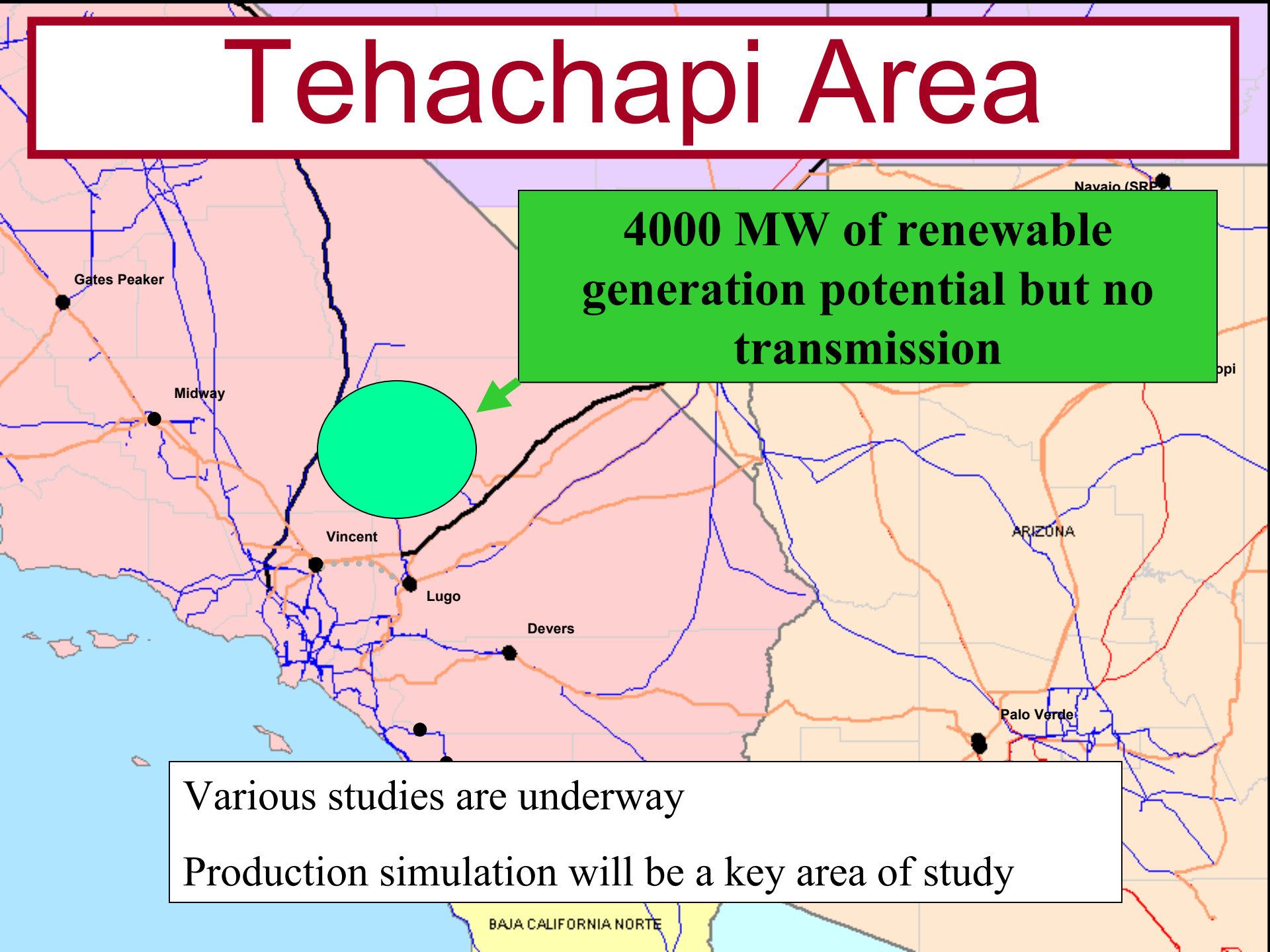
Tehachapi Area Renewable Generation Export Transmission (TARGET)

Jeffrey Miller

October 1, 2004

Tehachapi Area



Various studies are underway

Production simulation will be a key area of study

Tehachapi Study Process

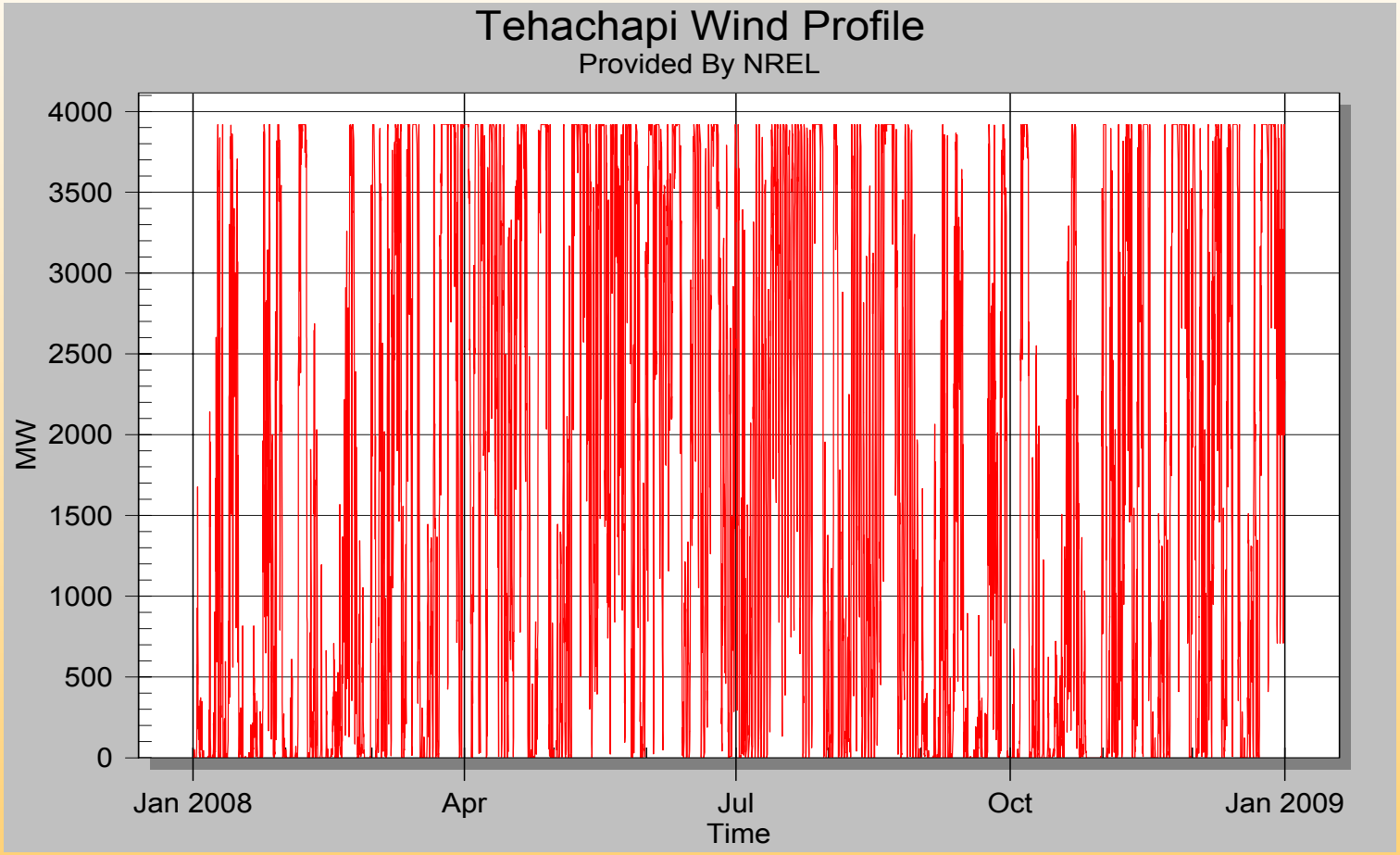
- Develop transmission plan alternatives through Powerflow studies.
- Use production cost studies as a tool to evaluate economic benefits and refine the plan

Tehachapi Generation Assumptions

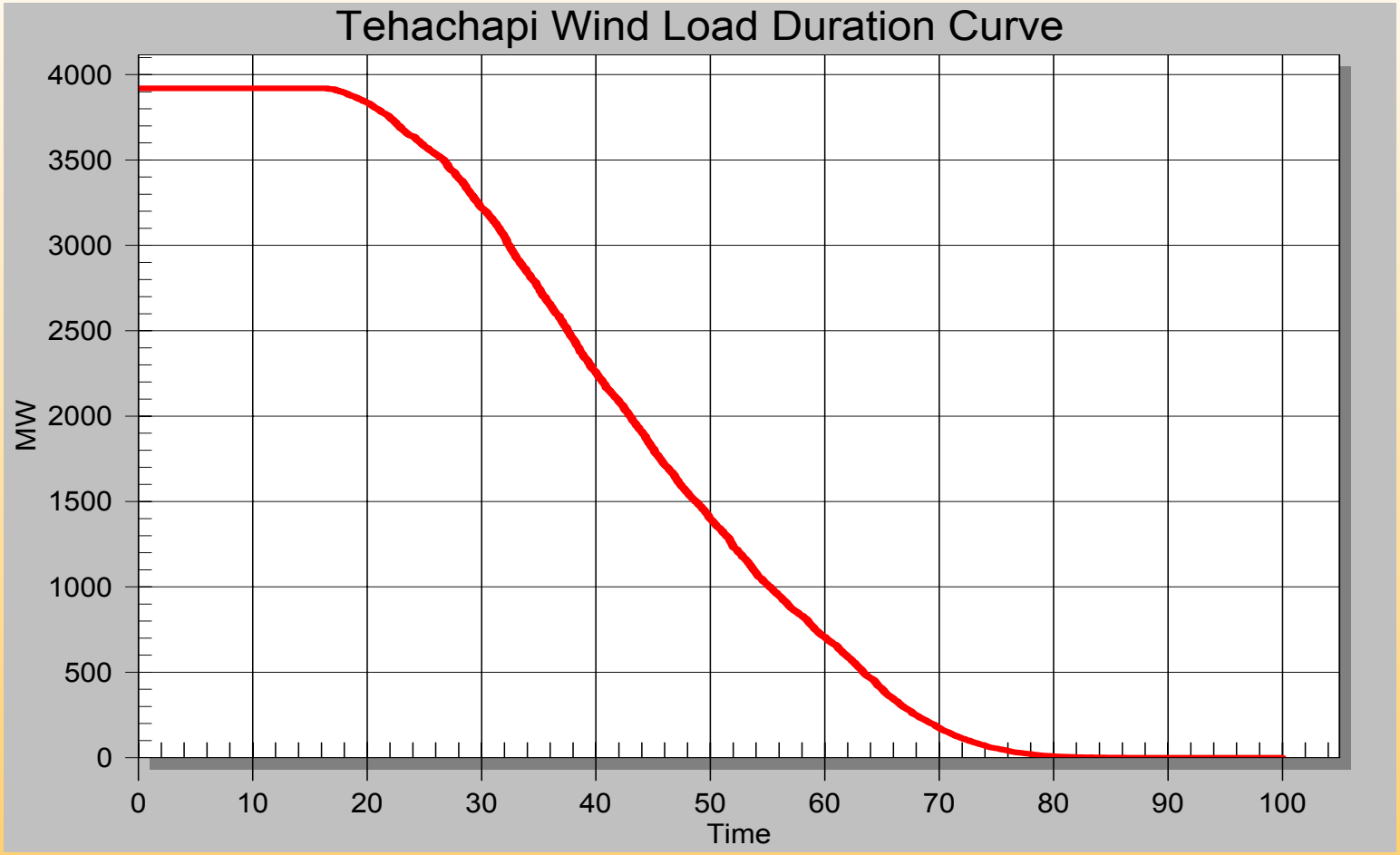
- Production simulation requires hourly dispatch for wind over a year.
- Existing wind unit dispatch is based on historical data.
- New wind unit dispatch was developed by National Renewable Energy Laboratory (NREL) and other stakeholders.
  - Assumed 70 meter rotor, 7.5 m/s speed and 2% unavailability.
  - Resulted in 45% capacity factor.

Tehachapi Hourly Wind Profile

(Developed by NREL and Other Stakeholders)



Tehachapi Wind Duration Curve

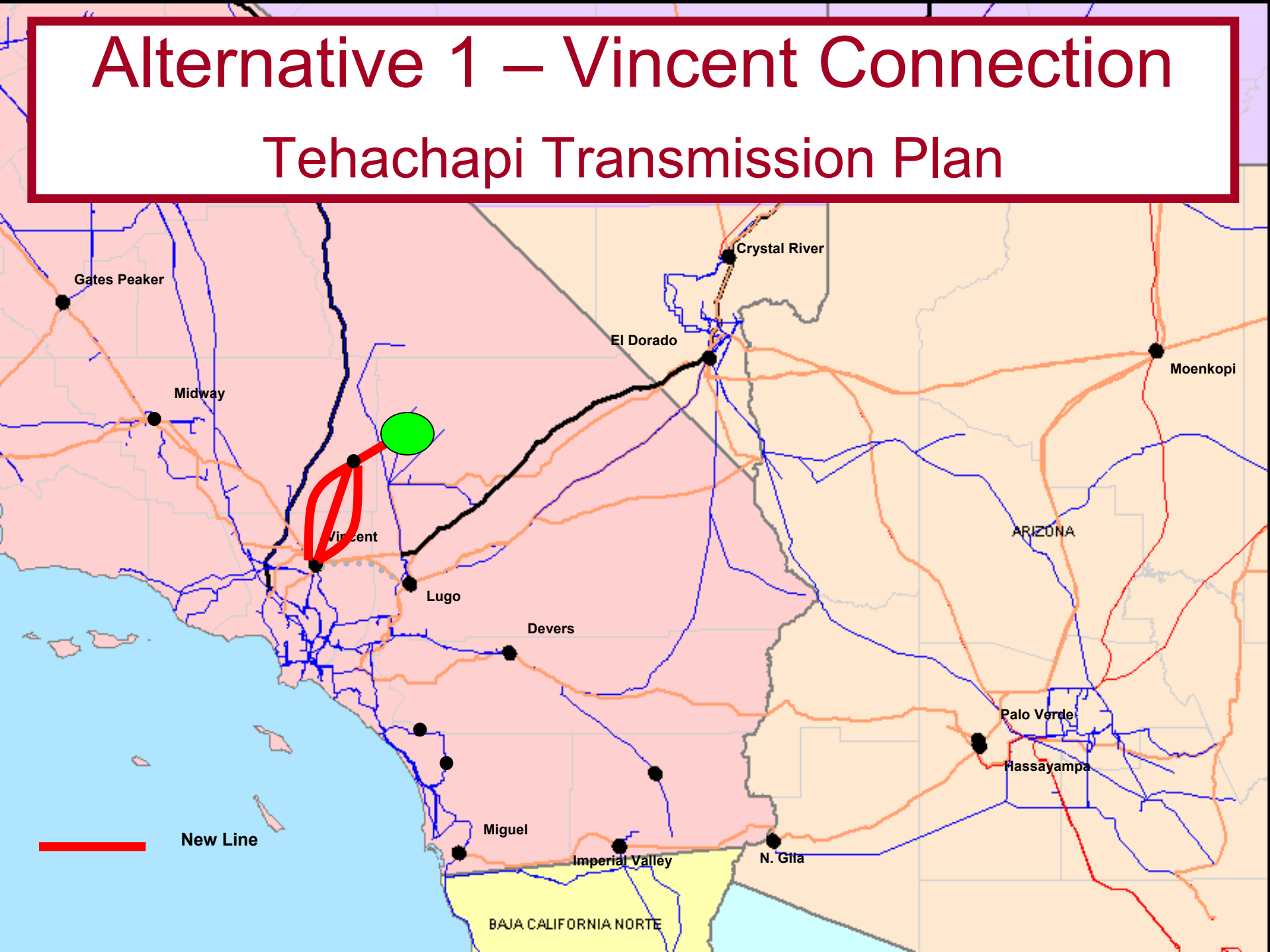


Input Assumptions

- Study years 2008 and 2013
- STEP short-term upgrades are modeled
- Same generation assumptions as used in STEP analysis
- Hydro generation dispatch is based on average historical data
- Average gas price is $4 in 2008 and $4.5 in 2013

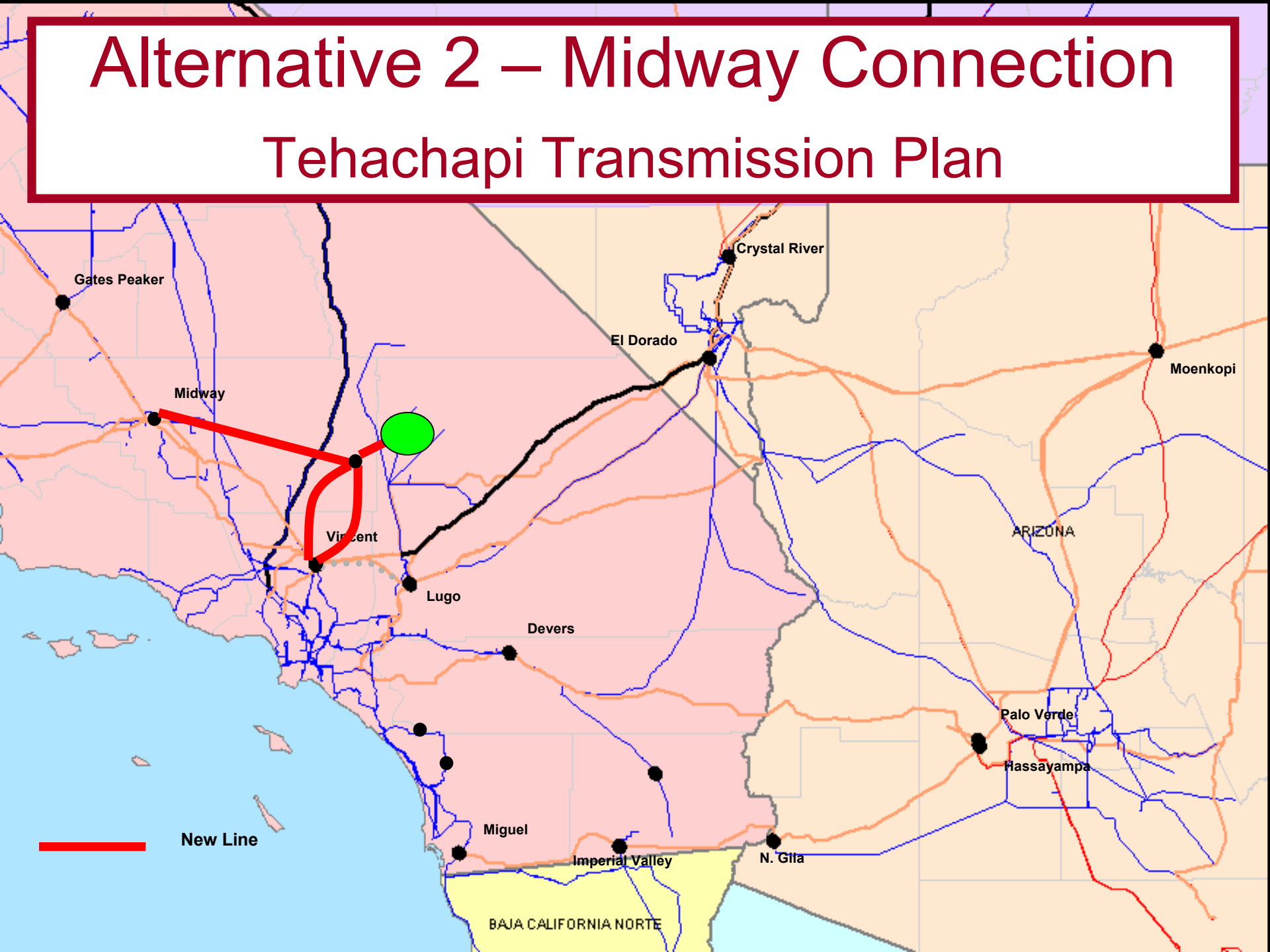
Alternative 1 – Vincent Connection

Tehachapi Transmission Plan

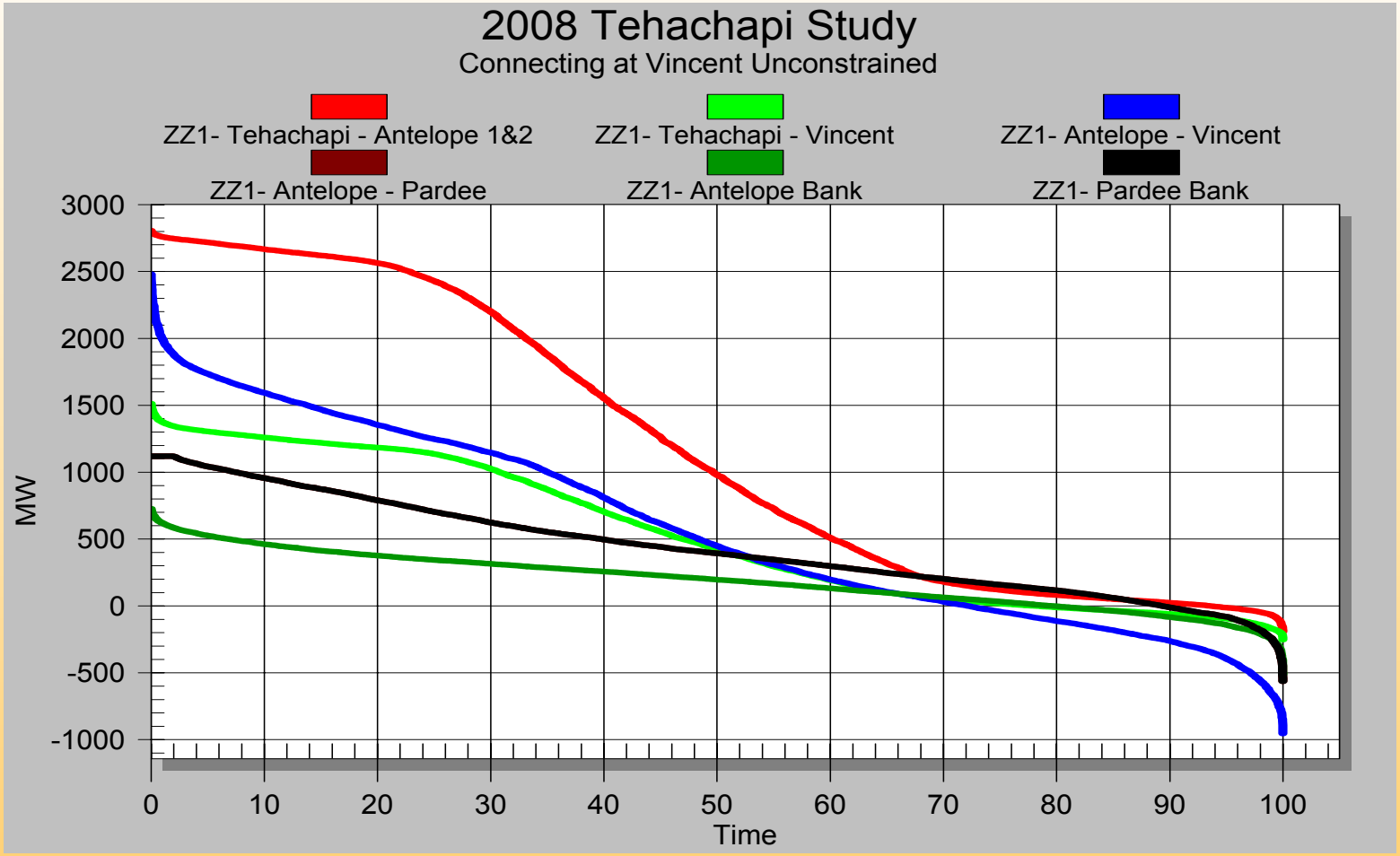


Alternative 2 – Midway Connection

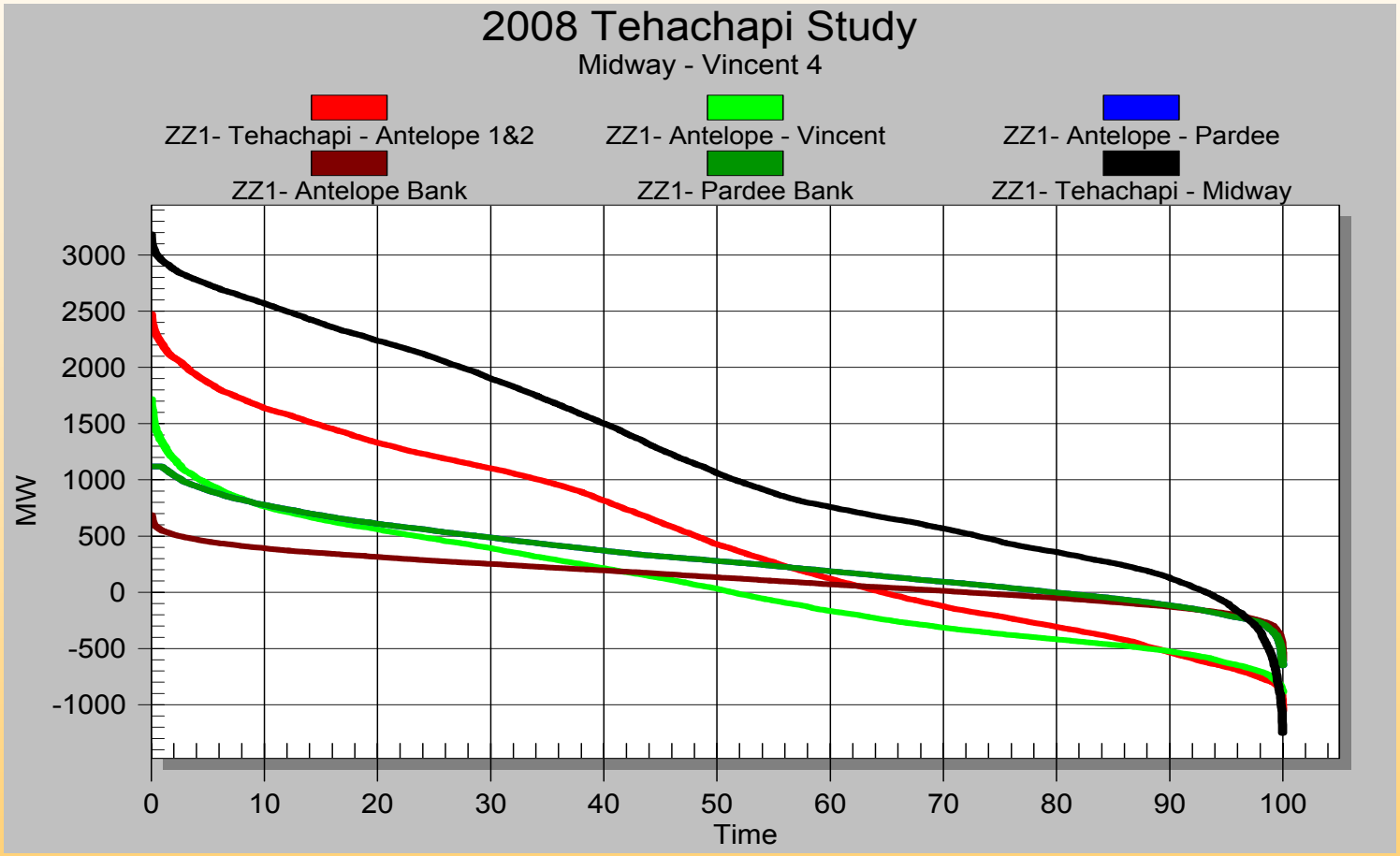
Tehachapi Transmission Plan



Alternative 1: Vincent Connection

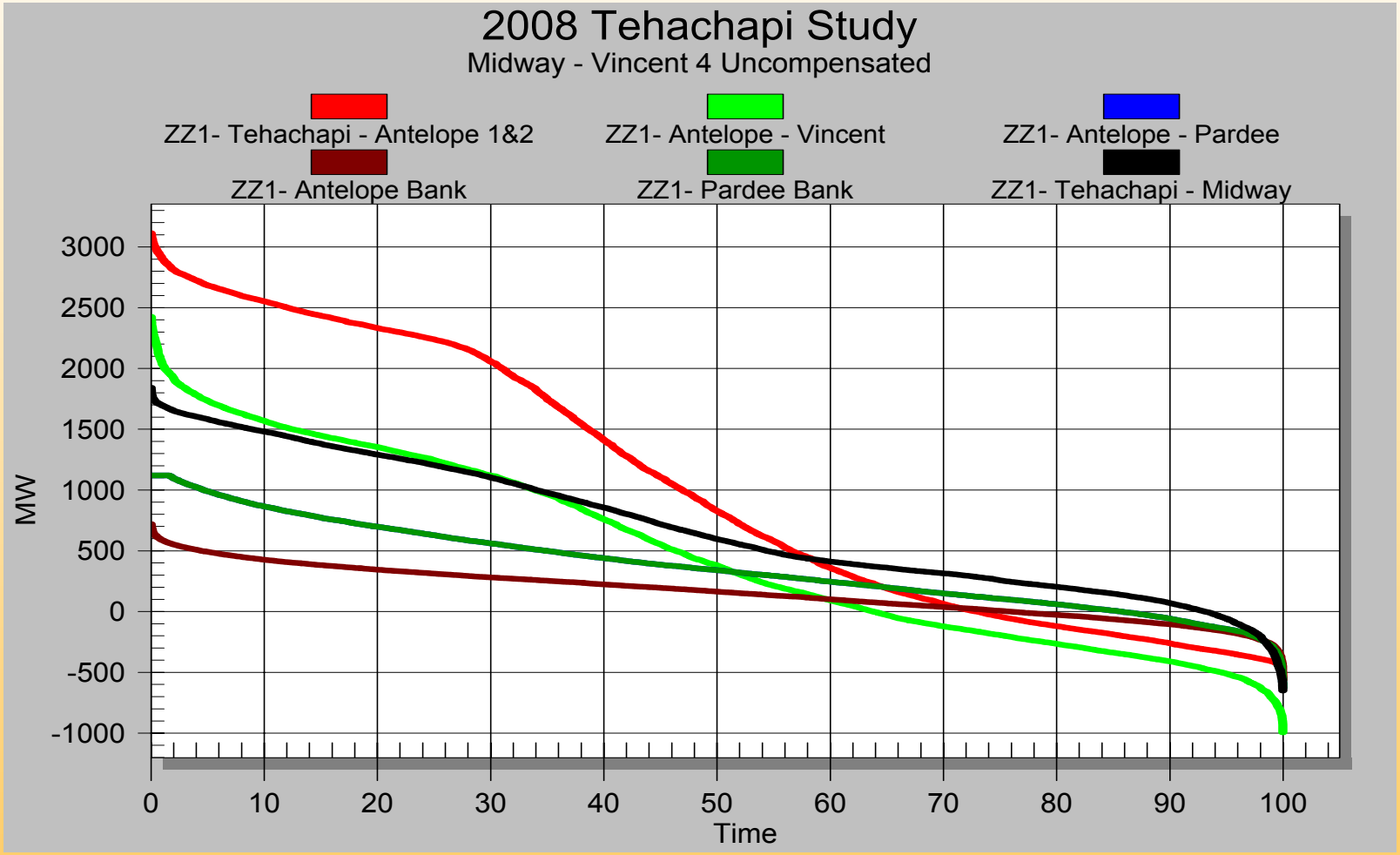


Alternative 2: Midway – Vincent 4



Alternative 2: Midway – Vincent 4

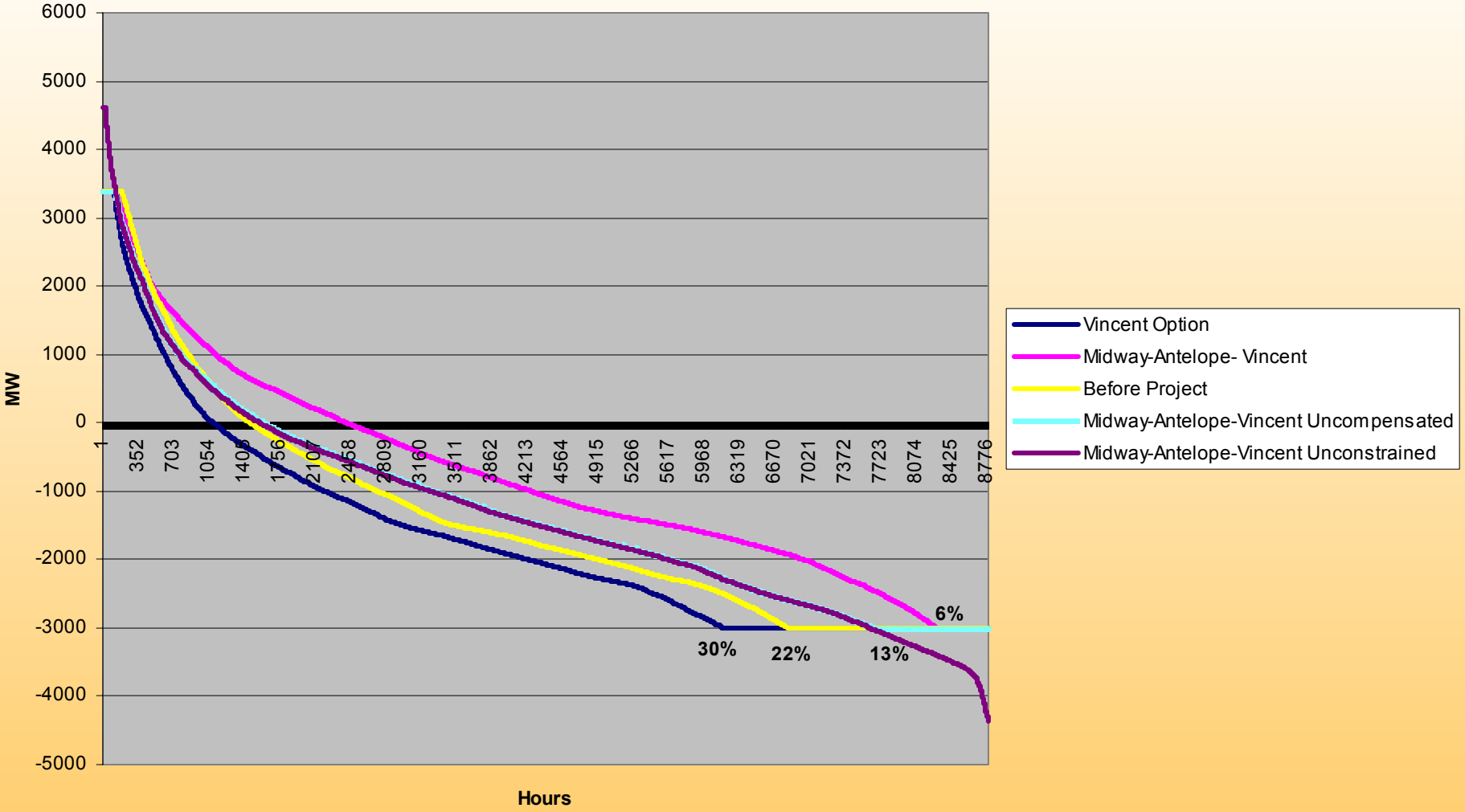
Without Tehachapi – Midway Compensation



CALIFORNIA ISO

California Independent System Operator

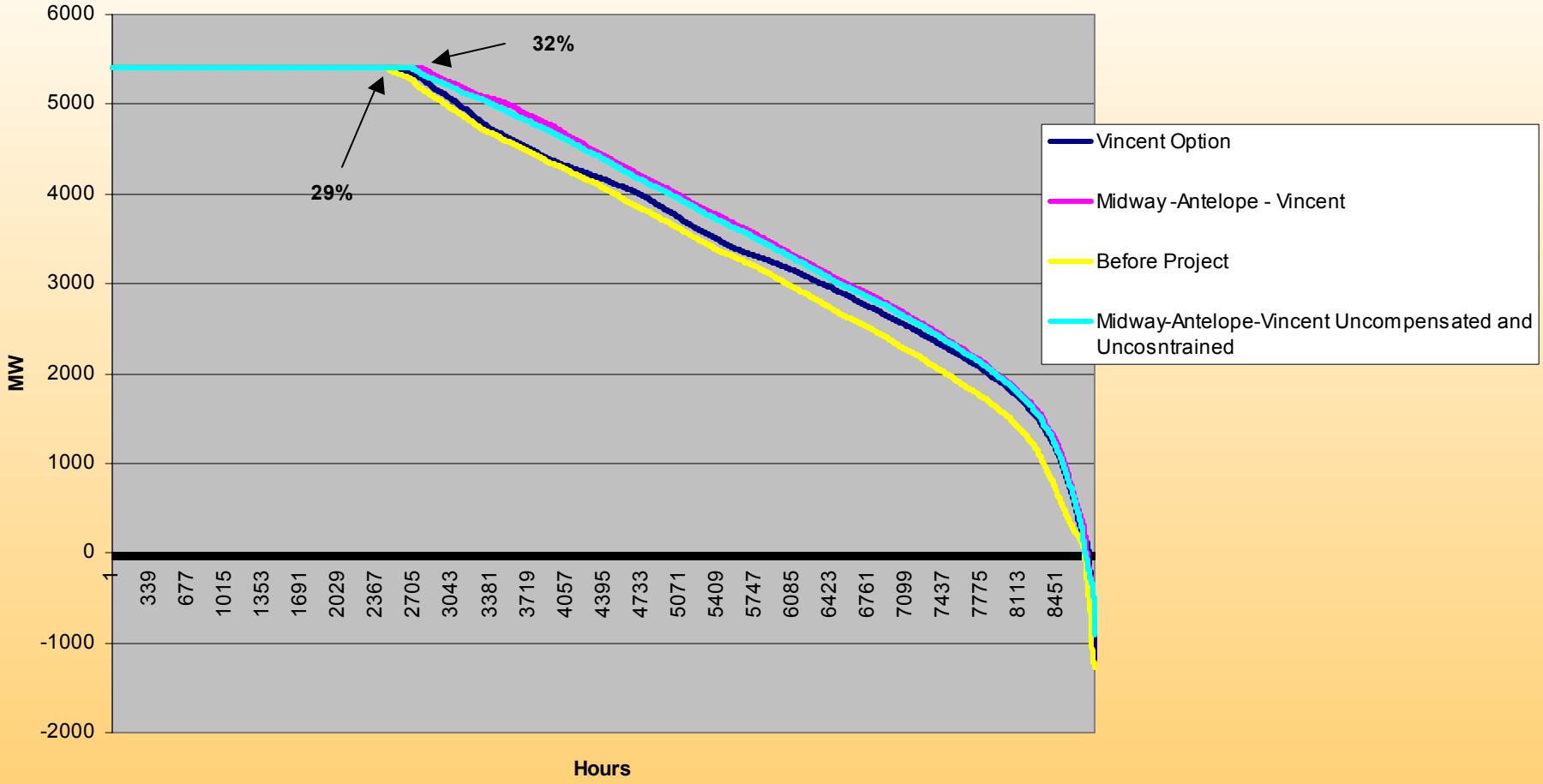
Path 26 Load Duration (2008)



Created By:Mohamed Awad

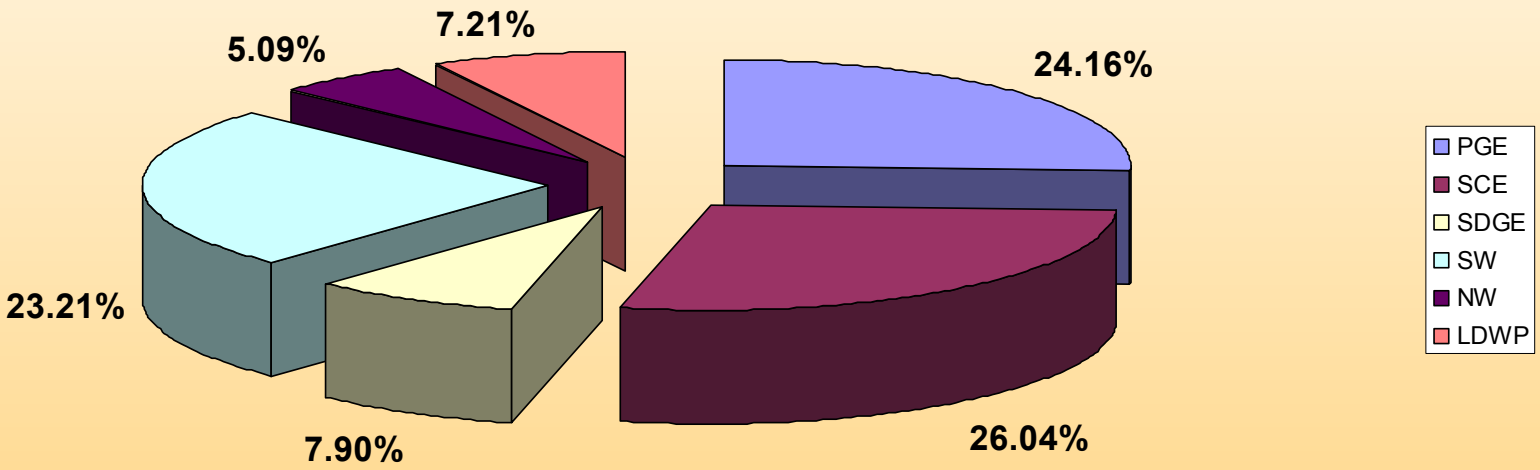
LST UPDT: 08/18/04

Path 15 Load Duration (2008)



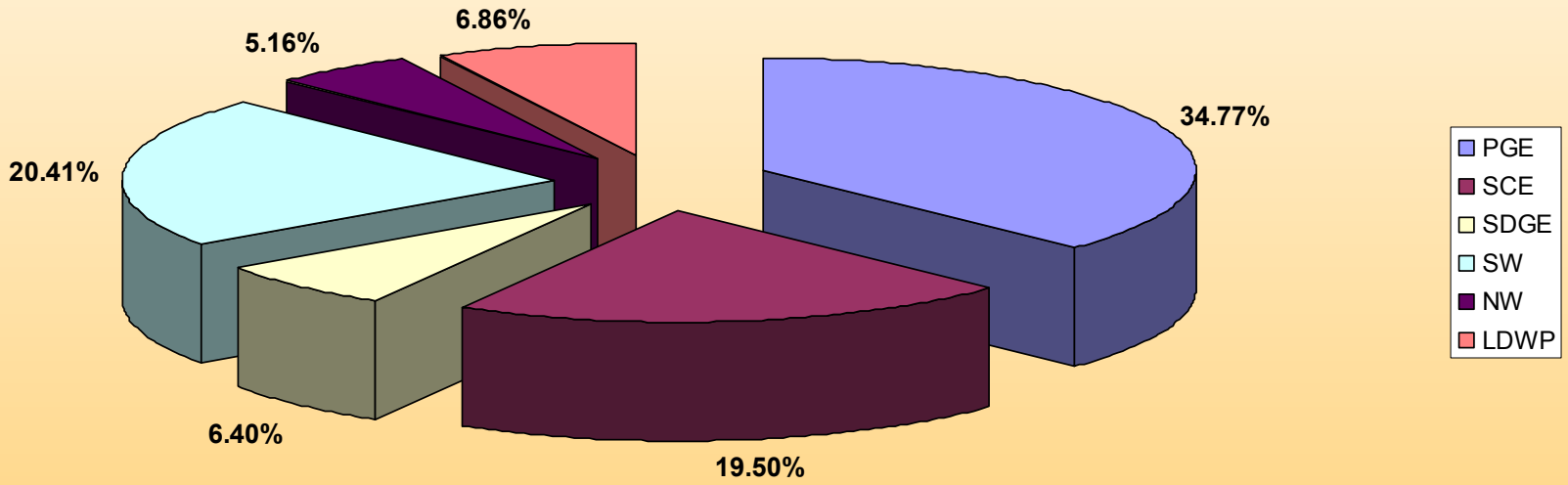
Alternative 1: Vincent Connection

Wind Energy Flow



Alternative 2: Midway – Vincent 4

Without Enforcing Path 26 Limit
Wind Energy Flow



ISO Ratepayers Benefits (2008 $)

Due to New Wind Generation and Transmission Plan

	Midway - Antelope -Vincent	Vincent Option
Change in Consumer Surplus	$248,744.00	$249,816.00
Change in Producer Surplus	-$105,232.27	-$117,494.16
Change in Congestion Rent	-$10,525.75	-$10,489.57
Total Benefits	$132,985.97	$121,832.27

All numbers in k$

Alternative 2 vs. Alternative 1

- Alternative 2 can allow higher rating and transfer capabilities for Path 26, or at least less congestion.
- Alternative 2 can allow higher level of wind energy transfer to the northern part of the Cal-ISO Grid.
- Alternative 2 has higher economic benefits.


Questions?