The California Electricity Crisis: *Causes and Lessons Learned*

Dr. John L. Jurewitz  
Director, Regulatory Policy  
Southern California Edison Company
Outline

- What happened?
- Why did it happen?
- What lessons should we learn from it?
The Making of California’s Electricity Crisis

- Short-Sighted Restructuring Rules
- Complex Market Rules and Supplier Behaviour
- Regulatory and Political Inaction
- Adverse Market Fundamentals
Regulatory Jurisdictions in the United States

**Federal Jurisdiction**
- Sales for Resale and Transmission service in interstate commerce

**State Jurisdiction**
- Local utility distribution service and sales to retail end-use customers
California’s Major Investor-Owned Utilities

- PG&E
  23,031 MW Peak Demand
  4.5 Million Customers

- SCE
  19,935 MW Peak Demand
  4.3 Million Customers

- SDG&E
  4,763 MW Peak Demand
  1.2 Million Customers

- New Zealand
  5,800 MW Peak Demand
  1.6 Million Customers
The New California Structure

New Private Businesses

New Non-Profit Governmental Company

Remaining Local Utility

Energy Service Providers

Customers

Gen

Gen

Gen

Gen

Independent System Operator (ISO)

Transmission

Distribution

Default Retail

“Market-Based” Regulation by The FERC

Regulated by the FERC

Regulated by the CPUC

No economic regulation
Rate Freeze Creates “Headroom” for Transition Cost Recovery
California Generation Divestiture

- 20,212 MW Divested so far
- New owners:
  - AES 4,076
  - Calpine 1,224
  - DukeEnergy 3,751
  - Dynegy 3,447
  - Port of San Diego 713
  - Reliant 3,776
  - Southern 3,065
  - Thermo Ecotek 280
- Sales proceeds used to reduce customer stranded cost obligation
- Market valuation of remaining non-nuclear generation (over 6,000 MWs) required by year-end 2001

<table>
<thead>
<tr>
<th>SCE</th>
<th>PG&amp;E</th>
<th>SDG&amp;E</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,016</td>
<td>8,040</td>
<td>1,996</td>
</tr>
</tbody>
</table>
CPUC Initially Insisted that Utilities Buy Everything Through the PX and ISO Spot Markets?

- Wanted transparent pricing to assure against self-dealing
- Did not want utilities incurring long-term obligations and potentially stranded costs in their role as default provider
- Wanted to encourage independent retailers
  - Customers wanting price hedges should seek them from ESPs
Key Restructuring Rules Created
Over-Exposure To Spot Market

- CPUC’s requirement that utilities buy all power through Power Exchange and ISO
- Generation divestiture without buy-back contracts
- Retail rate freeze

Over-exposure to the spot market
California’s Electricity Market Crisis
California Day-Ahead Electricity Prices
(PX - Southern Zone)
California Market Prices Have Skyrocketed in 2000

Comparison of Average Cal PX SP15 Monthly* Prices

Actual prices for last six months of 2000 averaged more than four times 1998 and 1999 prices

*Simple average of all hourly prices within the month
Cumulative Cost of California Electricity

1999 and 2000 Cost of Electricity

- Estimated annual cumulative cost to serve all load in the CA ISO’s control area
  - Cost includes energy and ancillary services

Source: ISO Board material, January, 2001
ISO Emergency Operations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 Emergency</td>
<td>3</td>
<td>32</td>
<td>11</td>
<td>40</td>
</tr>
<tr>
<td>» Operating reserve</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>below 7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 2 Emergency</td>
<td>1</td>
<td>17</td>
<td>9</td>
<td>40</td>
</tr>
<tr>
<td>» Operating reserves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>below 5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>» Interruption of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voluntary customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 3 Emergency</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>» Operating reserves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>below 1.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>» Possible involuntary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>interruptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(rolling blackouts)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involuntary Rolling</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Blackouts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How Can Rolling Blackouts Be Needed in Winter?

This winter, the ISO initiated rolling blackouts at a demand of only 65% of last summer’s peak.
Anatomy of a Rolling Disaster

- High Wholesale Spot Prices
- Over-Reliance On Spot Market
- Retail Price Freeze
- Utility Undercollections
- Political Inaction
- Bankruptcy Fears
- California Government Enters Market as Purchaser
- Generators Reluctant to Supply
- High Retail Prices (SDG&E)

Rolling Blackouts and Higher Prices
High Wholesale Prices: Market Fundamentals

- High rate of demand growth
- Virtually no new plants sited
- Reduced availability of imports
- Skyrocketing gas prices
  - Pipeline capacity shortages
- Air emissions limitations and high priced emission credits
SCE Sales Growth Rates
(Weather Adjusted)
Comparing Growth in Electricity Capacity and Population in California vs. Other WSCC States 1993-1999

California

WSCC (Other)

% Change in Capacity MWs 1993-1999
% Change in Population 1993-1999
Comparing Growth in Electricity Capacity and Peak Load Demand in California vs. Other WSCC States 1993-1999

% Change in Capacity MWs 1993-1999

% Change in Peak Load Demand 1993-1999
Natural Gas Prices in 2000

- Prices peak at an unheard level of $60/MMBtu
- Gas prices for the second half of 2000 were more than four times higher than 1998 and 1999 prices
Emissions Credit Prices in Los Angeles Area

(dollars/pound)
High Wholesale Prices: Market Structure, Rules, and Conduct

- Complex ISO/PX market protocols
- Large amount of unhedged power purchases
- Underdeveloped demand-side responsiveness
- Question of market power or shortage-induced high prices
## Comparison of Forward Contracting/Hedging in Other Electricity Markets

Regulatory Constraints in Forward Contracting in CAISO Market Was a Key Source of High Costs in Summer 2000

<table>
<thead>
<tr>
<th></th>
<th>% Market Hedged (long-term forward contracts, self-owned generation)</th>
<th>Unhedged Spot Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAISO</td>
<td>40-50%</td>
<td>50-60%</td>
</tr>
<tr>
<td>PJM</td>
<td>85-90%</td>
<td>10-15%</td>
</tr>
<tr>
<td>New England</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Australia</td>
<td>90%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Utility Undercollections:
Wholesale Average Electricity Prices
as Flowed Through to SCE Customers in
Monthly Billing Cycles

¢/kwh

Headroom available for CTC collection

Undercollection of operating costs

- 26 -
Procurement Undercollections (SCE)

Gross
Net
Revenues
from
Utility-owned
Generation

|       | Jan | Dec | Nov | Oct | Sept | Aug | Jul | Jun | Total
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross</td>
<td>$975 Million</td>
<td>$1,288 Million</td>
<td>$561 Million</td>
<td>$283 Million</td>
<td>$870 Million</td>
<td>$457 Million</td>
<td>$644 Million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net</td>
<td>$5.5 Billion</td>
<td>$1.7 Billion</td>
<td>$3.8 Billion</td>
<td>$975 Million</td>
<td>$5.5 Billion</td>
<td>$1.7 Billion</td>
<td>$3.8 Billion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regulatory and Political Inaction

- FERC’s blamed California for creating a flawed structure
- Californian Governor blamed FERC for not setting tighter controls on wholesale prices
- CPUC’s inaction in approving long-term contracts and setting reasonableness standards
- CPUC’s unwillingness to end the retail rate freeze last Fall
On January 17, Governor Davis authorized the California Department of Water Resources (CDWR) to begin purchasing spot and short-term power to avoid rolling blackouts.

On February 1, Governor Signed Assembly Bill 1X
- CDWR directed to purchase entire “net short” requirements of utilities
- Authorizes up to $10 billion in revenue bonds for long-term power contracts
- CDWR authorized to enter into contracts until 1/2/3003

CDWR now spending $40-50 million per day on near-term power purchases; $3 billion spent so far

Governor recently announced the signing of 40 long-term contracts totaling 8900 MWs
Governor Davis’ Announced Utility Recovery Plan

- State purchase of transmission grid at fair value
  - Amount in excess of book used to pay down utility undercollections

- Utility-owned generation will supply power at cost-based rates for ten years

- State receives conservation easements on utility-owned wilderness lands
What's Needed in the Near Term?

- Reasonable long-term wholesale contracts
  - FERC enforcement of its “just and reasonable” standard would be helpful
- Reasonable retail price increases
- Assurance of recovery of past and future procurement undercollections
- Very serious statewide (and West-wide) conservation program
  - Governor’s objective is 5,000 MW in Summer 2001
- Continue to foster development of new generation
  - Governor’s objective is 5,000 MW by Summer 2001
Is There Long-Term Relief?
New Generation in California

California 2001-2004
- Approved/Under Construction: 6,273 MW
- In Licensing: 7,716 MW
- Proposed: 5,780 MW
Total: 19,769 MW

Generation Scheduled for Summer 2001

<table>
<thead>
<tr>
<th>Project</th>
<th>Date</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sutter</td>
<td>8/1</td>
<td>500</td>
</tr>
<tr>
<td>Los Medanos</td>
<td>7/1</td>
<td>500</td>
</tr>
<tr>
<td>Various</td>
<td>6/1 - 9/1</td>
<td>1,070</td>
</tr>
<tr>
<td>California Total</td>
<td></td>
<td>2,070</td>
</tr>
<tr>
<td>Southwest</td>
<td>6/1 – 7/1</td>
<td>1,690</td>
</tr>
<tr>
<td>Northwest</td>
<td>7/1</td>
<td>500</td>
</tr>
<tr>
<td>Summer 2001 Total</td>
<td></td>
<td>4,260</td>
</tr>
</tbody>
</table>
California ISO Load/Resource Forecast

Max Import Capacity

Max Avail. Gen. Capacity

Load Forecast + OR

Source: California Independent Operator
Lessons Learned

- Regulatory vision must be internally consistent - Mixture of regulated retail prices and unregulated wholesale prices was an especially inconsistent and dangerous combination in California.

- Policies need to respond to unforeseen and unintended consequences

- Absence of clear policy accountability creates a slowness or inability to respond to evolving problems - The “blame game” doesn’t solve problems

- Uncertainty deters investors - key generation investments in late 1990’s were delayed due to policy uncertainty

- Market realities cannot be sidestepped - policy design should harness rather than ignore these forces