

STEP Planning Study Scope and Process

Jeff Miller
California ISO
March 13, 2003



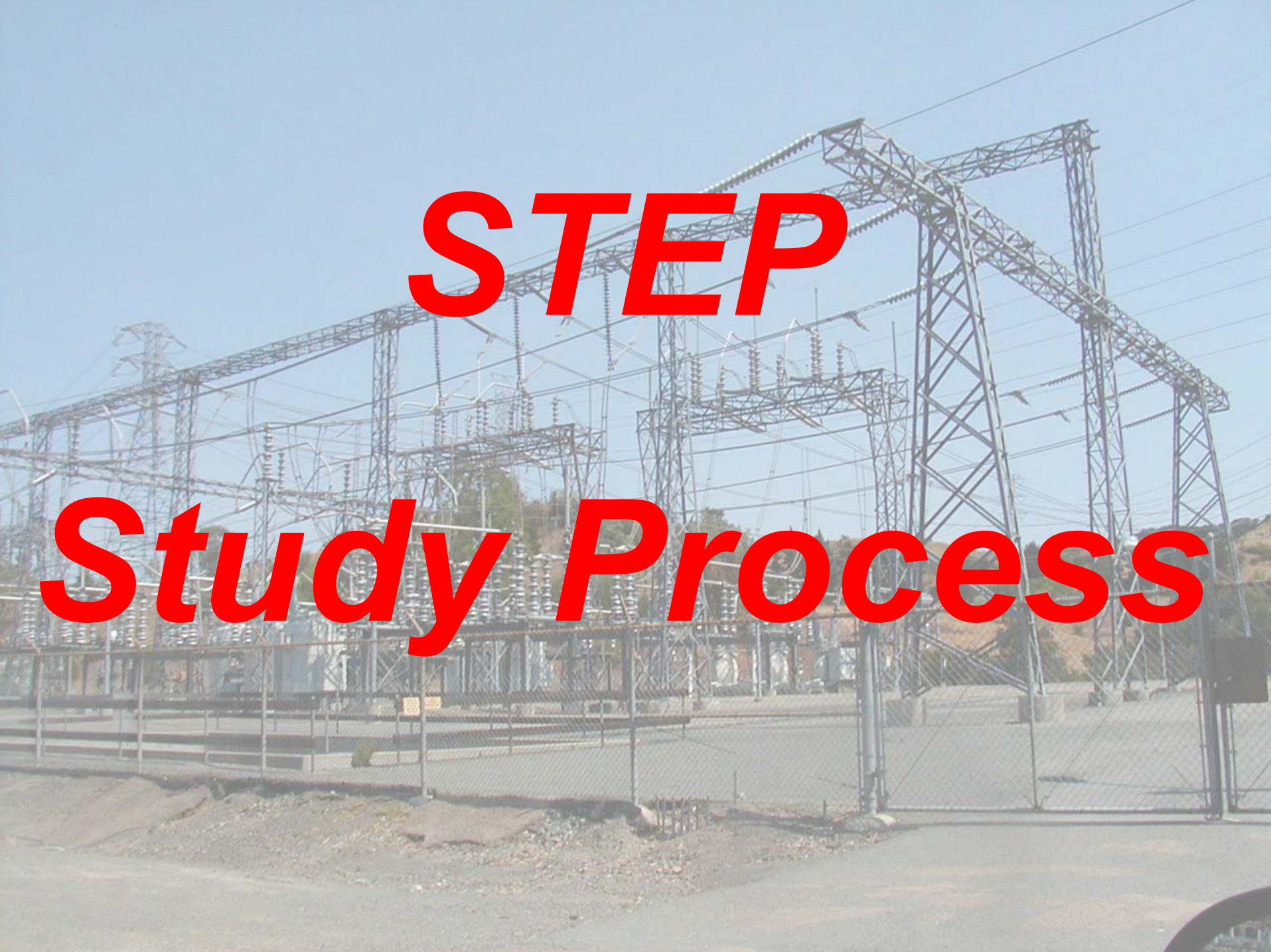


STEP's Goal – “To provide a forum where all interested parties are encouraged to participate in the planning, coordination, and implementation of a robust transmission system between the Arizona, Nevada, Mexico, and southern California areas that is capable of supporting a competitive, efficient, and seamless west-wide wholesale electricity market while meeting established reliability standards. The wide participation envisioned in this process is intended to result in a plan that meets a variety of needs and has a broad basis of support.”



Two Parallel Processes

- Coordination Process
 - Provides project sponsors with a forum to coordinate the development of their project
 - STEP provides technical input via STEP Technical Group
- Study Process
 - Actual studies conducted in the STEP forum



STEP

Study Process



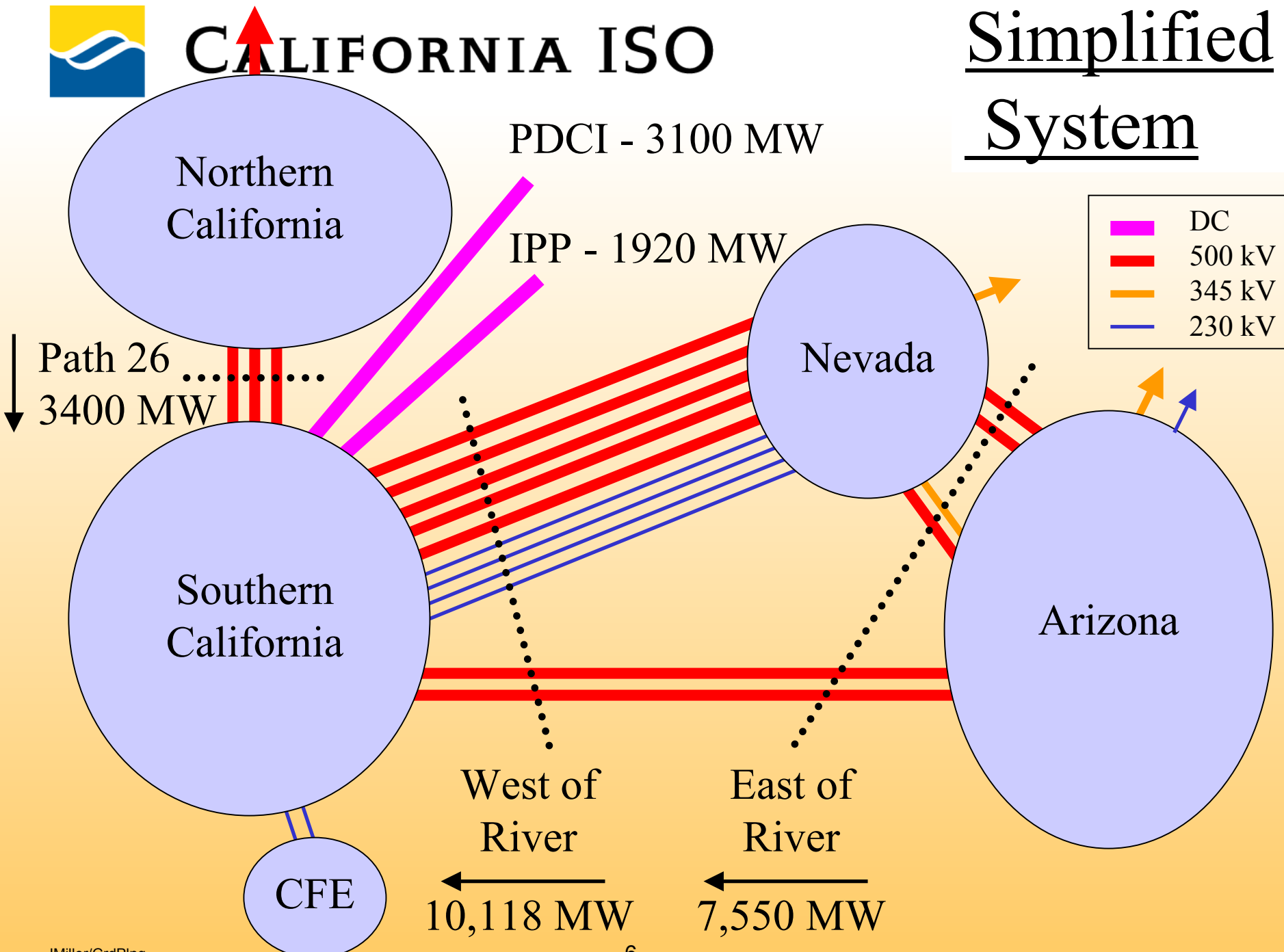
Three Study Phases

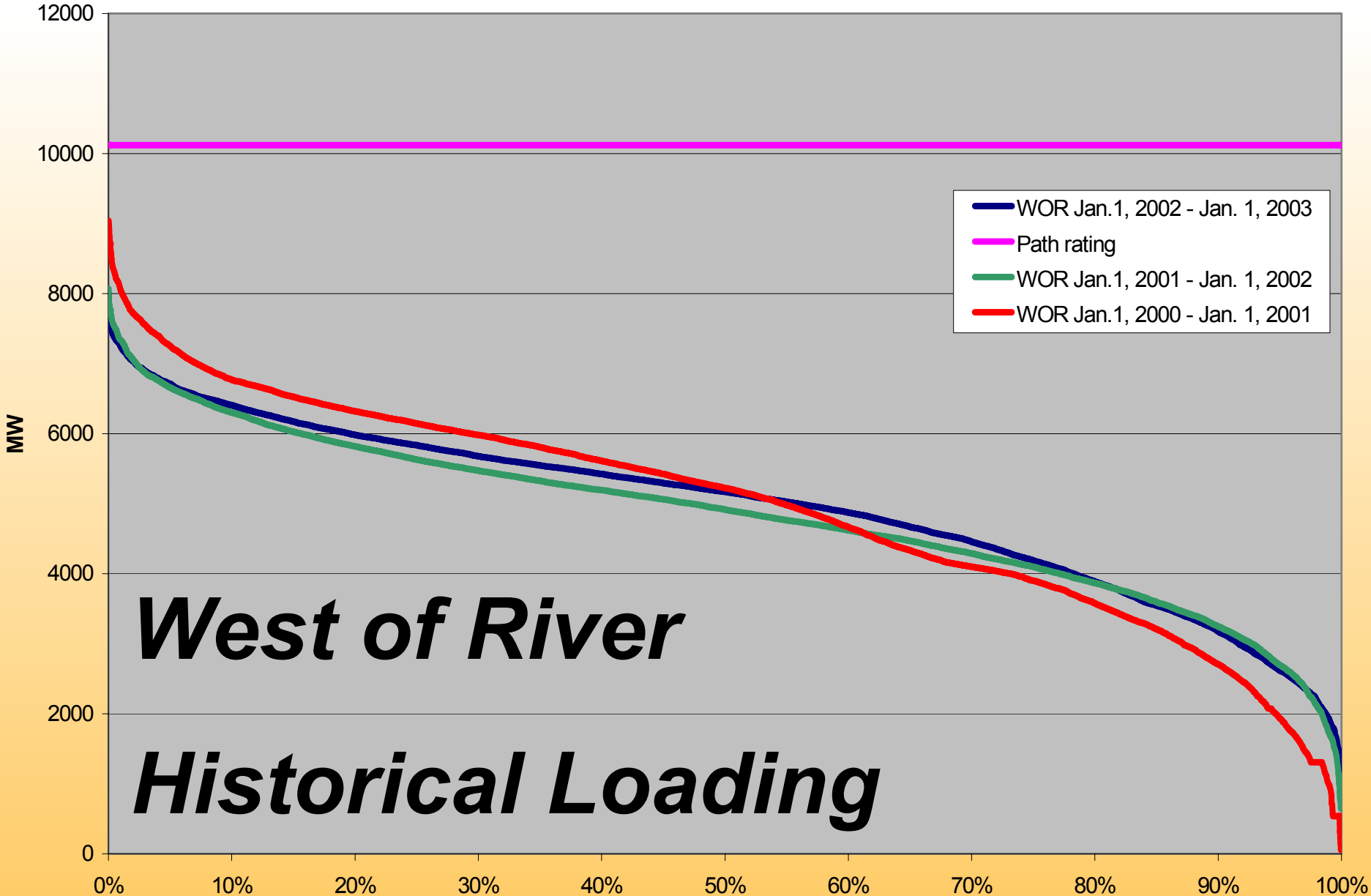
- Phase 1 – Short-term Solutions - Projects that can be implemented in a few years such as increasing the ratings of the series capacitors in the Southwest Power Link (SWPL).
- Phase 2 – Mid-term Solutions - Major new bulk transmission facilities such as a major new 500 kV line.
- Phase 3 – Long-term Vision - Conceptual future plan

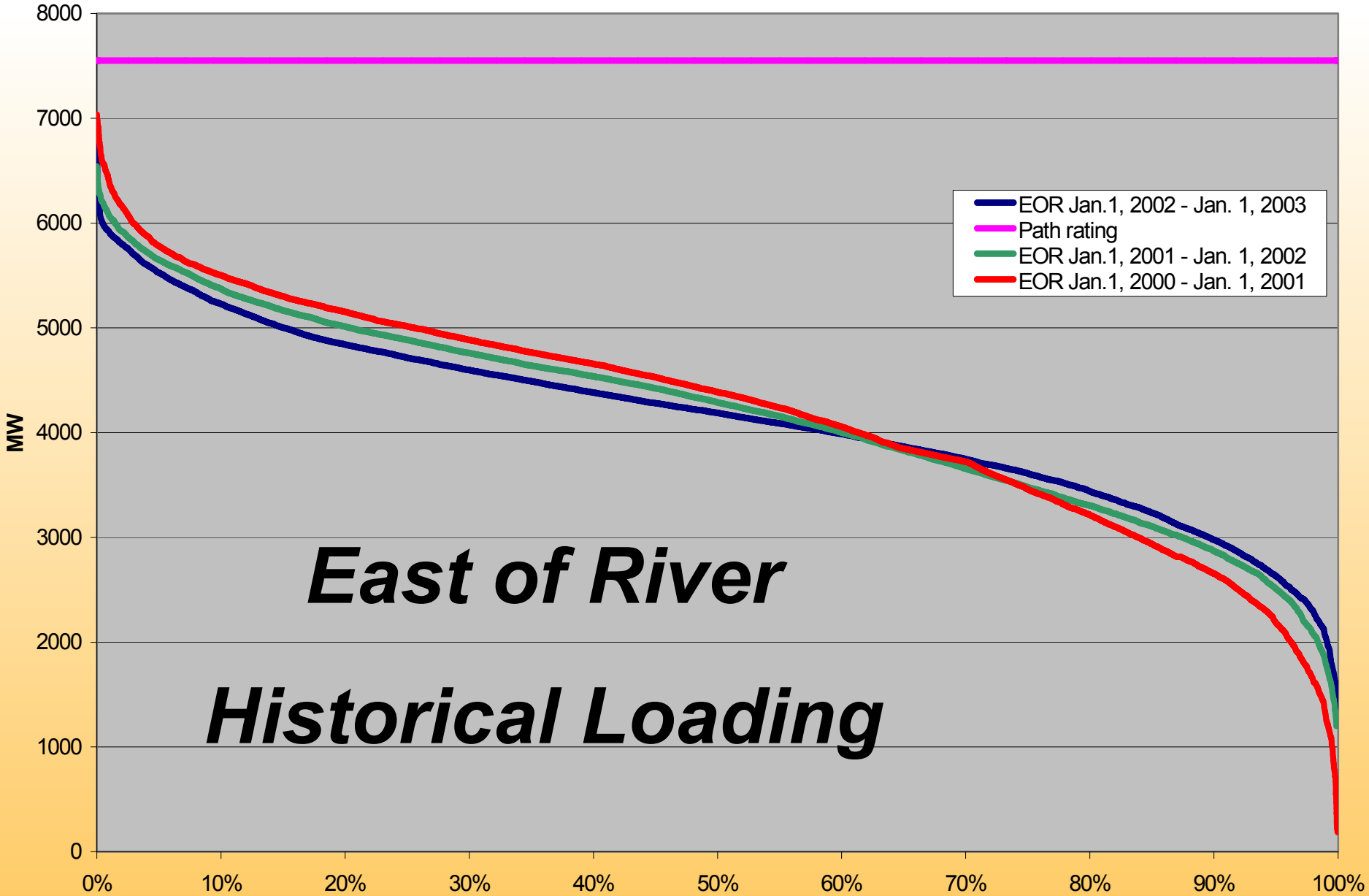


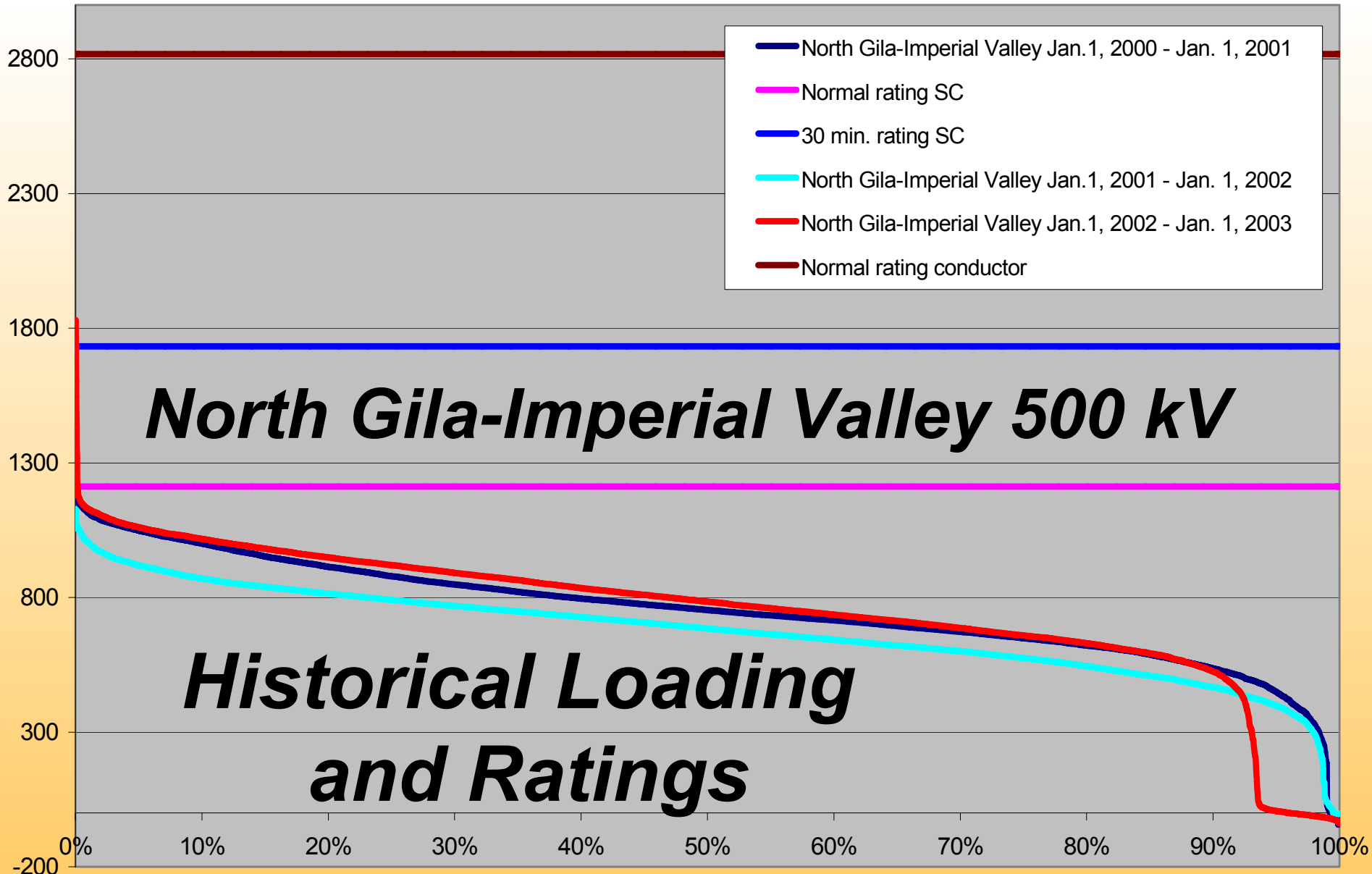
CALIFORNIA ISO

Simplified System

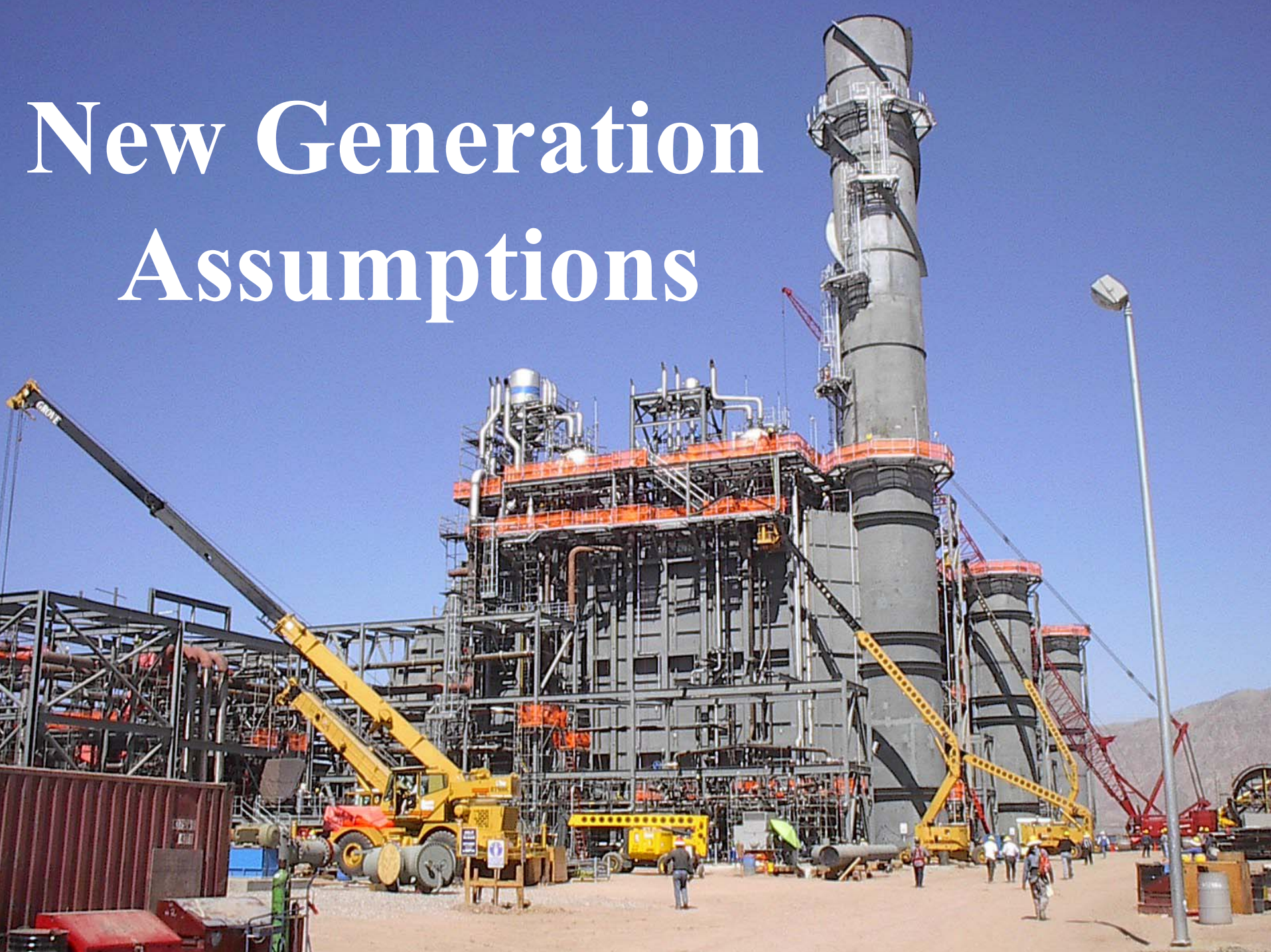








New Generation Assumptions





6100 MW in Western Arizona

- Red Hawk - 1000 MW in service
- Arlington Valley - 600 MW in-service
- Mesquite - 1250 MW in 2003
- Harquahala - 1170 MW in 2003
- Panda power - 2080 MW in 2003



2910 MW in Southern Nevada

- Mirant – 550 MW in March of 2003
- Bighorn – 570 MW in 2003
- Gen West - 590 MW in April of 2004
- Duke – 1200 MW (Currently on-hold but 70 % complete)



1660 MW in Mexico

- La Rosita I – 750 MW in 2003
- La Rosita II – 310 MW in 2003
- Sempra TDM - 600 MW in 2003



1820 MW in Southern California

- Blythe #1 – 520 MW
- Pastoria Phase 1 – 750 MW
- High Desert – 550 MW



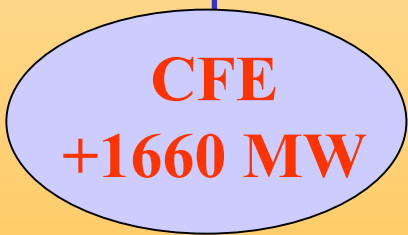
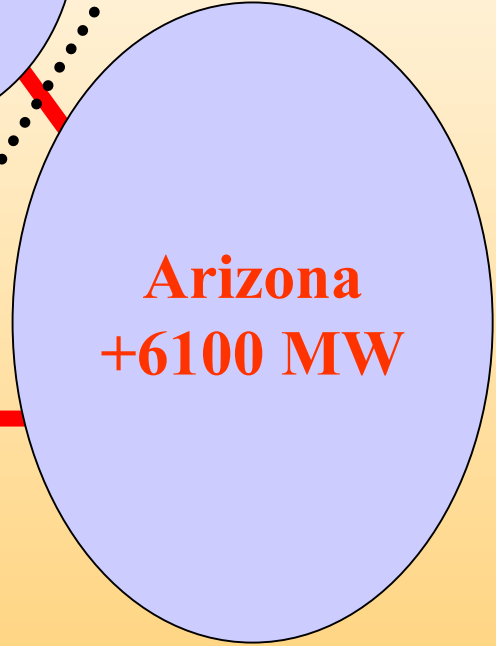
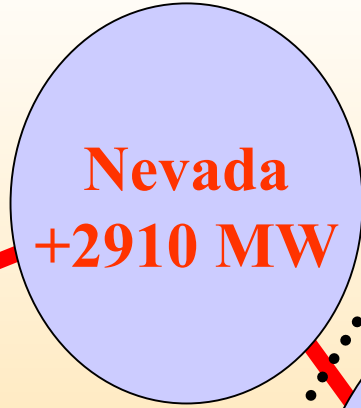
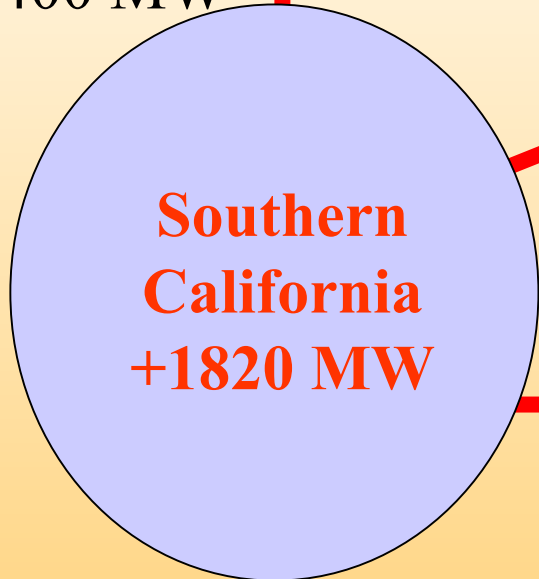
CALIFORNIA ISO

New Generation – 12,490 MW

California Independent System Operator

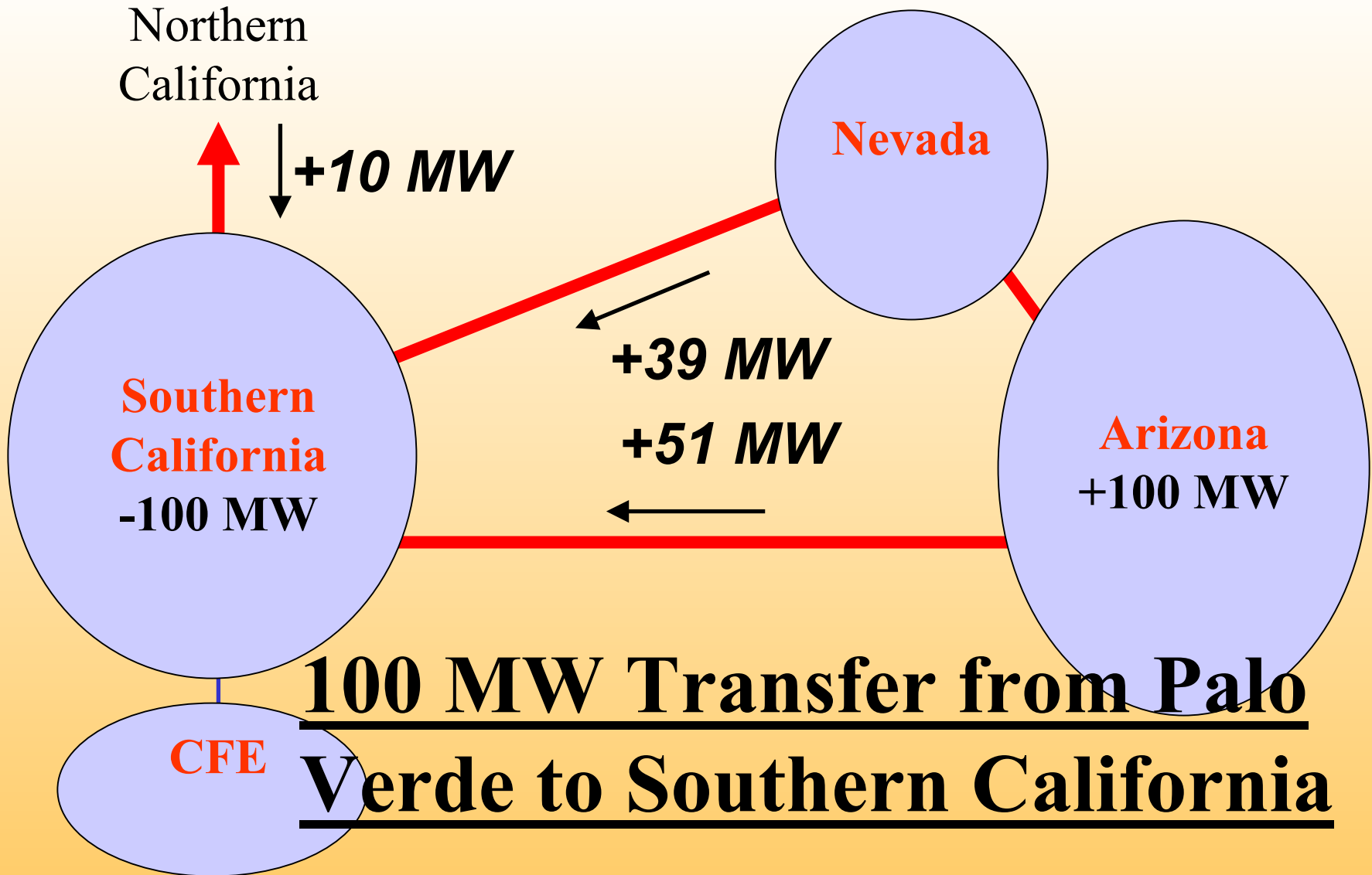
Northern California

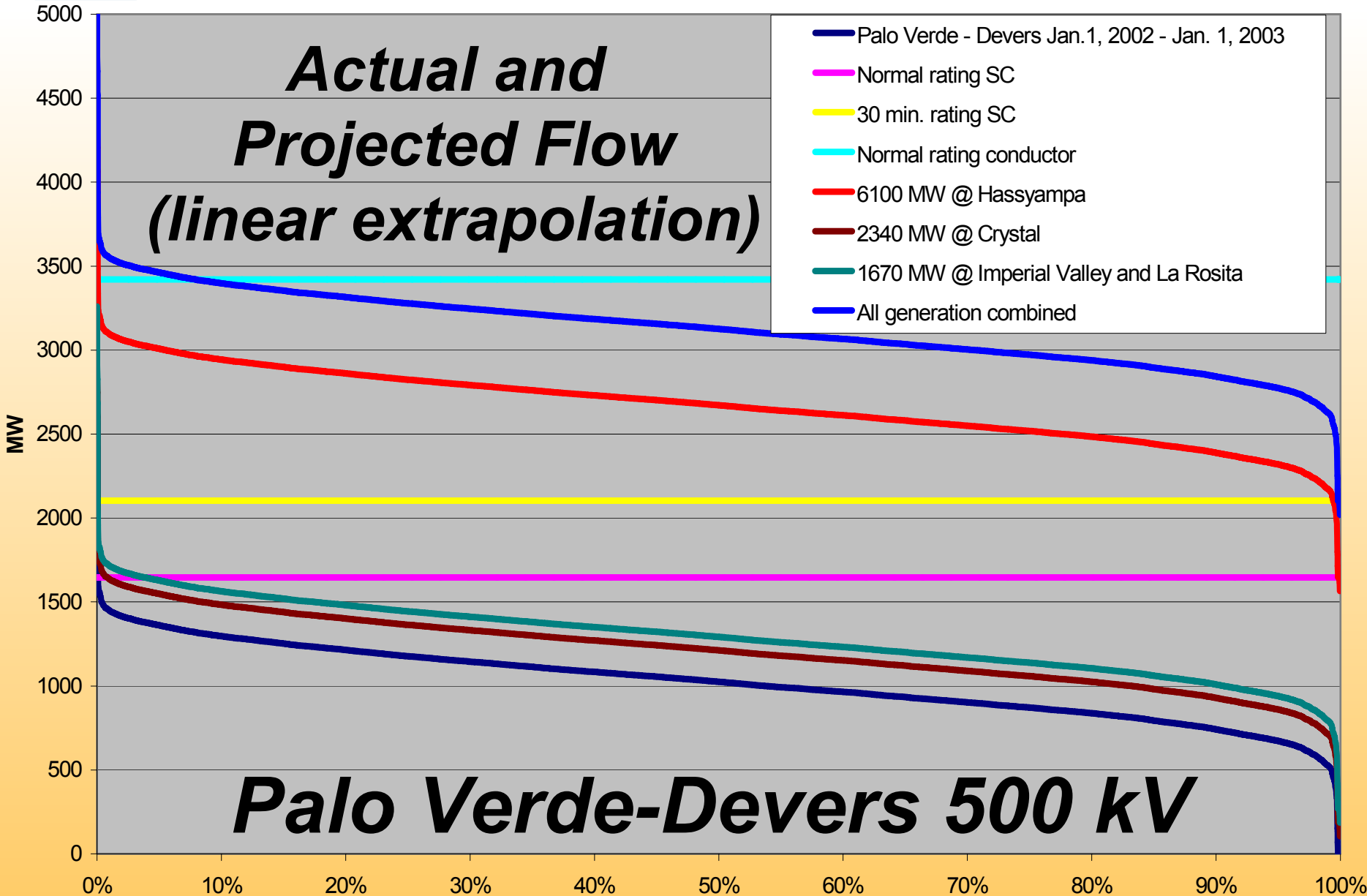
↓ Path 26
3400 MW ↑



West of River
← 10,118 MW

East of River
← 7,550 MW



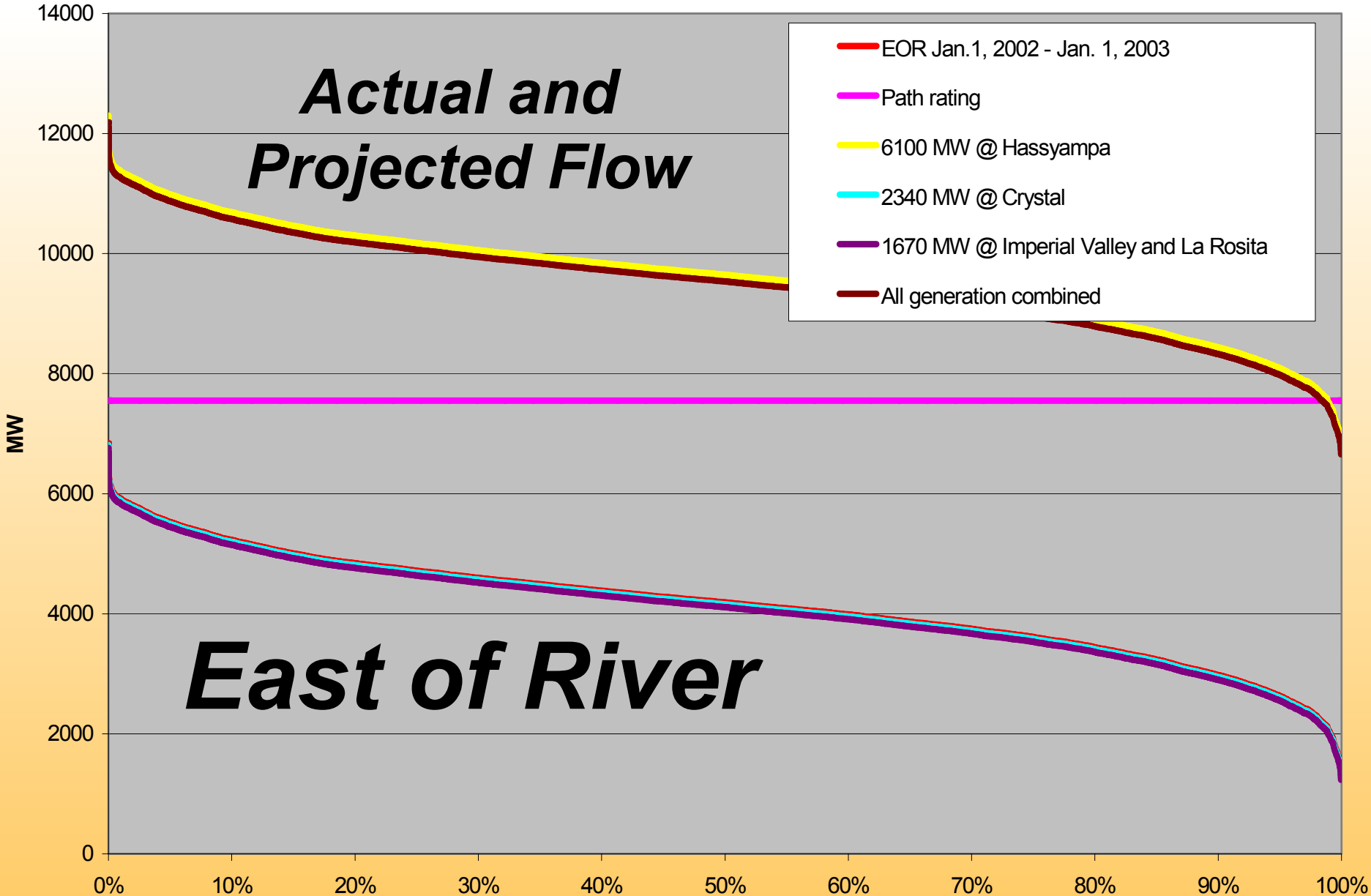




CALIFORNIA ITO

Projected Flow East of River (generation scheduled to SCE and SDG&E)

California Independent System Operator





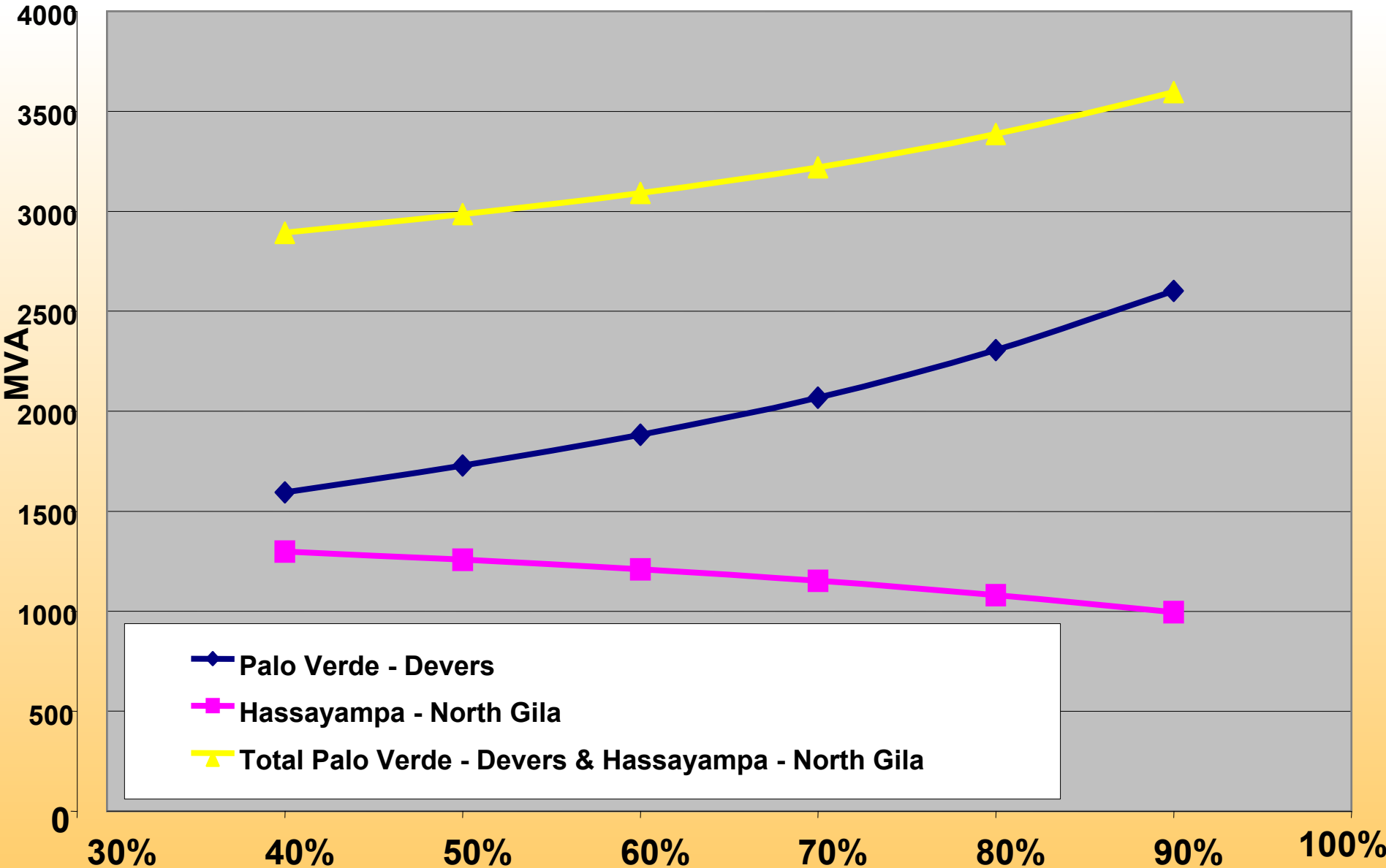
**Can We Get More
From the Existing
System by Adjusting
Series Compensation ?**



CALIFORNIA ISO

California Independent System Operator

Flow as a function of compensation level on Palo Verde Devers 500 kV line





Create a Maximum Southern California Import Case

- Extreme “bookend case”
- Will identify the maximum amount of power that could need to be accommodated
- To allow for design of potential projects
- Not for project justification
- Replace inefficient southern California Generation with new efficient generation



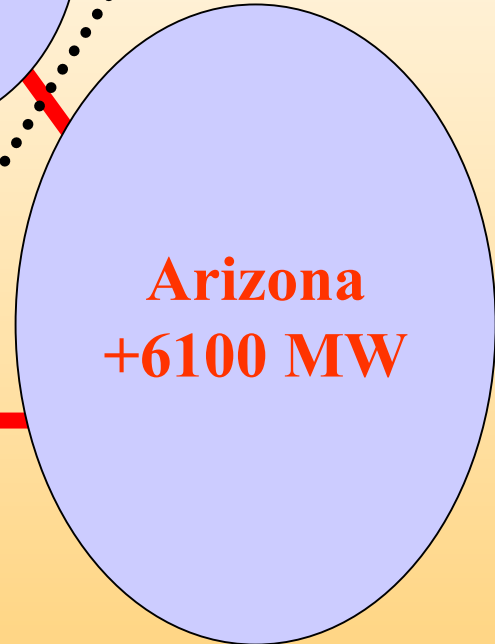
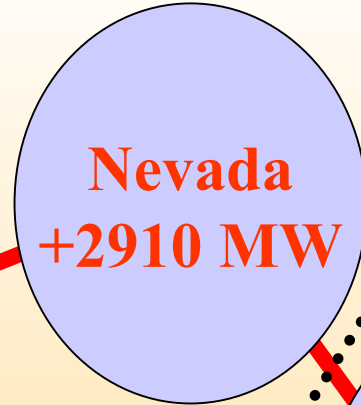
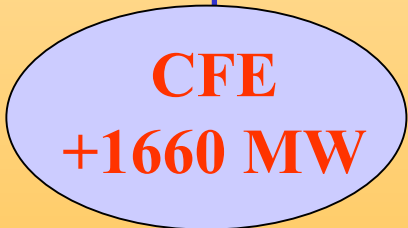
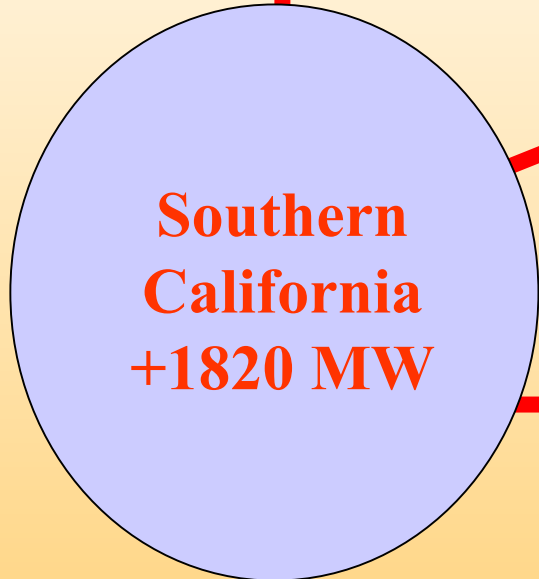
CALIFORNIA ISO

New Generation – 12,490 MW

California Independent System Operator

Northern California

Path 26
↓



West of River

East of River





Interface Flows (Maximum Import Case)

Interface	Flow
Path 26 - Northern Ca-Southern Ca	4139
West of River	12679
East of River	9163
Southern CA Imports	22098



Selected Normal Overloads (Maximum Import Case)

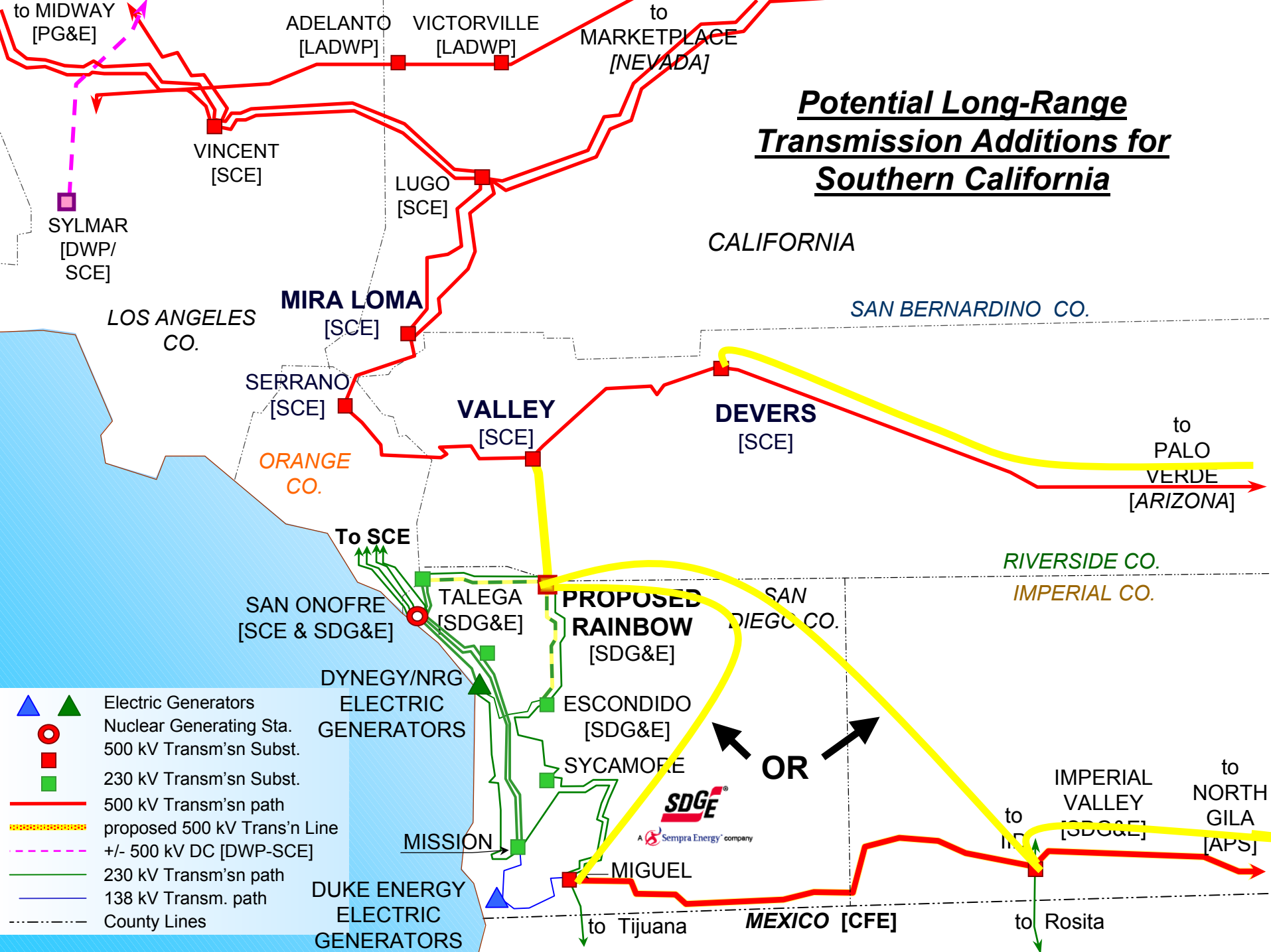
Facility	% Loading	Rating	Rating Unit
Miguel 500/230 kV	225	1120	Mva
Imperial Valley-Miguel	210	1400	Amp
Hassayampa-North Gila 500 kV	205	1400	Amp
North Gila-Imperial Valley 500 kV	190	1400	Amp
Palo Verde-Devers 500 kV	160	1900	Amp
Mead-Marketplace 500 kV	145	1430	Amp
Lugo-Victorville 500 kV	120	2771	Amp
McCullough-Crystal 500 kV	110	1986	Amp
Eldorado-Lugo 500 kV	110	1600	Amp
Mohave-Lugo 500 kV	110	1600	Amp



Real and Reactive Losses (Maximum Import Case)

	MW Loss	MVAR Loss
Palo Verde-Devers 500 kV	163	2140
Southwest Power Link 500 kV	159	1800
Lugo-Mohave 500 kV	42	370
Eldorado-Lugo 500 kV	42	375
McCullough-Victorville 500 kV #1	27	275
Marketplace-Adelanto 500 kV	23	200

Potential Long-Range Transmission Additions for Southern California



- ▲ ▲ Electric Generators
- Nuclear Generating Sta.
- 500 kV Transm'sn Subst.
- 230 kV Transm'sn Subst.
- 500 kV Transm'sn path
- - - proposed 500 kV Trans'n Line
- - - +/- 500 kV DC [DWP-SCE]
- 230 kV Transm'sn path
- 138 kV Transm. path
- - - County Lines



OR

**DUKE ENERGY
ELECTRIC
GENERATORS**

**DYNEGY/NRG
ELECTRIC
GENERATORS**

MEXICO [CFE]

**IMPERIAL
VALLEY
[SDG&E]**

**to NORTH
GILA
[APS]**

**to PALO
VERDE
[ARIZONA]**

to Tijuana

to Rosita

**San ONOFRE
[SCE & SDG&E]**

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]**

**to MIDWAY
[PG&E]**

**ORANGE
CO.**

**VALLEY
[SCE]**

**DEVERS
[SCE]**

**to PALO
VERDE
[ARIZONA]**

To SCE

**TALEGA
[SDG&E]**

**PROPOSED
RAINBOW
[SDG&E]**

**ESCONDIDO
[SDG&E]**

SYCAMORE

MIGUEL

MISSION

**SAN
DIEGO CO.**

**RIVERSIDE CO.
IMPERIAL CO.**

SAN BERNARDINO CO.

CALIFORNIA

**LOS ANGELES
CO.**

**MIRA LOMA
[SCE]**

**VINCENT
[SCE]**

**LUGO
[SCE]**

**ADELANTO
[LADWP]**

**VICTORVILLE
[LADWP]**

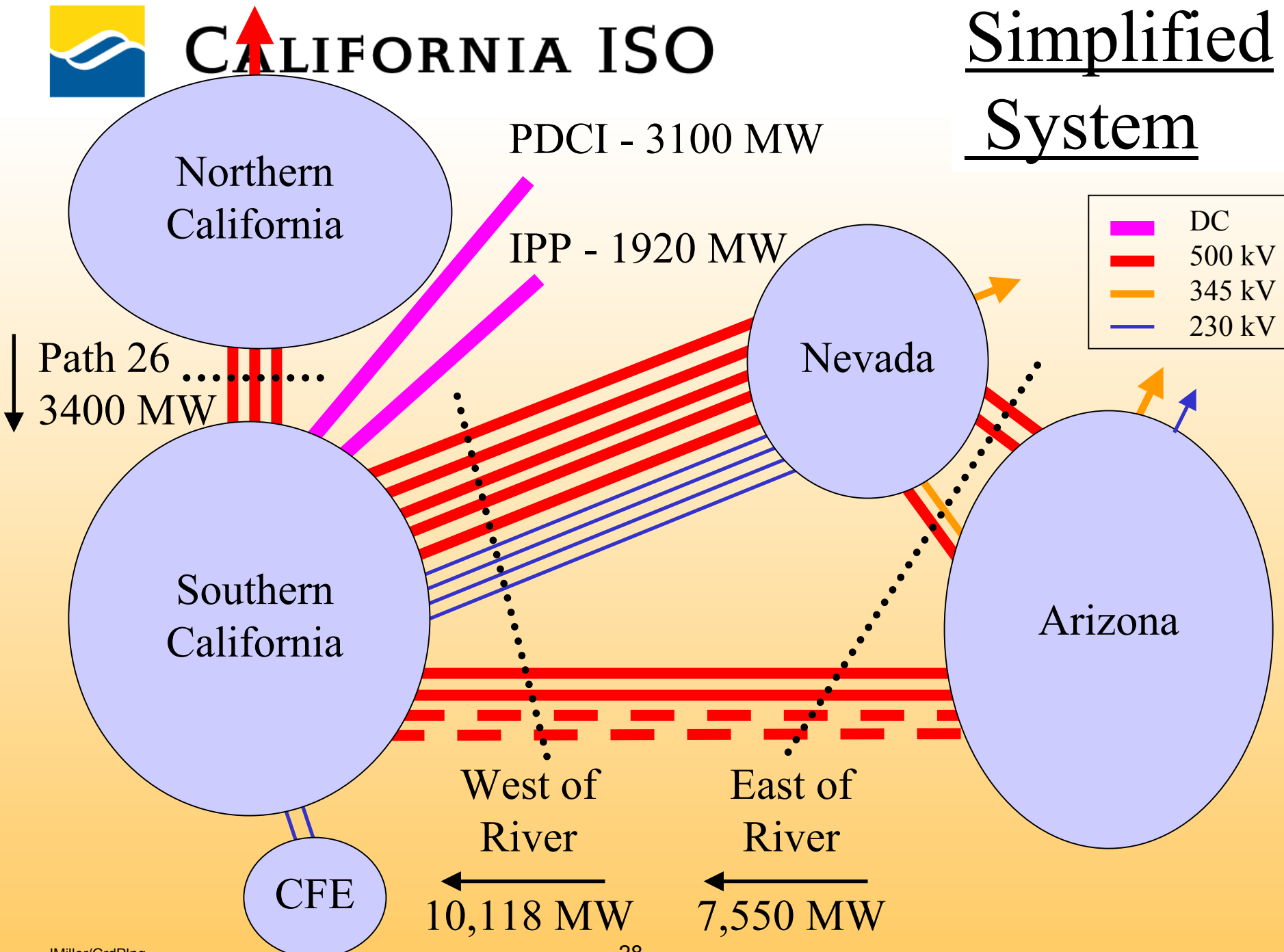
**MARKETPLACE
[NEVADA]**

**SYLMAR
[DWP/
SCE]</**



CALIFORNIA ISO

Simplified System



Study Plan Comments

