California’s Energy Crisis
- Traditionally energy policy in the United States has been through a vertically integrated geographic monopoly structure

- consumer
- transmission
- power plants
- energy source

California energy crisis
- In exchange for legal geographic monopoly status the firm is required to serve all demand in its service area at a regulated price.
  - Utility commissions generally allowed recovery of all prudent costs
- Combining the supply of energy in a large geographic area with one company allowed the company to lower costs by building larger and larger facilities which lowered production costs.

CEC
- This market structure also fostered extensive transmission and distribution grids to deliver electricity over the firm's geographic area
- The result was declining nominal electricity prices until the 1970’s
  - This in spite of growth in aggregate electricity consumption that was much higher than the rate of growth in the level of economic activity

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- The 1970’s brought sharp increases in oil prices and a search for alternative energy sources.
- During this period regulators and firms made many long lived investments that proved expensive in terms of what happened to oil prices
  - There also arose increased attention to environmental matters and the associated groups
  - Electricity consumption declined – rate of growth
### CEC
- California had made costly investments in:
  - New generation facilities
  - Long term purchased power
- The result was California had prices twice as high as surrounding states
- All these investments had been approved by the California Public Utilities Commission (CPUC)
- Over the 1994 to 1998 time period the new energy system was debated and finally established.

### CEC
- California’s competitive wholesale electricity market began operating in April of 1998. Here are some of its main features:
  - A non profit California independent operator system (ISO) was created to operate the transmission networks owned by the states Investor Owned Utilities
  - A Power Exchange (PX) was created to operate day ahead hourly auction markets for wholesale electricity.
  - The ISO also operates hourly auctions to balance supply and demand on short notice

### CEC
- The suppliers of generating capacity are composed of in and out of state generators
- In state is composed of:
  - 4 nuclear plants, hydro plants in northern cal. And gas fired steam and peaking turbines and co generators
  - In addition there are there are other sources called qualifying facilities
  - About ½ is supplied by gas fired and peaking units
- There has been no new generating capacity since 1998 and most of gas fired cap is from the 1960’s.

### CEC
- During summer months the marginal supply resource that clears markets is a steam or combustion turbine fueled by natural gas or oil.
- Marginal costs rise during peak periods and at peak times
- The costs rise as pollution permits are required
- Until 1998 the 18,000 Megawatts of gas fired cap. In the ISO was owned by the three IOU(firms) under the new rules they were forced to sell this capacity to independent companies or new generation owners
  - Most of this was sold to 5 out of state companies with nationally unregulated power plants
  - The nuclear and the hydro capacity and high price QF’s were retained by IOU’s
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- California has historically used energy from other states during peak periods and exported to others during Fall and Winter
  - Peak periods are summer and day rather than nights and workdays not weekends
  - Peak demand in 1999 was 43,000Mw falling same day to 20,000
  - Note that elasticity in short run is close to 0 an is unresponsive to hourly swings in use
    - Due to no hourly readers on meters at point of use
- The restructuring required IOU’s to serve all their default demand from PX and ISO markets
  - Independent and new generators not so required

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- Market Structure factors
  - Small amounts of new capacity built in 1990’s
    - Approximately 1,000Mw
  - Not much capacity in surrounding states
    - 800Mw
      - Growth outside Cal
      - Lower surplus to sell to Cal,
      - Higher winter deficit to purchase from Cal,
  - High water runoff years in 1998 and 1999
    - Normal runoff in 2000
    - Increased environmental concern further reduced hydro runoff in 2000

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- In sum, the new regulations did not set market prices for consumers and left regulated through the PUC and FERC the wholesale markets.
  - There are many features like recovery of stranded assets which I have left out but I believe they are not crucial for our purposes
- What factors contributed to the present problems

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- Higher natural gas prices
  - Ave. price in 1999 = 2.75 /MMBTU
  - Ave. price in 2000 = 6.50/MMBTU
  - Ancillary prices also rose
  - FERC regulations are potential source of part of price rise
- Unprecedented levels of forced outages since summer 2000
- Wholesale price is price inelastic
  - No real time price
  - Retail rate freeze
### CEC

**Regulatory Factors in current problems**
- Lack of forward financial contracting for between loads and generation
  - Virtually all energy produced on spot market
  - Firms have capacity to produce only about ½ their needs
  - Surrounding areas purchase less than 5% of energy from spot markets
- A 1% increase in spot market increases wholesale energy costs by at least 10 times more than wholesale energy costs in surrounding areas

### CEC

**A note on contracting restrictions**
- The restrictions were established so that the utilities could not sell off their generating capacity and then contract with their previous companies over time thus eliminating the spot market
- Result was however, that everything is spot market

**FERC and regulatory problems**
- Competitive market yields prices of production costs
- If market actors can show that it does not have market power then actor gets market rate
- In Cal. All actors had to make market based rate filing approved by FERC and
  - Ex ante hard to determine if market is competitive

### CEC

**The last 6 months have shown FERC to be wrong in allowing market based rates**
- November 1 FERC and again on DEC. 15
  - Wholesale rates are unjust and unreasonable
  - Reflect the exercise of market power
- Since 1998 FERC set hard price caps on wholesale prices which
  - Eliminated incentives to to have forward contracts
  - Eliminated incentives for price response retail demand
- In December of 2000 soft caps of 150/MWh

### CEC

**Under soft cap if generator can cost justify bid above 150 and it is needed to meet demand then paid as bid**
- Merchant producers are players in market
  - Own long term gas supply
  - Put them into storage in Cal.
  - Buy gas on spot market to burn in generating facility
  - Send bill to RERC to justify high bid
- All this creates artificial shortage of gas in California
- California can expect severe power blackouts this summer
CEC

- Summary of economic factors causing crisis
  - Fundamental imbalance between supply and demand
    - As Cal. Climbed out of recession –93 to 98 demand increased by 18% while supply increased by .01
  - Hot weather over the West in summer and cold weather in winter
    - Pushed up demand
    - And limited water supply thus diminishing hydropower
  - Natural gas prices rose dramatically
    - From $2 MMBtu in January 99 to $50 per MMBtu in the fall

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- Summary of regulatory causes of crises
  - Market transactions depended on spot market
    - This was intended to diminish utilities market power
      - No sell and buy back provisions
  - Market organization was fragmented allowing for gaming
    - Capacity divided into chunks and not all bid into PX thus in shortage ISO forced to buy at high prices
  - Market lacks incentives for demand side participation or provision of sufficient capacity
    - No incentives to conserve or supply