



**CALIFORNIA ISO**

California Independent  
System Operator

**Transmission Economic Assessment Methodology  
(TEAM)**

**Presentation to the CAISO Board  
May 27, 2004**

Anjali Sheffrin, Ph.D.  
Director, Market Analysis



# CALIFORNIA ISO

California Independent  
System Operator

## Presentation Outline

- ✓ Goals of TEAM Effort
- ✓ Overview of Process and Participants
- ✓ Testimony to CPUC
  - ✓ Key findings
  - ✓ Results from Path 26 Study
  - ✓ Expected Summer, 2004 Schedule



## Goals of TEAM Effort

- Develop a common methodology to evaluate economic need for transmission upgrades.
- Present a framework which can be used today to make effective decisions on transmission upgrade.
- Provide transparency in methods, databases and models so a variety of stakeholders can understand the implications of a transmission upgrade.



## Public Process

- ✓ In Feb. 2003, CAISO filed general blueprint of economic methodology and held a public workshop March 14, 2003 to fully review methods.
- ✓ In Dec. 2003, CPUC ALJ requested full implementation of methodology to be demonstrated using network model.
- ✓ In 2004 CAISO held:
  - 3 Public Workshops, each attended by approx 45 stakeholders
  - Input and review provided by 3 technical subgroups with 12 calls
    - Base case assumptions
    - Benefits framework
    - Market pricing
  - Input solicited from Market Surveillance Committee (MSC)



# CALIFORNIA ISO

California Independent  
System Operator

## Participants in TEAM Process

- CEC
- Consulting companies
- CDWR
- CPA
- CPUC
- EOB
- Coral Power
- Independent Power Producers
- LADWP
- NCPA
- Other Municipal Utilities
- Out-of-State Utilities
- PG&E
- Renewable Producers
- SCE
- SDG&E
- SMUD
- TURN
- WAPA
- BPA



## 2004 Implementation Effort

1. Develop customization specs for modeling effort Jan 2004
2. Formulate specs for market price determination using Residual Supply Index
3. Implement benefit algorithm Feb 2004
4. Develop generation/transmission expansion plan for base case
5. Calculate base case benefits for societal and participant tests
6. Work with subgroups to develop scenario input data Feb-March
7. Final testing of algorithms Mar 2004
8. Perform base cases and sensitivity case/contingencies April 2004
9. Run additional contingencies cases May 2004
10. Submit filing to CPUC June 2, 2004



## Key Principles of TEAM

1. **Benefits Framework** - Standard framework to measure benefits regionally and separately for consumers, producers, and transmission owners in different regions.
2. **Market Prices** – Utilize market prices to evaluate transmission expansion.
3. **Uncertainty** - Consider through wide range of future system conditions -- dry hydro, gas prices, demand growth, under- and over-entry of generation.
4. **Network Representation** – Demonstrate flow is physically feasible using full network model.
5. **Generation/Demand-Side Substitution** – Review alternatives to transmission expansion.



## Application of Principles

Definitive Elements of the Methodology	Possible Future Enhancements	What It Isn't?
1. Benefits framework Defined components of societal and participant perspectives. Treatment of contracts and renewables.	<ul style="list-style-type: none"><li>•Quantification of reliability benefits</li><li>•Impact on CRR holders</li><li>•Other elements of benefits (capacity, ancillary services)</li><li>•Integrated treatment of losses</li></ul>	Does not exclude benefit perspectives Databases does not represent adopted resource plan for California utilities
2. Market Prices – Should allow for mark-up over costs in market environment. Estimate hourly bid adder based on system conditions	Evaluation of Cournot model and supply function equilibrium	No endorsement of specific approach to forecast market prices
3. Treatment of Uncertainty- Selection method defined and technique for assignment of probabilities demonstrated	Expand # scenarios Evaluate boom/bust cycle	Data to be used in all studies is not pre-specified All sensitivities is not pre-specified.



## Application Principles continued

<b>Definitive Elements of the Methodology</b>	<b>Possible Future Enhancements</b>	<b>What It Isn't?</b>
4. Network Modeling – Utilize full network model with data provided by WECC.	Utilize full generation unit commitment in a A/C Power Flow	No specific tool is proscribed. Should not be a contract path approach. Demonstrated physical flow feasibility is necessary.
5. Generation/Demand-Side Substitution for Transmission project	Optimize generation additions throughout WECC including fuel diversity	



# CALIFORNIA ISO

California Independent System Operator

## Participant Benefit Summary For a Typical Scenario in 2013 -- Path 26 Upgrade

Perspective	Description	Consumer Benefit (mil. \$)	Producer Benefit (mil. \$)	Trans. Owner Benefit (mil. \$)	Total Benefit (mil. \$)	Production Cost Savings (mil. \$)	Notes
<i>Societal</i>	<i>WECC</i>	50.69	(31.68)	(14.73)	4.28	4.281	
						17,096.33	Production Cost before upgrade
						17,092.05	Production Cost after upgrade
<i>Modified Societal</i>	<i>WECC</i>	50.69	(28.93)	(14.73)	7.04		Excludes monopoly rent
<i>California Competitive Rent</i>	<i>ISO Ratepayer Subtotal</i>	10.92	0.04	(1.75)	9.21		Includes consumers, UDC generators and ISO PTOs. SMUD and some munis are treated as part of the CAISO due to data limitations.
	<i>ISO Participant Subtotal</i>	10.92	7.04	(1.75)	16.22		Consumers, producers and transmission owners participating in CAISO markets.

**Definitions:**

**Consumer Benefit** – Reduction in cost to consumers.

**Producer Benefit** – Increase in producer net revenue.

**Transmission Owner Benefit** – Increase in congestion revenues.

**WECC Societal** – Sum of Consumer, Producer, and Transmission Owner Benefit in WECC.

Also equal to difference in total production costs for the “without” and “with upgrade cases.

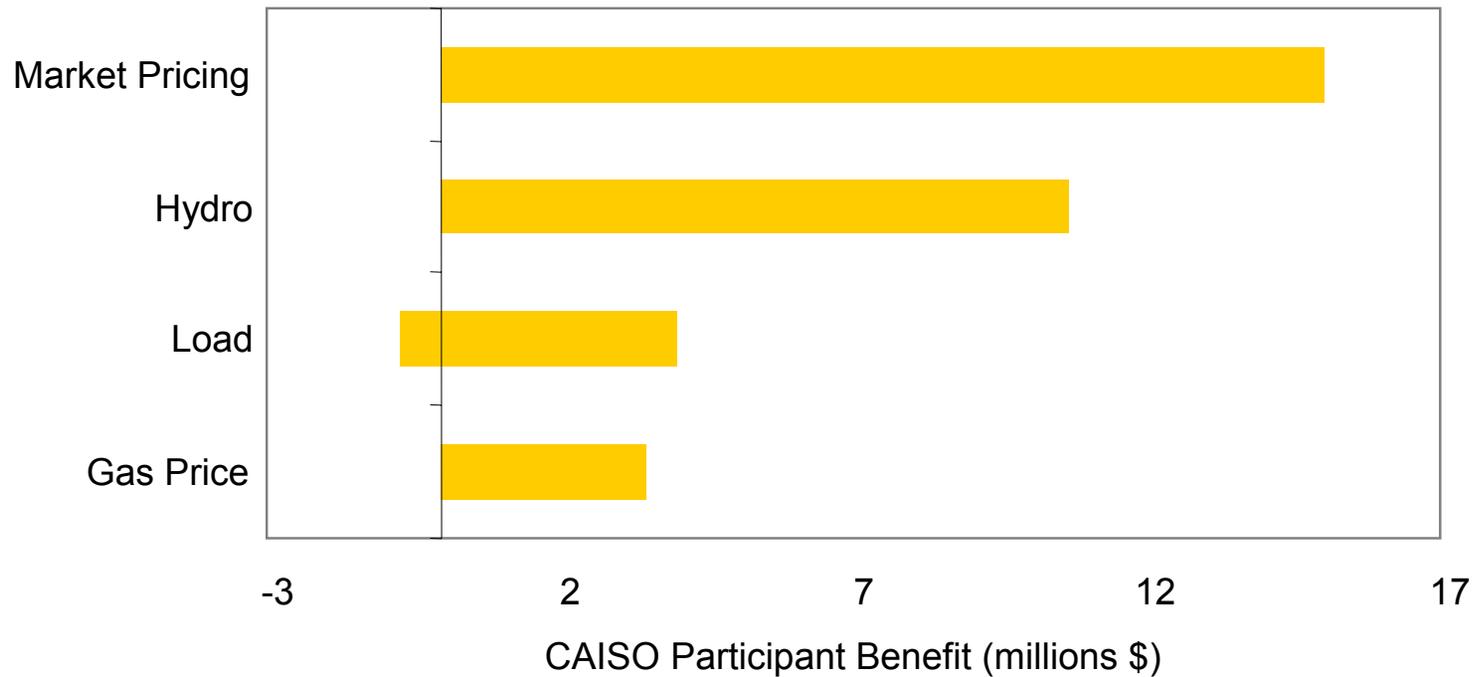
**WECC Modified Societal** – Same as Societal but excludes Producer Benefit derived from uncompetitive market conditions.

**ISO Ratepayer** – Includes ISO consumers and utility-owned generation and transmission revenue streams.

**ISO Participant** – Includes ISO Ratepayer plus the CA IPP Producer Benefit derived from competitive market conditions.

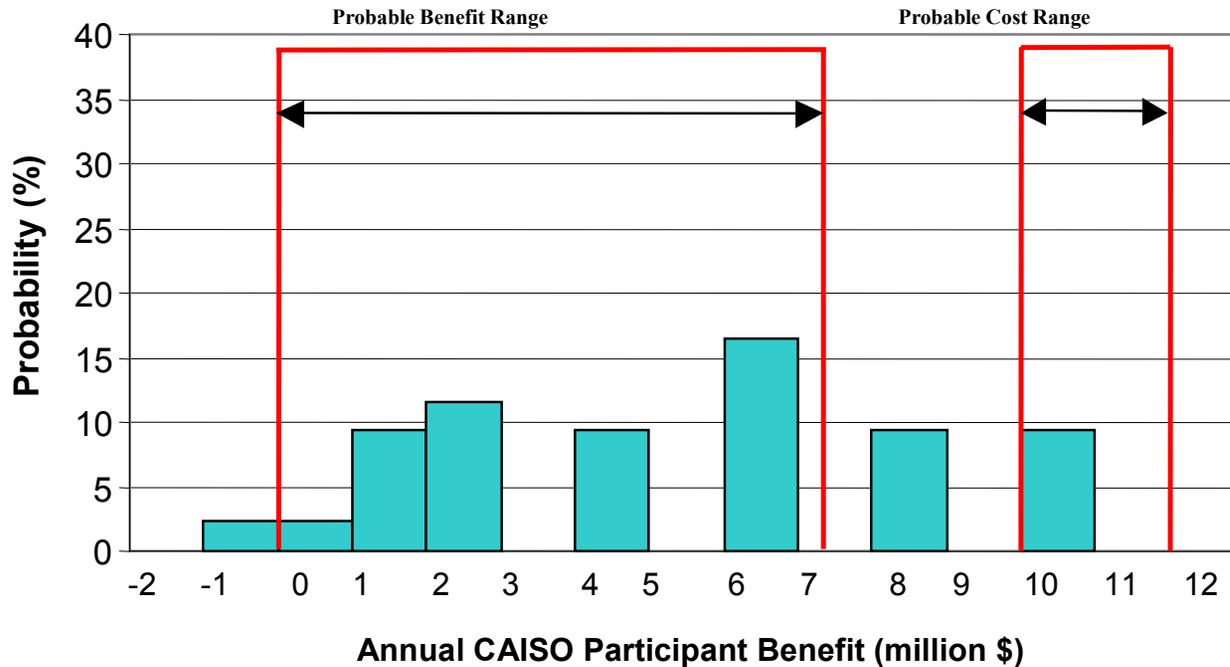


## Potential Impact of Uncertain Variables on Benefit Calculations in 2008





## Comparing Range of 2013 Annual CAISO Participant Benefits to Costs for Path 26 Upgrade





## **Insurance Value of Transmission Upgrades**

- Benefits are computed for contingencies or extreme events
- Expected value of contingencies may not be significant due to low probability of event
- If viewed as an insurance policy, risk aversion value (i.e. premium) could be considerably higher



## Expected Summer, 2004 Schedule

- CPUC report and testimony – June 2, 2004
- Interveners response – June
  - Software tool to be made available to interveners under following terms and conditions
    - 60-day license (requires executed agreement)
    - Cost estimate to be provided by software vendor
    - Provided by US distributor
  - Input and output datasets to be made available to interveners under following terms and conditions
    - Protective order must be executed
    - Provided by CAISO DMA staff
- Reply comments for all parties (including CAISO) – July
- Evidentiary Hearing – August
- Post-Hearing Briefings -- September