BLACK AND BLUE: THE CALIFORNIA ELECTRICITY RESTRUCTURING SAGA

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for the PSERC Seminar Series
February 20, 2001

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OUTLINE

- The backdrop for the California developments
- Basic thrusts of California restructuring
- Performance of California markets in year 1
- The situation in summer 2000
- The prices in summer 2000
- The December 15, 2000 FERC order
- The winter 2000 - 2001 situation
- The State plan
1997 AVERAGE RATES IN CALIFORNIA

- Anaheim
- Anza Coop
- Modesto
- Los Angeles
- Vernon
- WAPA
- PG&E
- SoCalEd
- SDG&E
CALIFORNIA DEVELOPMENTS

- The December 1995 CPUC restructuring decision and the 1996 enactment of AB 1890 establish the creation of the ISO and PX as two independent entities.

- All stakeholders – IOU’s, municipals, IPP’s, marketers, customers, public interest groups – participated in the specification of the restructuring framework and filings.

- The ISO and PX and the implementation of direct access operational as of March 31, 1998.
Financing mechanism was established to allow a 10% rate reduction for residential and small commercial customers.

A rate cap was imposed for large commercial and industrial customers for 1998 - 2001.

Full recovery of stranded costs is possible for all IOU’s through the imposition of non-bypassable competition transition charges.
SALIENT CHARACTERISTICS

- Basic principles embodied are:
  - customer choice
  - competition in generation
  - open access transmission

- Physical direct access: flow-based bilateral transactions coexist with the PX spot market

- Independence of the ISO and PX: separation of security and economics functions

- ISO has primary responsibility to facilitate transactions while maintaining system reliability/security
THE CALIFORNIA SYSTEM

- ESP
- End user
- Load aggregator

Distribution (Wires)

ISO

Bilateral contracts

PX

AS market

SC
CAISO created as a not-for-profit public benefit corporation responsible for:
- transmission system operations and control
- provision of open access
- maintenance of system reliability/security
- operation of real-time energy markets
- provision of ancillary services

CALPX is an independent entity responsible for:
- operation of the forward markets
- balancing buyers’ demands and sellers’ supplies
- provision of reference market clearing signals
AB 1890 PROVISIONS

- IOUs required to divest themselves of fossil-fired generation assets
- IOUs mandated to sell output from the remaining plants into the PX markets and to purchase all energy in the PX
- Expressly prohibited the IOUs from entering into long-term contracts
- Freeze of all retail rates at 1996 levels for the shorter of five years or until all the IOU stranded costs were recovered
THE RESTRUCTURING IMPACTS

- Failure to induce much competition among energy suppliers at the retail level
  - very small fraction of retail consumers exercising consumer choice
  - failure of new ESPs to lure many customers
- Stifling of construction of new facilities in generation and transmission due to uncertainty in the recovery of investment costs
### CUSTOMER CHOICE IMPACTS: SWITCHING TO ESPs

<table>
<thead>
<tr>
<th>Customer Type</th>
<th>Percent of Switches</th>
<th>Percent of Demand</th>
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</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1.9</td>
<td>2.3</td>
</tr>
<tr>
<td>Commercial &lt; 20 kW</td>
<td>3.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Commercial 20 &lt; kW &lt; 500</td>
<td>7.2</td>
<td>14.9</td>
</tr>
<tr>
<td>Industrial &gt; 500 kW</td>
<td>20.1</td>
<td>32.6</td>
</tr>
</tbody>
</table>

Source: CPUC Direct Access Reports; period of 4/1/98 to 3/15/00
The three IOUs sold 26 GW of generating plants.

Generation units sold above book value:


California’s electricity prices among the highest in the nation
Lack of self sufficiency in electricity supply: traditional reliance on imports from the neighboring northwest and southwest states
Fleet of aging generation resources: 50% of generators are 30 years or older
Major bottlenecks in transmission
Most restrictive environmental requirements in the nation
Booming economies of the state and the region and marked population growth
ISO and PX operation began March 31, 1998

Customer switching: 156,000 residential customers, 48,000 commercial customers and 1,016 industrial customers switched to non-utility suppliers by December 1999; the direct access load represents 13.8% of total demand with annual billings of $587 million.

IOU’s sold power plants for up to 4 times book value and collected $2.2 billion.

SDG&E recovered 100% of stranded costs 2 1/2 years earlier than anticipated.
RETAIL ENERGY COSTS  4/1/98 - 3/31/99

wholesale energy 21%
distribution 30%
stranded costs 23%
rate reduction bonds 13%
ISO costs 5%
transmission 4%
public purpose 5%

total costs = $ 28 billion

CA ISO estimates
CA ISO estimates

supplemental energy: 81%
spinning reserves: 3%
non spinning reserves: 4%
replacement reserves: 12%
Between 1990 and 2000, population grew 13.8% by 4.1 million; the 35 million residents make it the nation’s most populous state.

The economy grew at 6% in 2000, 1.5% above the national economy leading to a $5 billion surplus in state coffers.

Between 1990 and 2000, the annual peak demand grew 7800 MW and the annual energy consumption increased 30,000 GWh.

No major new plants have been constructed since 1990.
The West experienced unusually high prices during summer 2000 with large spikes in May and June and high average prices in May - September.

Many end users, except those in the SDG&E area, were insulated from the high prices.

California IOU’s financial positions significantly weakened.

Principal factors contributing to the high price:
- market design problems;
- competitive market forces; and,
- market power exercise
## SUMMER 2000 MARKET RESULTS

<table>
<thead>
<tr>
<th>month</th>
<th>demand (TWh)</th>
<th>total purchases ($billion)</th>
<th>average price ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>energy</td>
<td>AS</td>
</tr>
<tr>
<td>May</td>
<td>20.0</td>
<td>1.161</td>
<td>0.063</td>
</tr>
<tr>
<td>June</td>
<td>21.6</td>
<td>3.171</td>
<td>0.436</td>
</tr>
<tr>
<td>July</td>
<td>21.9</td>
<td>2.458</td>
<td>0.125</td>
</tr>
<tr>
<td>August*</td>
<td>21.8</td>
<td>3.746</td>
<td>0.274</td>
</tr>
</tbody>
</table>

*August data is up to August 29 only*
VOLATILITY OF SUMMER 2000 LOAD
<table>
<thead>
<tr>
<th>month</th>
<th>percent change with respect to 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>average daily peak</td>
</tr>
<tr>
<td>May</td>
<td>13</td>
</tr>
<tr>
<td>June</td>
<td>15</td>
</tr>
<tr>
<td>July</td>
<td>3</td>
</tr>
<tr>
<td>August</td>
<td>9</td>
</tr>
</tbody>
</table>
AUGUST '00 VS. AUGUST '99 LOADS

August 2000 actual loads
August 1999 forecast loads

August

MW

15,000
21,000
27,000
33,000
39,000
45,000

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
### CA ISO Outaged Capacity

<table>
<thead>
<tr>
<th>Month</th>
<th>Planned 1999</th>
<th>Planned 2000</th>
<th>Unplanned 1999</th>
<th>Unplanned 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>4145</td>
<td>2886</td>
<td>801</td>
<td>2187</td>
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<tr>
<td>Feb</td>
<td>5791</td>
<td>3083</td>
<td>957</td>
<td>1158</td>
</tr>
<tr>
<td>Mar</td>
<td>6735</td>
<td>3531</td>
<td>1506</td>
<td>1420</td>
</tr>
<tr>
<td>Apr</td>
<td>8774</td>
<td>6140</td>
<td>1508</td>
<td>1124</td>
</tr>
<tr>
<td>May</td>
<td>3361</td>
<td>2702</td>
<td>1877</td>
<td>2331</td>
</tr>
<tr>
<td>Jun</td>
<td>882</td>
<td>1349</td>
<td>1516</td>
<td>2688</td>
</tr>
<tr>
<td>Jul</td>
<td>660</td>
<td>1039</td>
<td>1204</td>
<td>2666</td>
</tr>
<tr>
<td>Aug</td>
<td>586</td>
<td>724</td>
<td>604</td>
<td>3391</td>
</tr>
</tbody>
</table>

The chart above shows the outaged capacity for various months from 1999 to 2000, categorized by planned and unplanned outages.
CA ISO EMERGENCY DECLARATIONS

- **Stage One**: Appeals (operating reserves ≤ 7%)
- **Stage Two**: Curtailment of interruptible loads (operating reserves ≤ 5%)
- **Stage Three**: Load shedding (operating reserves ≤ 1.5%)

![Bar chart showing emergency declarations](chart.png)

- **Summer**:
  - 1998: 3
  - 1999: 3
  - 2000: 38

- **Stage Two**:
  - 1998: 6
  - 1999: 3
  - 2000: 24

- **Stage Three**:
  - 1998: 3
  - 1999: 3
  - 2000: 14
CA ISO AVERAGE HOURLY NET IMPORTS

Average Hourly Net Energy Imports, Scheduled and Real Time

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>May-August</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scheduled 1999</strong></td>
<td>6107</td>
<td>5804</td>
<td>6748</td>
<td>6502</td>
<td>6294</td>
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<tr>
<td><strong>Real Time 1999</strong></td>
<td>6050</td>
<td>5812</td>
<td>6740</td>
<td>6664</td>
<td>6321</td>
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<tr>
<td><strong>Real Time 2000</strong></td>
<td>5489</td>
<td>4501</td>
<td>3770</td>
<td>3215</td>
<td>4241</td>
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<tr>
<td><strong>Scheduled 2000</strong></td>
<td>4704</td>
<td>3598</td>
<td>2960</td>
<td>1673</td>
<td>3231</td>
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</tbody>
</table>
AVERAGE HOURLY OFFPEAK EXPORTS FROM CALIFORNIA

Average Exports (Megawatt):

- Exports 1999
- Exports 2000

<table>
<thead>
<tr>
<th>period</th>
<th>number of hours of scarcity</th>
<th>percent of total hours</th>
<th>percent of total payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1 - June 30</td>
<td>28</td>
<td>4%</td>
<td>19%</td>
</tr>
<tr>
<td>July 1 - Aug 5</td>
<td>59</td>
<td>7%</td>
<td>25%</td>
</tr>
<tr>
<td>Aug 6 - Aug 25</td>
<td>52</td>
<td>11%</td>
<td>22%</td>
</tr>
</tbody>
</table>
Market sales in 2000 are triple those of 1998

About 60% of the California electricity market is exposed to spot price volatility (vs. 10% of the PJM market)

The lack of forward contracting increases price exposure in the market; the threat of CPUC prudence review is a key barrier

The rapid increases in input prices contribute to the high electricity prices

- Natural gas to as high as $10/MMBtu from $2/MMBtu
- NOx emission effect credits to $45/lb from the $6/lb level
Supply scarcity is a key concern:

- Summer 2000 required multiple appeals to customers and curtailment of interruptible load
- Summer 2001 may be tighter since no more than 1500 MW supply will come on line and load is forecast to grow more

Demand responsive load is a critical need
THE SUMMER 2000 MARKETS

monthly totals (billion $)

average price $/MWh

cap price $750 $500 $250

May June July August*(1-29 only)
PG&E CITY GATE NATURAL GAS SPOT PRICES

$/MMBtu

Sept. 3
Oct. 4
Nov. 5
Dec. 5
Jan. 5
Feb. 5
March 7
April 7
May 8
June 8
July 9
Aug. 9

daily spot 8/98 to 7/99

daily spot 8/99 to 7/00
AVERAGE NOx CREDITS PRICES FOR SCAQMD

Source: Cantor Fitzgerald Environmental Brokerage Services
SOUTHERN CALIFORNIA GAS-FIRED GENERATION RUNNING COST ESTIMATES

Dollars per MWh

- 10,000 btu/kWh
- 16,000 btu/kWh
SUMMER 2000 SCHEDULED AND ACTUAL LOADS

Average hourly load (MW)

Operating hour

June scheduled

June actual

July scheduled

July actual

August scheduled

August actual

Underscheduled amount
OUT-OF-MARKET PURCHASE PRICES

- **June 1 - 30:**
  - OOM hourly average price: $680 /MWh
  - Real-time hourly average price: $623 /MWh

- **July 1 - August 6:**
  - OOM hourly average price: $500 /MWh
  - Real-time hourly average price: $461 /MWh

- **August 7 - 31:**
  - OOM hourly average price: $252 /MWh
  - Real-time hourly average price: $245 /MWh

Cap price:
- **June 1 - 30:** $750 /MWh
- **July 1 - August 6:** $500 /MWh
- **August 7 - 31:** $250 /MWh
REAL-TIME AND SPOT MARKET PRICES

average daily peak period
real-time price at SP15

daily spot price at Palo Verde
DAY-AHEAD RESERVES PRICES

![Graph showing day-ahead reserves prices for May, June, July, and August 2000 with different colors for Spinning Reserves Price, Non-Spinning Reserves Price, and Replacement Reserves Price.]
AUGUST 2000 SP15 PX AND REAL-TIME PRICES

August

$/MWh

-100 0 100 200 300 400 500

constrained PX price

real-time price
AUGUST 2000 NP15 PX AND REAL-TIME PRICES

- Constrained PX price
- Real-time price

$/MWh
# AUGUST 2000 NP15 PX AND REAL-TIME PRICES

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>NP 15 Prices ($/MWh)</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Peak Period</td>
<td>Off-Peak Period</td>
<td>Overall Average</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1999</td>
<td>2000</td>
<td></td>
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<td>2000</td>
<td>constrained PX</td>
<td>169.08</td>
<td>93.28</td>
<td>143.81</td>
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<td></td>
<td>real time</td>
<td>229.4</td>
<td>133.54</td>
<td>196.99</td>
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<td>1999</td>
<td>constrained PX</td>
<td>40.32</td>
<td>23.31</td>
<td>34.65</td>
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<td>43.63</td>
<td>21.75</td>
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<td></td>
<td>peak period</td>
<td>off-peak period</td>
<td>all hours</td>
<td>percent of hours with zonal pricing</td>
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<td>real-time system</td>
<td>215.51</td>
<td>105.37</td>
<td>178.27</td>
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<td>229.40</td>
<td>133.54</td>
<td>196.99</td>
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<td>201.62</td>
<td>77.20</td>
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<td></td>
<td>201.52</td>
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<td>159.49</td>
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<td></td>
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<td>39</td>
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<td>PX constrained</td>
<td>185.94</td>
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<td>150.10</td>
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<td>93.28</td>
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<td>202.80</td>
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<td>166.80</td>
<td>63.52</td>
<td>132.37</td>
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<td></td>
<td>67</td>
<td>89</td>
<td>74</td>
<td></td>
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</table>
PRICES AT OR ABOVE $250 LEVEL

April 1999 to March 2000

April to August 2000
FERC'S DECEMBER 15, 2000 ORDER

- FERC determined that the California market structure is “severely flawed” and proposed measures to restructure the markets and remedy the electricity pricing problems; measures to become effective January 1, 2001 for 24 months

- The remedies aim to
  - dampen extreme price volatility
  - provide a stable environment for generation investment
  - ensure just and reasonable wholesale rates
FERC’S KEY REMEDIES FOR THE CALIFORNIA MARKET

- Elimination of the requirement that the three IOUs trade through the PX
- Requirement that market participants schedule 95% of their transaction in the forward markets with a penalty of up to $100/MWh for scheduling deviations above 5% of hourly load requirements
- Imposition of a $150/MWh or $150/MW/h “soft” cap or breakpoint price but allowing bids above $150 on a pay-as-bid basis and subject to FERC scrutiny
- Replacement of existing governing boards of the PX and ISO by non-stakeholder boards
FERC REQUESTS FOR SUPPORT FROM CALIFORNIA POLICY MAKERS

- Additions of generation and transmission resources
- Implementation of demand response programs
- Assurance of sufficient reserve requirements
- Permission for load serving entities to engage in securing power supplies on a more forward basis
Governor Gray Davis requested that FERC order retroactive refunds to consumers; and, lower the price cap for the next 3 years. This was not met.

PG&E and SCE ended up on the brink of bankruptcy by undercollecting some $13 billion from retail customers.

Since December 5, 2000, California has been on stage 2 and stage 3 alert almost continuously.

The utilities received a temporary rate hike allowing them to raise rates between 9 - 15% for 90 days.


The State becomes a major purchaser of electricity.
PX DAY-AHEAD MONTHLY MARKETS

Source: California PX
BOON FOR MARKETERS: EXAMPLES

- Powerex (BCHydro) revenues -- in large part from sales to California -- nearly quadrupled from April to September 2000, to about $1.5 billion.

- Dynegy pretax earnings from operations that include California plants in 2000 Q3 rose to $106.4 million from $22 million in 1999 Q3.

- Reliant Energy made $90 million in operating income from California in 2000 Q3, over 200% increase over the 1999 Q3 figures.
California Today

- 9 new plants under construction representing a total of 6,723 MW and 22 more are in the regulatory pipeline; however, only in 2003 will CA have sufficient installed capacity to meet summer peak demand.

- The new plants, by and large, are being built in places where local officials welcome them as an economic boom or where the opponents lack the clout to prevent them from being approved.

- State officials moved aggressively to cut regulatory procedures and Governor Davis persuaded the Legislature in fall 2000 to pass the “fast track” approval measures.
The State Legislature enacted a $10 billion plan to let the state buy power through long-term contracts. The Act authorizes the state to issue revenue bonds - the largest bond program in California’s history - to buy bulk power at prices below those available in the daily/hourly markets and to sell the electricity to utility customers. The State plans to sell the bonds to cover the difference between the price the State will pay for power and at which it will resell to the utilities, and to pay for short-term power purchases.
Governor Davis promulgated a series of aggressive conservation proposals. An executive order in which he invoked his emergency power makes it compulsory to curtail outdoor lighting at retail businesses and allows the power police to impose fines up to $1,000 per day. The order exempts lighting deemed “necessary for the health and safety of the public, employees and property.” The goal is to reduce retail outdoor lighting by 50%.
Governor Davis’ plan calls for the state to purchase the IOUs’ transmission network at a yet-to-be-determined price as part of the resolution of the problem of the utilities’ accumulated debts; the book value is above $3 billion.

The State would sell bonds to finance the purchase; the compensation for the network is expected to be insufficient to cover the utilities’ debts.

The State would also allow the utilities to sell bonds guaranteed by a dedicated portion of the revenue stream from customers.

The parent companies of the utilities are expected to cover a significant portion of the utilities’ debts.
Partial *deregulation* can lead to a disastrous situation: free markets must be allowed to work and be free of price controls and strict regulations.

- Rate caps do not work
- Demand side response is crucial: importance of price signals in influencing demand
- New supply is critically important: tradeoffs between environmental desires and adequate energy supply must be struck
- The vital importance of electricity to the economic well being and lives of the people is clear