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# Summary of Natural Gas Issues

Bob Gray, ACC Staff

October 2006

AZ CORP COMMISSION  
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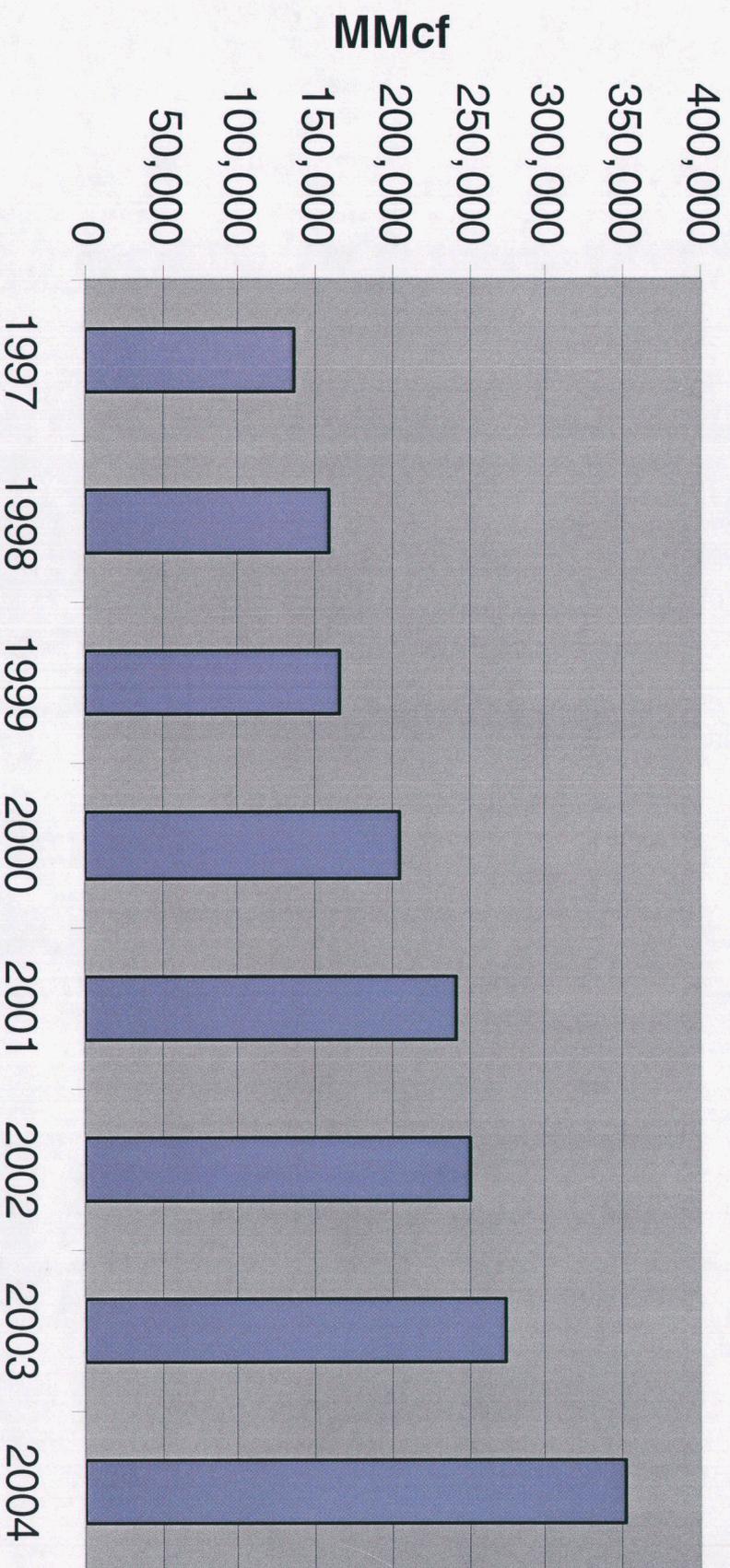
Arizona Corporation Commission  
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Docket Number: L-000000A-06-0295-00130

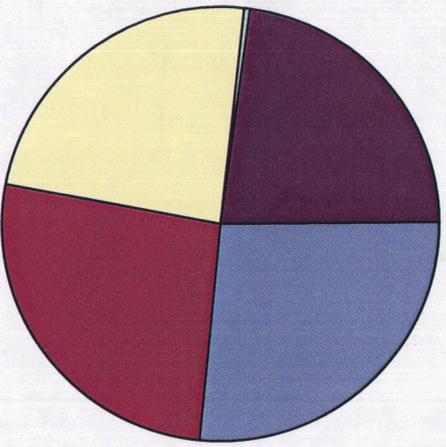
# Arizona Total Natural Gas Consumption



Source: U.S. Department of Energy, Energy Information Administration

### Arizona Delivered Volumes by Sector - 1997

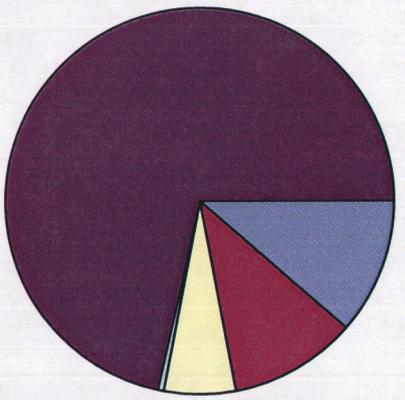
Source: U.S. Department of Energy, Energy Information Administration



- Residential
- Commercial
- Industrial
- Vehicle Fuel
- Power Generation

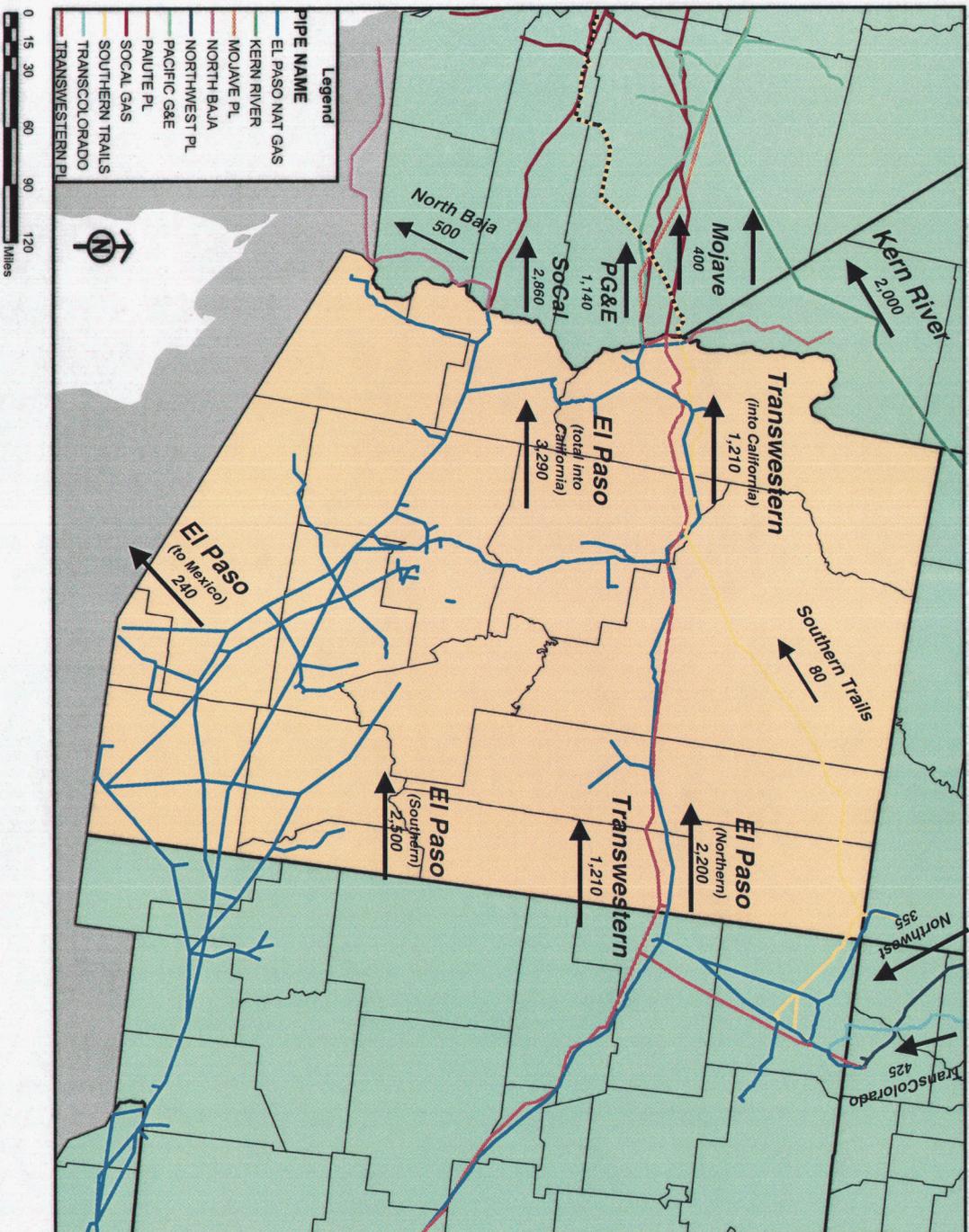
### Arizona Delivered Volumes by Sector - 2004

Source: U.S. Department of Energy, Energy Information Administration



- Residential
- Commercial
- Industrial
- Vehicle Fuel
- Power Generation

# Natural Gas Pipelines In Arizona and Surrounding States



Source: Arizona Natural Gas Market and Infrastructure Study, EEA, January 5, 2006

## Natural Gas Impacts of Proposed Devers – Palo Verde 2 Transmission Line

- Natural gas is the fuel on the margin for electric generation in the Southwest most of the time
- Natural gas demand in the central Arizona is expected to increase as gas-fired generation is run more to provide greater exports to California via the proposed Devers – Palo Verde 2 line, particularly if California fails to construct in-state generation to meet growing demand in California
- The DPV-2 line would increase Arizona's connection to the heavily natural gas reliant California electricity market (natural gas consists of 51.6 % of mwh generated in California in 2004 vs 27.0 % in Arizona). Source: Energy Information Administration

## Natural Gas Impacts of Proposed Devers – Palo Verde 2 Transmission Line (cont.)

- Additional natural gas demand growth in Arizona resulting from the proposed DPV-2 line will likely require additional acquisition of interstate pipeline capacity by electric generators, possibly via acquisition of existing capacity or construction of new capacity
- The need for development of natural gas storage in Arizona and/or access to storage facilities elsewhere in the Southwest will be exacerbated by the proposed DPV-2 line

# EI Paso Pipeline Rate Case

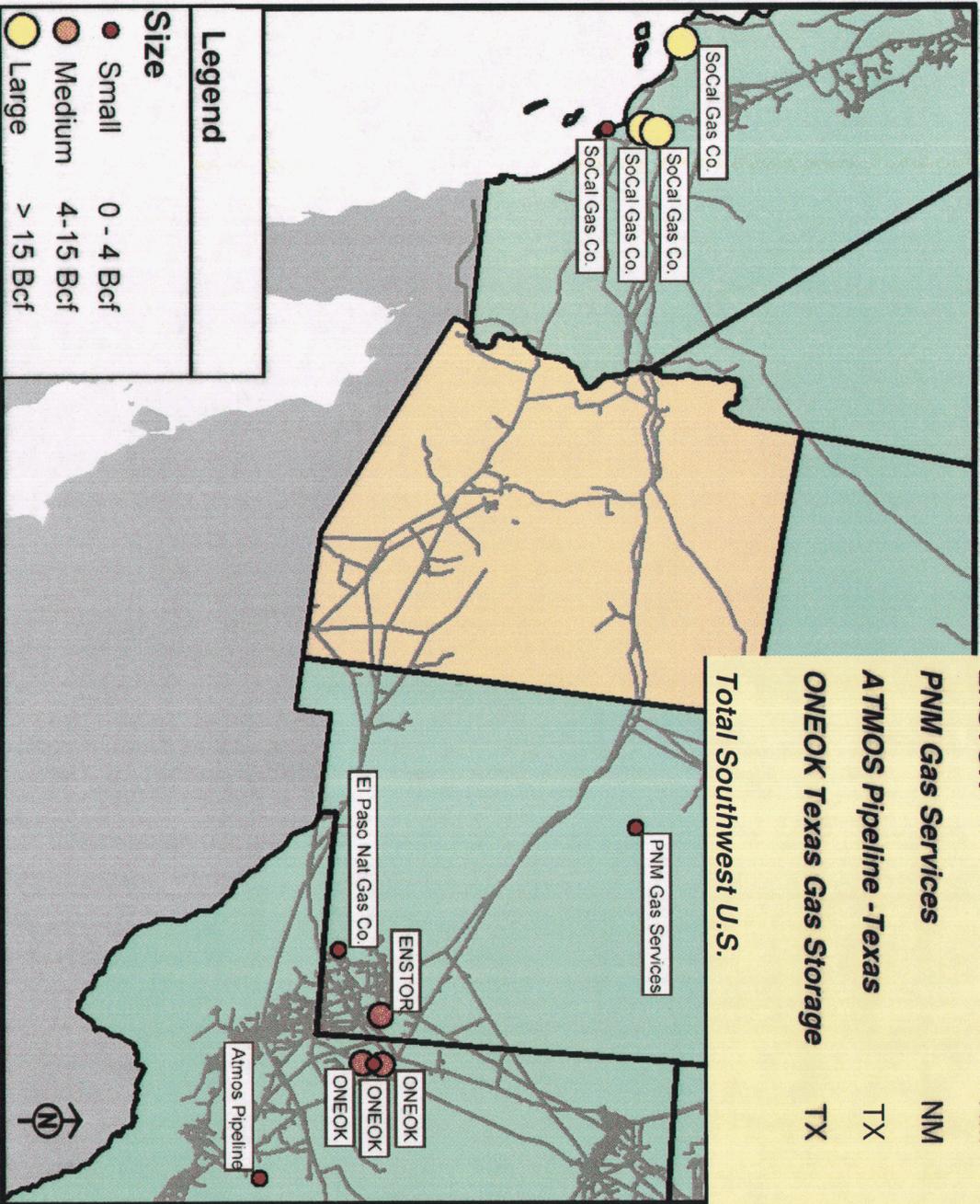
- EI Paso Natural Gas Company currently is before the Federal Energy Regulatory Commission in a general rate case
- Proposals by EI Paso to significantly change how its pipeline operates, including implementation of hourly balancing and penalty provisions will likely lead to significant cost increases for pipeline service by electric generators and others in Arizona
- The structure of the natural gas marketplace in the Southwest will be shaped to a significant extent by the outcome of EI Paso's rate case
- EI Paso has put forth proposals, including elimination of its short-haul rate and bundling of its service offerings, that have competitive implications and create substantial barriers for other natural gas infrastructure developers in Arizona to construct pipeline or storage facilities

# El Paso Pipeline Rate Case

- El Paso's rate case has drawn national attention, with the Electric Power Supply Association, the Edison Electric Institute, the Interstate Natural Gas Association of America, the American Public Gas Association, and the Tennessee Valley Authority making filings in the case
- California parties have repeatedly expressed concerns regarding the impact on natural gas service reliability of growing demand for natural gas-fired electric generation in Arizona and the resulting load swings on the interstate pipeline system
- Significant uncertainty regarding many major issues remains in the El Paso case, as settlement negotiations continue and the case moves toward the hearing phase

# Southwestern Storage Fields

Operator	State	2005 Working Gas Capacity (Bcf)	Peak Deliverability (MMcfd)
Southern California Gas Co.	CA	123.6	3,200
EI Paso Natural Gas	NM	20.0	125
ENSTOR	NM	4.5	50
PNM Gas Services	NM	1.1	11
ATMOS Pipeline - Texas	TX	1.3	38
ONEOK Texas Gas Storage	TX	16.4	450
<b>Total Southwest U.S.</b>		<b>146.0</b>	<b>4,529</b>



- Almost 150 Bcf of underground storage in area, not including storage located in northern California
- No storage in Arizona

# Natural Gas Storage Options for Arizona

- Arizona currently has no natural gas storage facilities within the state and no access to storage which can help Arizona address load changes on a timely basis
- El Paso relies on the Washington Ranch storage facility in west Texas to provide some system flexibility, but Arizona market area storage is needed to address both reliability and cost issues
- El Paso explored building the Copper Eagle storage facility in west Phoenix, but the project was derailed by opposition
- El Paso and Chevron (Unocal) have both explored building a storage facility between Phoenix and Tucson
- The salt dome location north of Kingman, where the Aquilla and Desert Crossing projects have been considered, is not active at this time

## Recent Natural Gas Infrastructure Developments

- On September 15, 2006, Transwestern Pipeline filed with FERC an application for a certificate of convenience and necessity to construct and operate the Phoenix Expansion Project
- The Phoenix Project would originate in the San Juan basin, would skirt the west side of the Phoenix metro area and end near Coolidge, Arizona. Its anticipated in-service date is 2008.
- The ACC has pre-approved cost recovery for Arizona Public Service and Southwest Gas for costs related to pipeline capacity they would acquire on the Phoenix Project
- On June 28, 2006, El Paso announced plans to develop a salt cavern natural gas storage facility near Eloy, Arizona
- The El Paso storage facility would have a capacity of 3.5 billion cubic feet and El Paso projects the facility will go into service in the 2010-2012 timeframe.

# Storage and California

- Northern California has storage facilities that could provide some benefit to Arizona shippers, but these facilities are not currently physically accessible
- Southern California has very significant natural gas storage facilities, 123.6 billion cubic feet of capacity in 2005, that are physically accessible for Arizona
- However, California has rules which only allow use of storage in Southern California for in-state California uses
- As California becomes more reliant on natural gas-fired generation imports from Arizona, California should reconsider its decision to not provide interstate access to its storage facilities. Access to even a small portion of the existing natural gas storage facilities in Southern California could enhance natural gas service reliability in the Southwest, benefitting both California and Arizona, and could create a more efficient and reliable regional energy market

# Summary

- The proposal under consideration in this proceeding would increase natural gas consumption for electric generation in Arizona to meet California needs, exacerbating the need for natural gas storage services in Arizona
- Arizona natural gas consumers, including merchant plants in the Palo Verde area, will incur additional costs due to the lack of storage availability
- Availability of storage to Arizona natural gas consumers would reduce costs and increase natural gas service reliability in the Southwest
- Lack of access to existing storage facilities in the region, specifically in Southern California, is an impediment to natural gas service reliability and efficiency in Arizona and the Southwest
- California should consider regional concerns regarding natural gas storage facility issues as it espouses consideration of regional electric issues in this case

## Proposed Condition

If the application in this case is approved, Staff recommends adoption of the following natural gas related condition:

- “Southern California Edison agrees to make good faith efforts to work within future California and regional proceedings to encourage regional access to natural gas storage facilities in California in a manner that addresses natural gas service reliability and efficiency in the region, including Arizona”

1 Original and twenty-five (25) copies  
2 of the foregoing filed this 26<sup>th</sup> day  
3 of September, 2006 with:

3 Docket Control  
4 Arizona Corporation Commission  
5 1200 West Washington Street  
6 Phoenix, Arizona 85007

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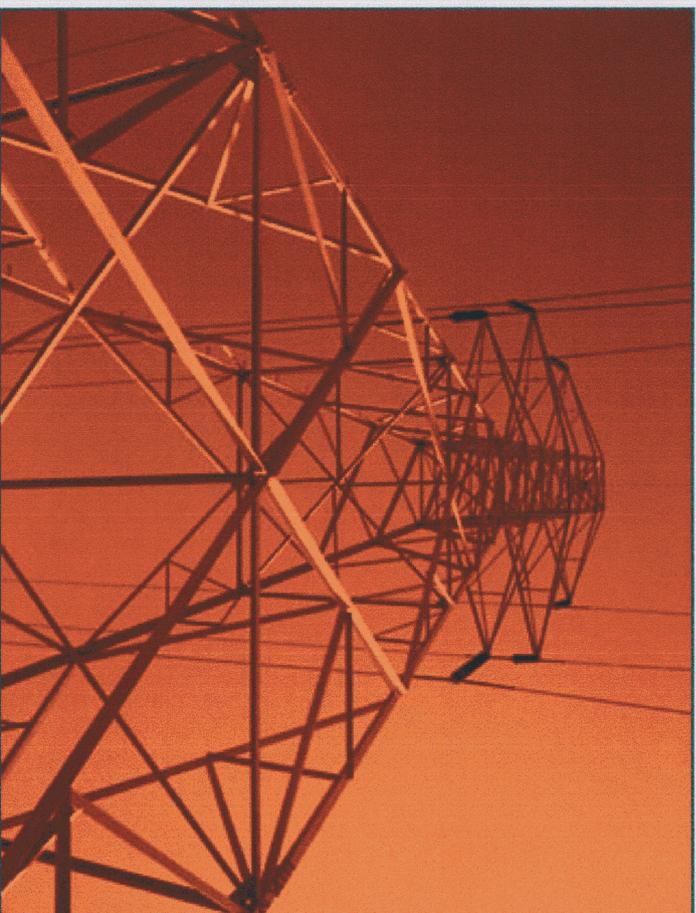
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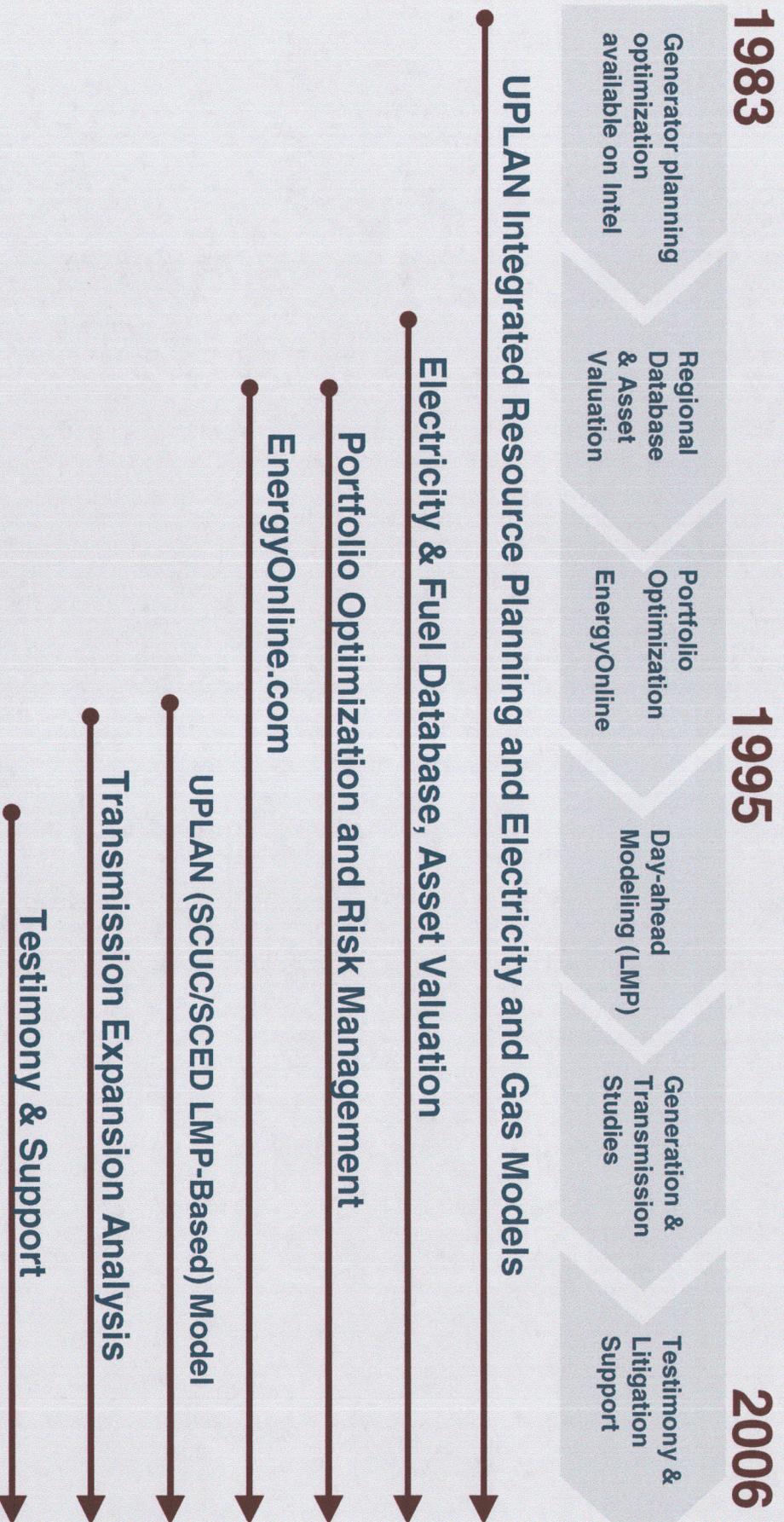
# Study of the Economic Impact of PVD2 Transmission Line on Arizona Consumers

*Prepared for Arizona Corporation Commission  
September 14, 2006*



LCG Consulting - 4962 El Camino Real Suite 112 - Los Altos, CA 94022  
1 (650) 962-9670 - [www.energyonline.com](http://www.energyonline.com)

# LCG Consulting



# Features of UPLAN

## Functions

- Day-ahead SCUC/SCED
- Supply, demand & portfolio bids
- Bilateral transactions
- Ancillary service model
- Time varying bus level demand
- Full Network Model (DC/AC) marginal/average losses
- Congestion management
- Contingency analysis (N-X)
- Real time imbalance Market Model
- Portfolio bid optimization
- Long-term portfolio optimization
- Structural Volatility analysis

## Results

- Day ahead energy LMP
- A/S bids, prices & revenues
- Generator operation, costs, revenues
- Load flow, binding contingencies, PARS, OTDF, PTDF,GSF, RAS, LODF, CRR
- Shadow prices
- Real time LMP distribution
- Capacity prices
- Volatility reports options, VaR, delta, gamma, statistical output

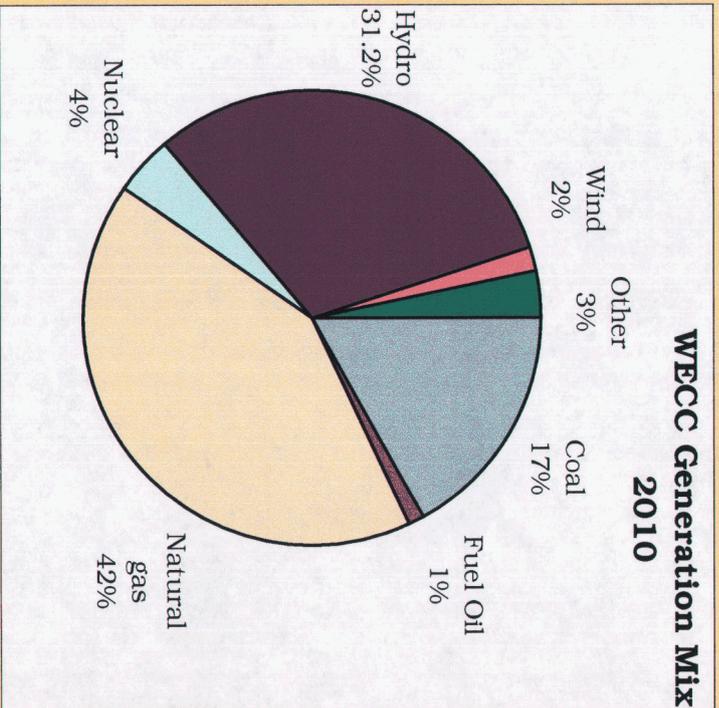
## Technology

- MS- SQL server with .net
- Dashboard, report wizard, auto charting
- Distributed (Parallel) processing- scalable cluster manager
- Powerful grouping, filtering, storage management
- Intuitive control of data viewing, manipulation
- Powerful scenario based comparison module
- Security and access privilege

# WECC Generation Mix (2010)

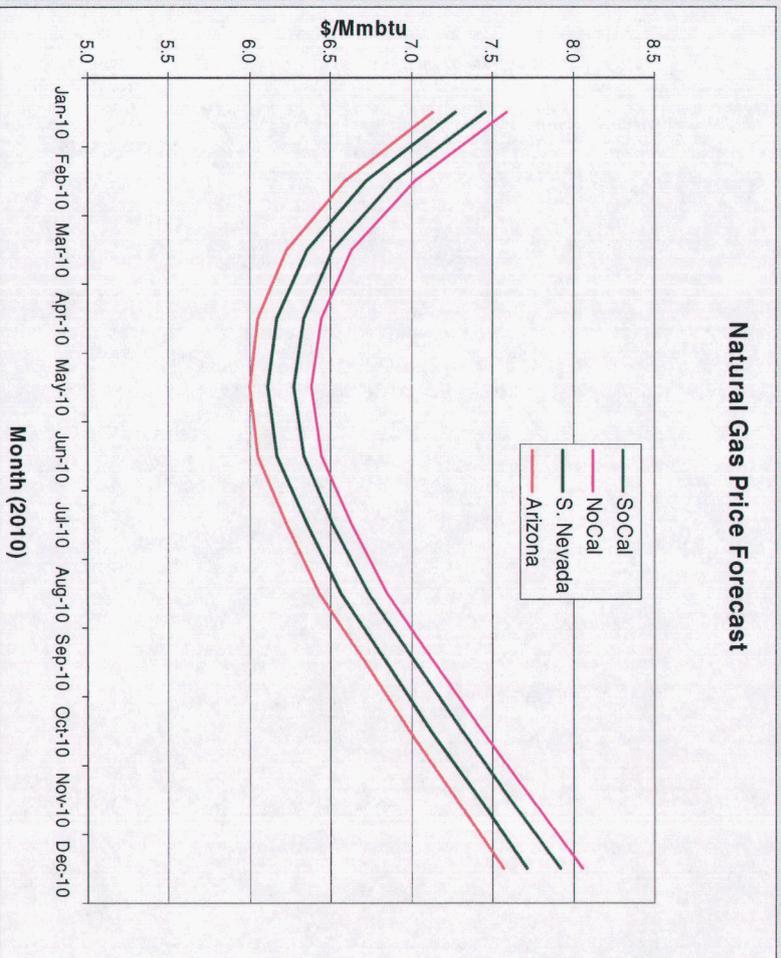
WECC Capacity (MW), 2010		
Fuel	MW	%
Coal	37,869	16.9%
Fuel Oil	2,517	1.1%
Natural gas	93,061	41.6%
Nuclear	9,519	4.3%
Hydro	69,750	31.2%
Wind	3,400	1.5%
Other	7,594	3.4%
Grand Total (MW)	223,711	100.0%

Source : EIA 411 A & B Filing



# Natural Gas Price Forecast

Month	Year 2010			
	SoCal	NoCal	S. Nevada	Arizona
Jan-10	7.46	7.59	7.27	7.13
Feb-10	6.89	7.02	6.72	6.59
Mar-10	6.51	6.63	6.35	6.23
Apr-10	6.33	6.44	6.17	6.05
May-10	6.27	6.38	6.11	6.00
Jun-10	6.33	6.44	6.17	6.05
Jul-10	6.51	6.63	6.35	6.23
Aug-10	6.73	6.85	6.56	6.43
Sep-10	7.02	7.14	6.84	6.71
Oct-10	7.31	7.44	7.12	6.99
Nov-10	7.61	7.75	7.42	7.28
Dec-10	7.92	8.06	7.71	7.57



# Demand Forecast (2010)

Area	Annual Peak (MW)	Annual Energy (GWh)
Arizona-New Mexico-Southern Nevada	2010	2010
California-Mexico Power Area	30,142	142,973
Northwest Power Pool Area	63,080	337,118
Northwest Power Pool Area	64,078	373,912
Rocky Mountain Power Area	11,975	67,515
<b>Total WECC in UPLAN*</b>	<b>154,107</b>	<b>921,516</b>

# Revised PVD2 Plan of Service (POS)

- Build new Harquahala-Devers 500 kV line
- Build new Devers-Valley 500 kV #2 line
- 230 kV Circuit Breaker Replacements and Upgrades
- Reactive Power Equipment
- SPS to Mitigate DPV1 and DPV2 outage
- Annual Fwd. Cap Path 49. Limit increased from 8055 MW to 9255 MW

# Export / Import

## EXPORT FROM ARIZONA (2010)

TO ZONE	W/O PVD2		W/ PVD2		Difference in Flow (Gwh)	Difference in Revenue (\$1000)
	FLOW (Gwh)	EXPORT REVENUE (\$1000)	FLOW (Gwh)	EXPORT REVENUE (\$1000)		
CS_IMPERIAL	843	47,536	820	48,310	(23)	774
CS_LADWP	20,468	1,153,852	19,749	1,173,281	(719)	19,429
CS_SANDIEGO	8,300	457,636	7,901	454,270	(399)	(3,366)
CS_SOCALIF	26,868	1,522,209	33,835	2,019,006	6,967	496,797
NEVADA	4,933	292,776	4,901	301,979	(32)	9,203
NEW MEXI	6,089	340,293	5,389	314,985	(700)	(25,308)
PACE	2,720	160,493	2,748	171,551	28	11,058
WAPA R.M	1,046	61,801	962	60,938	(84)	(863)
TOTAL	71,267	4,036,596	76,305	4,544,320	5,038	507,724

## IMPORT TO ARIZONA (2010)

FROM ZONE	W/O PVD2		W/ PVD2		Difference in Flow (Gwh)	Difference in Revenue (\$1000)
	FLOW (Gwh)	EXPORT REVENUE (\$1000)	FLOW (Gwh)	EXPORT REVENUE (\$1000)		
CS_IMPERIAL	647	39,616	709	42,957	62	3,341
CS_LADWP	47	3,193	76	5,252	29	2,059
CS_SANDIEGO	737	44,015	657	38,879	(80)	(5,136)
CS_SOCALIF	329	22,236	442	29,308	113	7,072
NEVADA	254	14,854	282	16,523	28	1,669
NEW MEXI	6,914	390,469	7,036	412,263	122	21,794
PACE	208	6,115	680	35,891	472	29,776
WAPA R.M	111	4,082	141	5,426	30	1,344
TOTAL	9,247	524,580	10,023	586,499	776	62

# Consumer Payments & NG Consumption

## CONSUMER PAYMENTS (2010)

ZONE	CONSUMER PAYMENTS (Millions\$)		Difference
	W/O PVD2	W/ PDV2	
ARIZONA	5380	5621	242
CN_PGE	6627	6552	-75
CS_IMPERIAL	258	255	-3
CS_LADWP	2600	2574	-27
CS_SANDIEGO	1791	1775	-16
CS_SOCALIF	8161	8037	-124

## NATURAL GAS CONSUMPTION (2010)

Zone Name	Fuel Consumption (MBtu)		Difference
	W/O PVD2	W/ PVD2	
ARIZONA	524,227,828	556,795,603	32567775
CN_PGE	358,307,787	346,608,797	-11698990
CS_IMPERIAL	31,836,822	30,524,249	-1312573
CS_LADWP	86,345,440	83,508,456	-2836984
CS_SANDIEGO	114,393,661	111,123,248	-3270413
CS_SOCALIF	377,840,118	358,593,266	-19246852

# Zonal Prices

## ZONAL PRICE (2010)

ZONE	W/O PVD2			W/ PVD2		
	OFF-PEAK (\$/MWh)	PEAK (\$/MWh)	OVERALL (\$/MWh)	OFF-PEAK (\$/MWh)	PEAK (\$/MWh)	OVERALL (\$/MWh)
ARIZONA	49.42	62.98	58.10	50.54	66.93	61.00
CN_PGE	51.65	69.39	62.82	51.21	68.58	62.15
CS_IMPERIAL	52.68	68.36	62.75	51.97	67.39	61.88
CS_LADWP	52.23	69.43	63.32	51.80	68.72	62.71
CS_SANDIEGO	52.87	68.63	63.05	52.21	68.18	62.52
CS_SOCALIF	52.54	69.74	63.62	51.87	68.66	62.69

# Arizona Monthly Prices

Month (2010)	W / O PVD2			W / PVD2		
	OffPeak Price (\$/MWh)	OnPeak Price (\$/MWh)	Overall Price (\$/MWh)	OffPeak Price (\$/MWh)	OnPeak Price (\$/MWh)	Overall Price (\$/MWh)
1	51.18	61.17	57.29	52.93	67.69	61.96
2	46.94	56.21	52.77	47.77	63.74	57.82
3	46.73	60.36	55.53	46.82	61.82	56.51
4	46.34	59.67	55.02	46.37	60.22	55.39
5	42.75	56.10	51.22	44.83	59.11	53.89
6	46.96	64.00	58.09	47.51	65.72	59.41
7	50.78	74.57	66.38	51.18	75.49	67.11
8	50.90	72.69	64.72	51.31	72.74	64.91
9	47.99	64.59	58.88	50.60	68.06	62.05
10	52.59	62.12	58.55	53.71	68.88	63.20
11	55.12	61.09	58.80	56.50	69.71	64.64
12	54.74	63.14	59.98	56.90	70.01	65.07
Average	49.42	62.98	58.10	50.54	66.93	61.00

# Q & A

# Ratemaking Impacts

Matthew Rowell, ACC Staff

September 2006

Docket Number: L-00000A-06-0295-00130

# Simulation Model Results

- Staff's Consultant, LCG Consulting ran a production simulation model that estimated the impact of the proposed PVD2 line.
- LCG's model estimated that construction of the PVD2 line would result in a \$3 per MWh average increase in wholesale energy prices in Arizona. The model also estimated that the line would result in price decreases in California and other WECC areas.
- These estimates are for 2010 and increases and decreases are relative to the model's estimates for 2010 with no PVD2 line in service.

- What is the basic rationale for the estimated increase in Arizona wholesale energy prices?
- *Basic economic theory suggests that the proposed line would drive up the market price for power in AZ. The logic is simple: Transmission between the PV hub and California is currently constrained. California is short power. Increases in transmission capacity will result in an increase in the demand for power at the PV hub. That is, an increase in demand for power generated in Arizona. Assuming all other factors are constant, an increase in demand will result in an increase in the market price for power.*
- So the results of the model run are not at all surprising.

- What are the implications of this wholesale price increase for Arizona?
- Because of the increase in Arizona wholesale prices LCG's model indicates that Arizona generator's profits will increase by \$468 M and total generation in Arizona will increase by 4,221 GWh.

- The model indicates that the increase in generator profits will be distributed as follows:

<b>Category</b>	<b>Share of increased profit</b>
AZ Utilities	39%
Merchant Generators	34%
Federally owned Generation	6%
Non-AZ Utilities with Shares of	
AZ Generation	19%
Other*	3%

\*CAWP, CRIIP, USBIA

- How will the increase in Arizona generator profits affect Arizona consumers?
- For the 62% of the estimated increased profits that accrue to entities other than Arizona utilities, Arizona consumers will receive virtually no benefit.
- For the 39% of the estimated increased profits that accrue to Arizona utilities, the impact on Arizona consumers is unclear and will vary by utility.

- While the estimated increase in wholesale prices has an unambiguously positive impact on Arizona generators, the impact on Arizona consumers is less clear. The model indicates that Arizona consumer benefit will decline by \$242 M as a result of the increased wholesale energy prices brought about by PVD2.
- However, Arizona consumers are not 100% reliant on wholesale markets for their energy needs.

- Currently, Arizona consumers receive their energy from utilities whose prices are set on a cost of service basis. Thus, if a utility has adequate generation to meet its load, its customers will be largely insulated from increases in spot market prices.
- However, Arizona utilities will *not* own sufficient generation to meet all their loads in 2010.

- As a whole, Arizona utilities will be short an estimated 30% of their energy needs in 2010. Thus, Arizona consumers will be exposed to the market for an estimated 30% of their needs.
- To cover this short position Arizona utilities will need to go to the market but not necessarily the spot market. Utilities typically enter into long term contracts with suppliers or build generating units rather than relying on the spot market.

- Are the model's estimated impacts on spot market prices likely to influence the cost of long term contracts entered into by Arizona Utilities?
- Yes. The same demand and supply fundamentals that drive up spot market prices in the model will influence the price of long term contracts.

- The ratemaking impacts of the PVD2 line will vary by utility:

- **APS and AEPCCO**
- APS and AEPCCO have Commission approved adjustor mechanisms. Through these mechanisms, increases in the cost of purchased power are passed directly on to customers. These increases will be offset by increased profit from off system sales that results from the estimated higher energy prices.
- However, given that these utilities are short power, it is unlikely that the increased profit from off system sales will outweigh the increased costs to consumers resulting from the increase in purchased power prices.
- Off system sales are made on an efficiency basis during off peak periods (when prices are low.) Whereas, purchases made to meet load typically cover peak periods (when prices are high.)

- **TEP**
- TEP currently has no adjustor mechanism and is regulated on a cost of service basis. TEP has a relatively large proportion of coal generation relative to its load. TEP does not need to purchase power to the same extent as other Arizona utilities. These factors currently shield TEP's rate payers from fluctuations in market prices.
- However, TEP currently has an application pending before the Commission (Docket No. E-01933A-05-0650) where it is asserting that it is entitled to move away from cost based ratemaking to a market based approach. Depending on how that application is decided, TEP's rates may be based entirely, in part, or not at all by prices prevailing in the market.

# Need

- The above discussion indicates that from an Arizona perspective there is no fundamental need for the PVD2 project. Arizona utilities are faced with the need to procure resources to meet rapidly growing load. The PVD2 project does not address that need.
- The purpose of the PVD2 project is to move energy from Arizona to California.
- “The Project’s primary economic benefit is the increased ability to import low-cost generation from the southwest and displace higher-cost generation in California.”\*

\*February 18, 2005 memorandum from CalISO Staff to CalISO Board of Governors.

California's need to import power is driven by its load growth and its historic underinvestment in generation resources. Even now, California does not appear to be adding significant generation in state:

“The only high probability resource additions or retirements included beyond this (2006) summer are the new 153 MW Roseville Energy Park and LADWP replacing a 585 MW plant with a new 600 MW combined cycle project in 2008.”\*

\*Summer 2006 Electricity Supply and Demand Outlook, Final Staff Report, California Energy Commission, April 2006, CEC-700-2006-005

- This lack of generation investment in California is apparently driven by cost considerations:
- “Because the southwest has less expensive permitting, land, emission-offset, and labor expenses, the ISO estimated the fixed costs of a new combined –cycle (CC) plant to be about 13 percent less in Arizona than in California. The ISO expects that California generation interconnection costs – those necessary to make generation deliverable to load – will further increase this cost differential. In addition, the ISO expects units in the southwest to have lower operating costs due to lower natural gas costs forecast for that region. Thus, from strictly a unit cost perspective, the ISO ratepayer would benefit more from having access to lower cost units in the Southwest. Constructing new in-state gas-fired generation would also not increase access to the more diverse fuel supply available in the southwest.”\*
- \*February 18, 2005 memorandum from CalISO Staff to CalISO Board of Governors.



## Memorandum

**To:** ISO Board of Governors  
**From:** Armando J. Perez, Director of Grid Planning  
Anjali Sheffrin, Director of Market Analysis  
**cc:** ISO Officers; ISO Board Assistant  
**Date:** February 18, 2005  
**Re:** *Palo Verde-Devers No. 2 500 kV Transmission Project*

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*This memorandum requires Board action.*

### EXECUTIVE SUMMARY

During the last few years, a large number of new and efficient combined cycle generation power plants have been constructed in western Arizona near the Palo Verde area. This new generation is more efficient than the older steam boiler generation that exists in the Los Angeles, San Francisco, and San Diego load centers. In addition, the new gas-fired generation in Arizona and elsewhere in the Southwest is expected to be significantly less expensive than similar generation located in California due to permitting, land, emission credit, labor, and gas costs. However, the current transmission system is not adequate to import this new generation to southern California. As a result, it continues to be necessary to operate old and inefficient generation in southern California.

In June of 2004, the ISO Board approved the "STEP Short-Term Transmission Upgrades." These upgrades increase the ability of the existing transmission system to import power from Arizona without adding any new transmission lines. These short-term upgrades are planned to be in place in June 2006. Additional upgrades are planned for the existing transmission lines between Arizona and Nevada. However, even after these additions have been completed, our analysis indicates that there will still be substantial congestion on the grid between Arizona and California. The Palo Verde-Devers No. 2 project (PVD2 Project or Project), as described later in this memo, would further reduce this congestion and provide economic benefits to California ISO ratepayers as well as the Western interconnection as a whole. Our analysis indicates that expected benefit-cost ratio for ISO Ratepayers ranges from 1.2 to 3.2 depending on input assumptions and allocation of transmission congestion rents.

The ISO's analysis of the PVD2 Project further indicates that the project scope and cost appear to be appropriate.

Based on the economic and reliability benefits of the PVD2 Project (as discussed later in this memo and in the attached report), ISO Management recommends that the ISO Board approve the project and direct Southern California Edison Company (SCE), as the project sponsor, to proceed with the necessary permitting and construction of the project.

**MOVED,**

***That the ISO Board of Governors approve the Palo-Verde-Devers No.2 transmission project as a necessary and cost effective addition to the ISO Controlled Grid and direct Southern California Edison Company to proceed with the permitting and construction of the transmission project, preferably to be completed by the summer of 2009, as detailed in the memorandum to the ISO Governing Board dated February 18, 2005.***

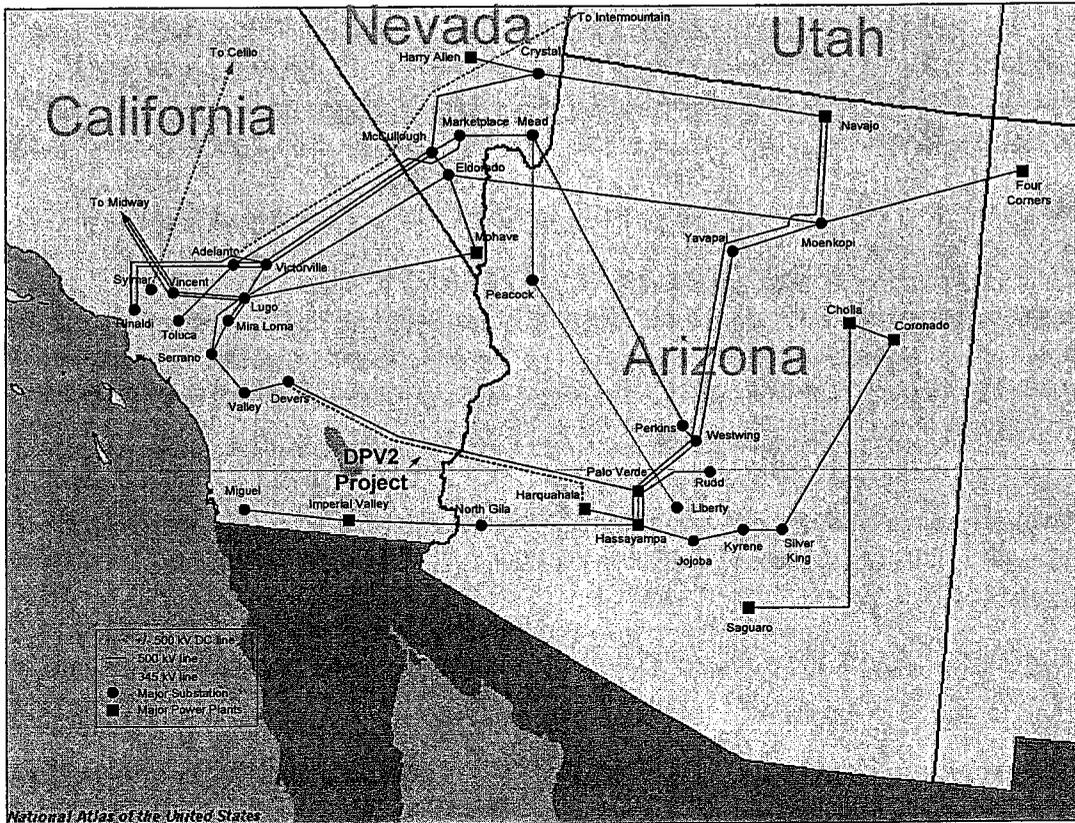
## **PROJECT DESCRIPTION**

The PVD2 Project includes the following facilities:

- A new 230 mile 500 kV line to be constructed between the Harquahala Switchyard (near Palo Verde) and SCE's Devers 500 kV Substation. The route proposed from Devers to Harquahala parallels SCE's existing Palo Verde-Devers No.1 (PVD1) transmission line. Most of the proposed line is to be constructed on single circuit steel lattice towers.
- The four 230 kV lines west of the Devers substation will be rebuilt: the Devers-San Bernardino 230 kV lines #1 and #2, and the Devers-Vista 230 kV lines #1 and #2.
- Voltage support facilities will be added in the Devers area in southern California.

The proposed PVD2 Project is expected to increase California's ability to import power from Arizona by at least 1,200 MW. The project could be operational as early as 2009 and is expected to cost \$680 million in year 2009 dollars. Figure 1 shows the location of the project.

**Figure 1**  
**Location of Proposed PVD2 Transmission Expansion Project**



**The proposed PVD2 project is a 230 mile, 500 kV transmission line from the Haraquala substation Haraquala switchyard near Palo Verde to SCE's Devers substation near Palm Springs, California. PVD2 will parallel the existing PVD1 line and use an existing transmission line corridor and will use the existing PVD1 right-of-way.**

**PUBLIC PROCESS IN DEVELOPING RECOMMENDATION**

The development of the Palo Verde- Devers project originated in a transmission group process called the Southwest Transmission Expansion Plan (STEP). This group has approximately 300 members on its distribution list and about 50 members routinely attend STEP meetings that are held every two months. The goals of STEP include:

- To provide a forum to further the development of a robust transmission system between the Arizona, Nevada, Mexico, and Southern California areas that meets Western Electricity Coordinating Council (WECC) and North American Electric Reliability Council (NERC)

Reliability Criteria and is capable of supporting a competitive, efficient, and seamless west-wide wholesale electricity market;

- To encourage all interested parties to participate in the development of transmission plans that benefits the customers in the Southwest; and
- To provide a broad basis of support that will aid the implementation of future transmission projects.

In developing a transmission plan for the area, STEP analyzed 26 different combinations of facilities to increase the transmission capability between the Southwest and Southern California and proposed a series of projects. The first project was the STEP Short-Term Transmission Upgrades. The ISO Board approved the California portion of this project in June 2004 and these facilities are expected to be in service in 2006. Similar upgrades are being planned on the transmission lines between Arizona and Nevada. The next major project in the series is the PVD2 Project. STEP determined the PVD2 Project would provide more benefits from both a technical and economic perspective than the other transmission projects that were considered.

In parallel with STEP, SCE determined that PVD2 Project was a cost effective project and requested that the ISO approve the project. The ISO staff has performed an independent evaluation of the economic and reliability benefits of the PVD2 Project using the newly developed Transmission Economic Assessment Methodology (TEAM).

The TEAM methodology was the subject of a four-month public stakeholder process in 2004. The ISO conducted three public workshops and conducted a public ISO Market Surveillance Committee meeting to further discuss TEAM. In addition, three technical subgroups were formed. The three subgroups worked on base case assumptions, the scenario selection, and methods of modeling market prices. In all, there were twelve separate technical sessions. The ISO filed a report with the California Public Utilities Commission (CPUC) in June 2004, documenting this methodology and providing a detailed example study.

In its analysis of the PDV2 Project, the ISO has reviewed the interim results in a number of public forums. The ISO has incorporated input from these meetings into its findings. The ISO also presented its preliminary results in a public Market Surveillance Committee meeting in November 2004. At this meeting, the Los Angeles Department Water and Power (LADWP), a significant operator in the project area, asked whether the ISO had reviewed the impact of proposed East-of-River (EOR) 9000 upgrades in Nevada/Arizona. LADWP suggested that this upgrade could be an alternative to the PVD2 Project. The ISO spent the following two months reviewing the implication of the EOR 9000 upgrades on the PVD2 Project. The ISO's results indicate that the EOR 9000 Project is a complementary project to the PVD2 Project and not an alternative. The STEP Plan includes the upgrades that are currently part of the EOR 9000 project.

In addition, stakeholders were provided the following opportunities to review the latest economic studies for the PVD2 Project. These meetings are in addition to the two years of STEP meetings that were spent in determining the overall transmission expansion plan for the region.

1. On January 11<sup>th</sup>, the ISO presented its findings-to-date to the Western Arizona Transmission Studies (WATS) group

2. On January 14<sup>th</sup>, the ISO conducted an ISO stakeholder meeting to review preliminary results with a broader group of interested parties. 48 attendees from 33 different companies or agencies were present at the stakeholder meeting.
3. On January 18<sup>th</sup>, the ISO solicited further review and input from the ISO Market Surveillance Committee.
4. On January 25<sup>th</sup>, the ISO posted a variety of our study work papers on our website and on February 2<sup>nd</sup>, the ISO posted the Draft PVD2 report.
5. On February 4<sup>th</sup>, the ISO discussed the PVD2 study results at a MSC Open Meeting.
6. On February 9<sup>th</sup>, the ISO reviewed the PVD2 study results at a STEP meeting and received concurrence on proceeding with approval of the project.

Throughout this process, the ISO has solicited input from a wide variety of stakeholders. Management will summarize the input the ISO has received and the ISO's response to comments at the Board meeting. Written responses to the comments received by the ISO are posted on the ISO's web site.

### **ECONOMIC AND RELIABILITY BENEFIT ASSESSMENT**

ISO Management's recommendation on the PVD2 Project is based on consideration of the projects economic and reliability benefits. As mentioned previously, the ISO completed a comprehensive analysis of the benefits of PVD2 Project using TEAM and concluded that the project will provide significant reliability and economic benefits to ISO ratepayers. The PVD2 Project will improve reliability by increasing voltage support in southern California and enhance system operational flexibility by providing ISO operators with more options in responding to transmission and generation outages. The Project's primary economic benefit is the increased ability to import low-cost generation from the southwest and displace higher-cost generation in California. The PVD2 Project will also provide access to additional capacity that can serve to meet the State's resource adequacy requirements and lower transmission system power losses. The PVD2 Project will significantly augment the transmission infrastructure critical to support competitive wholesale energy markets for California consumers.

As part of the evaluation of the Project, alternatives to the project were considered such as other transmission projects and new generation. Demand-side and renewable resources were not considered alternatives since the ISO believes these resources should be maximized first, before other traditional resources are considered. For this analysis, the ISO reviewed several alternatives. One alternative the ISO examined was the East-of-River (EOR) 9000 transmission project, which upgrades lines between Nevada and Arizona. The ISO's analysis indicates that the EOR 9000 project is complementary to the PVD2 Project and is therefore appropriately included in the base case. Another alternative examined by the ISO was siting additional in-state generation. The resource mix the ISO used in the study assumed additions of gas-fired plants known to be under consideration. The mix also met California's adopted renewable portfolio standards. Because the southwest has less expensive permitting, land, emission-offset, and labor expenses, the ISO estimated the fixed costs of a new combined-cycle (CC) plant to be about 13 percent less in Arizona than in California. The ISO expects that California generation interconnection costs – those necessary to make generation deliverable to load – will further increase this cost differential. In addition, the ISO expects units in the southwest to have lower operating costs due to lower natural gas costs forecast for that region. Thus, from strictly a unit cost perspective, the ISO ratepayer would benefit more from having

access to lower cost units in the southwest. Constructing new in-state gas-fired generation would also not increase access to the more diverse fuel supply available in the southwest.

The quantified benefits of the PVD2 project in this evaluation include: (a) a reduction in production costs (energy savings); (b) operational savings (reduced uneconomic generation dispatch for reliability purposes); (c) capacity savings (lower capacity costs from the Southwest); (d) NOx emission reduction (displacement of inefficient California generation with more efficient Southwest generation); and, (e) loss reduction (WECC total system losses are reduced due to increased transmission capacity). The energy benefits were determined in accordance with the TEAM. The remaining benefits were estimated outside of the market simulation model used to determine the energy benefits and are documented in the Board Report and Technical Appendices.

Management estimates that benefits from the Project will exceed its costs under a wide range of future system conditions. Because we believe that no single point estimate can adequately capture its value, the ISO calculated its costs and benefits under a number of likely system conditions. Management believes this range represents the best assessment of the impact of the line on the ISO system. The expected benefit-cost ratio ranges from 1.2 to 3.2 depending on input assumptions and allocation of transmission congestion rents. The attached report describes this analysis in detail.

## **RECOMMENDATION**

As a result of the extensive analysis that has been completed for the PVD2 Project, ISO Management recommends the approval of the Palo Verde-Devers #2 Project and recommends the following motion:

***MOVED,***

***That the ISO Board of Governors approve the Palo-Verde-Devers No.2 transmission project as a necessary and cost effective addition to the ISO Controlled Grid and direct Southern California Edison Company to proceed with the permitting and construction of the transmission project, preferably to be completed by the summer of 2009, as detailed in the memorandum to the ISO Governing Board dated February 18, 2005.***

CALIFORNIA  
ENERGY  
COMMISSION

**SUMMER 2006 ELECTRICITY  
SUPPLY AND DEMAND OUTLOOK**

**FINAL STAFF REPORT**

April 2006  
CEC-700-2006-005



Arnold Schwarzenegger, *Governor*

# CALIFORNIA ENERGY COMMISSION

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## DISCLAIMER

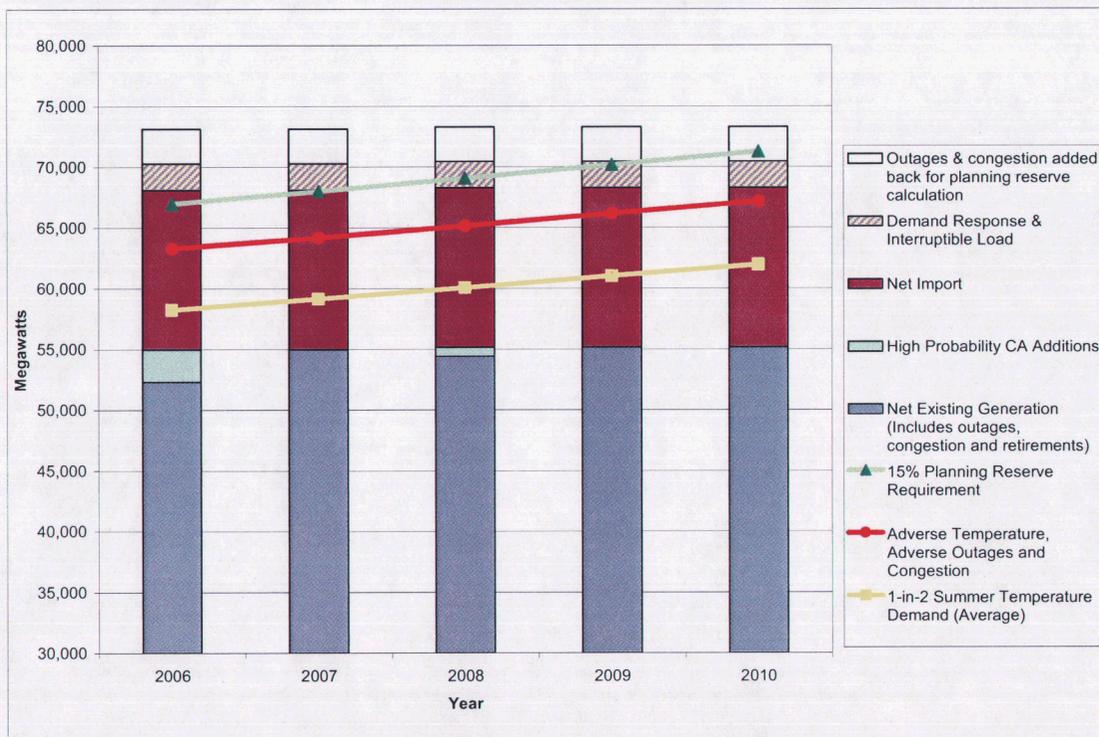
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## CHAPTER 4: FIVE-YEAR OUTLOOK

Figures 4-1 thru 4-4 provide preliminary five-year outlooks for each of the four regions presented in Chapter 1. Staff made several simplifying assumptions in an effort to account for the uncertainties in predicting future activities and program achievements. The starting point for these charts is the peak-month analysis from each of the 2006 tables.

The only high probability resource additions or retirements included beyond this summer are the new 153 MW Roseville Energy Park and LADWP replacing a 585 MW plant with a new 600 MW combined cycle project in 2008. The only other significant change in assumptions from year to year is the increase in peak demand. Staff again used the high case from CED 2006 to project demand over the five-year period. Using these assumptions, the only region that does not have adequate resources to maintain at least 5 percent operating reserves is SP26. The region is able to maintain a 9.5 percent operating reserve under expected conditions in 2009 yet it would need an additional 761 MW in order to maintain a 5 percent operating reserve under adverse conditions.

**Figure 4-1: Five-Year Electricity Outlook - California Statewide**



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2 of the foregoing filed this 26<sup>th</sup> day  
3 of September, 2006 with:

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6 Phoenix, Arizona 85007

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