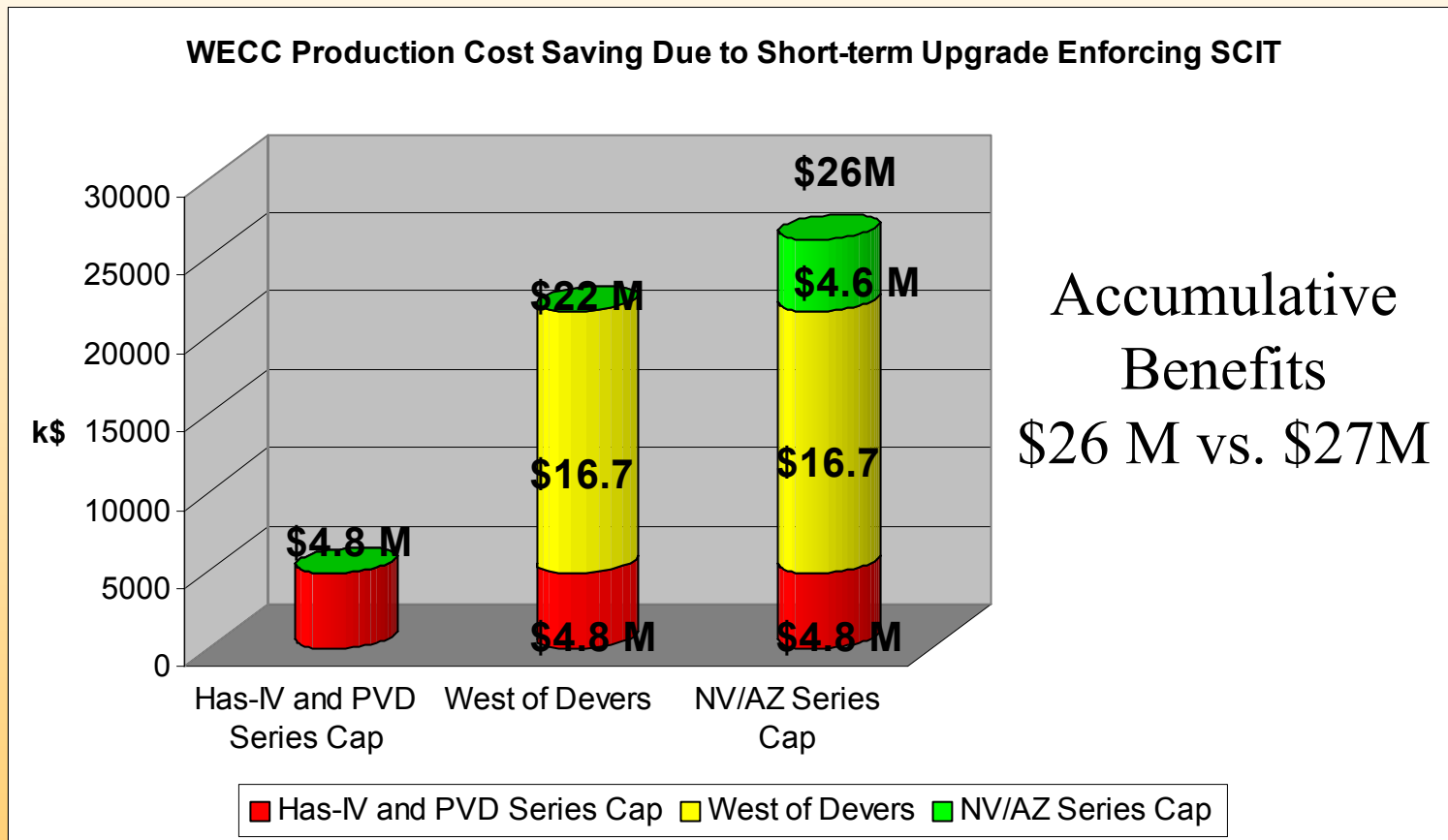


S6: SCIT Diagonal Limit



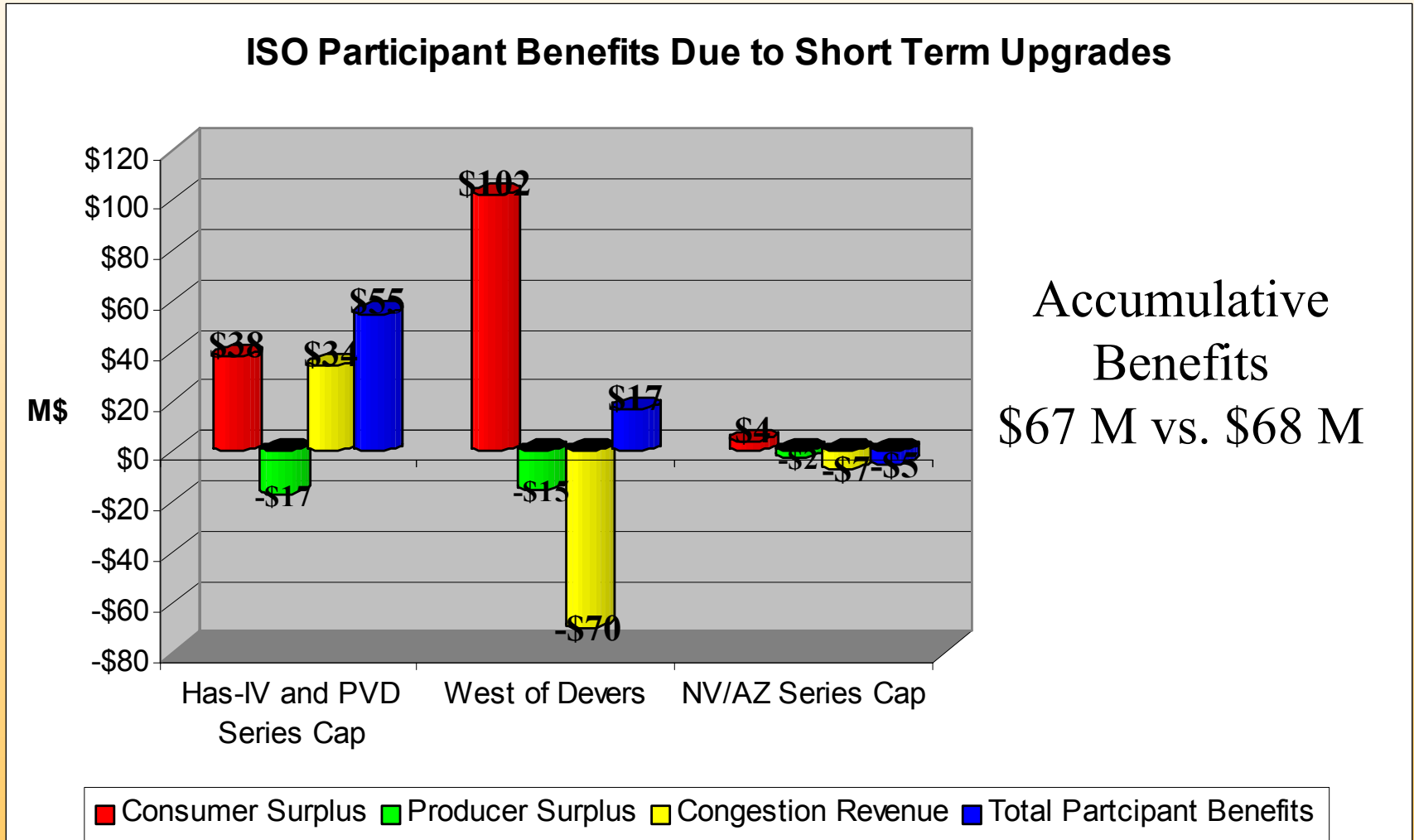


WECC Production Cost Saving Due to Short-term Upgrade Enforcing SCIT





ISO Participant Benefits Due to Short-term Upgrades Enforcing SCIT





Questions?