EDISON ELECTRIC INSTITUTE

Energy Efficiency Why Now and How?

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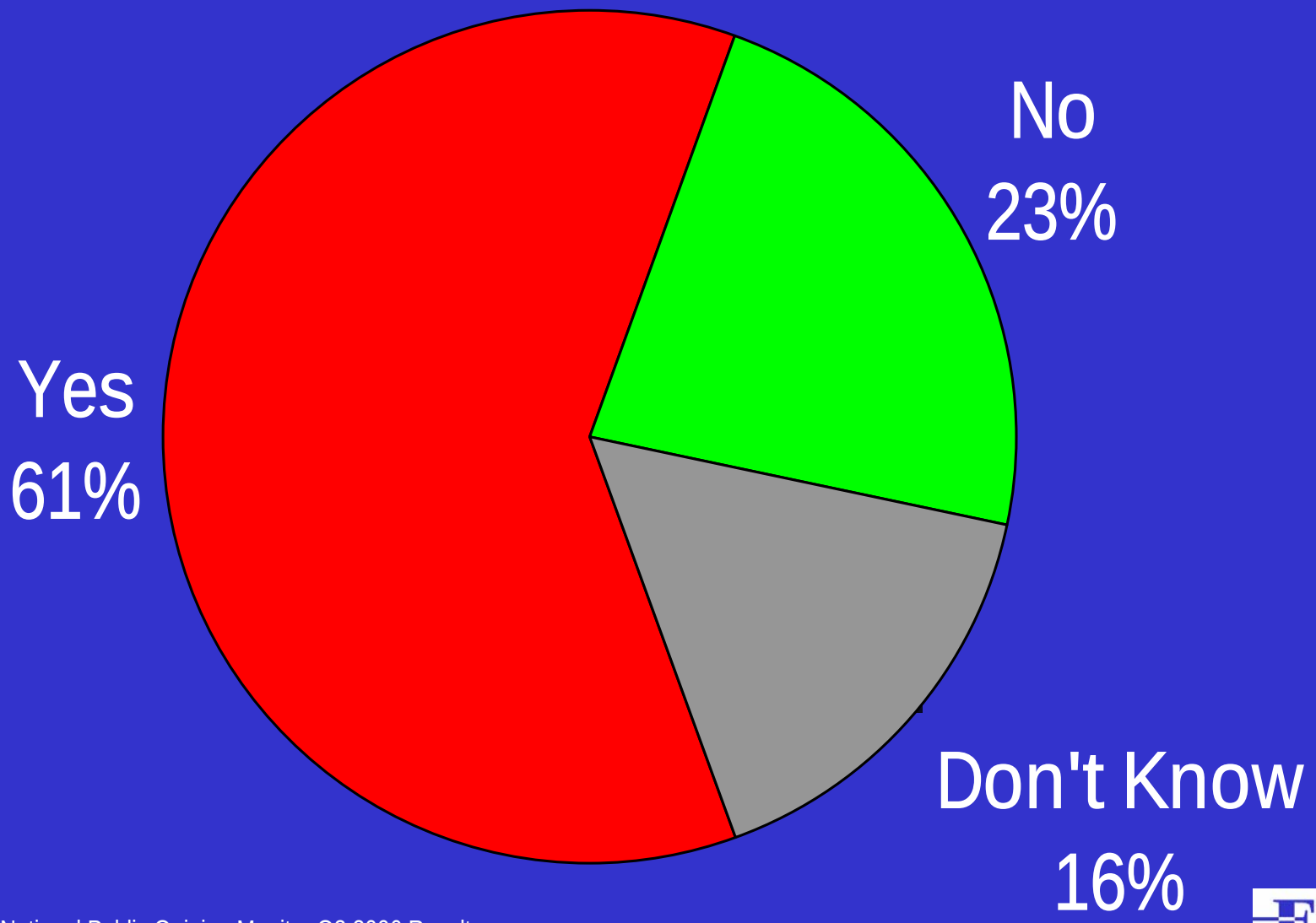
What is *"The Regulatory Bargain?"*

- Balance consumer and investor interests
- Investments dedicated to the public interest
  - *Return of* investment
  - *Return on* investment commensurate with the risks
- Rates allow company to
  - Operate successfully
  - Maintain its financial integrity
  - Attract capital
  - Compensate investors for the risks assumed

Federal Power Commission vs. Hope Natural Gas Co.
U.S. Supreme Court, 1943

"Are We In An Energy Crisis?
Consumer Survey

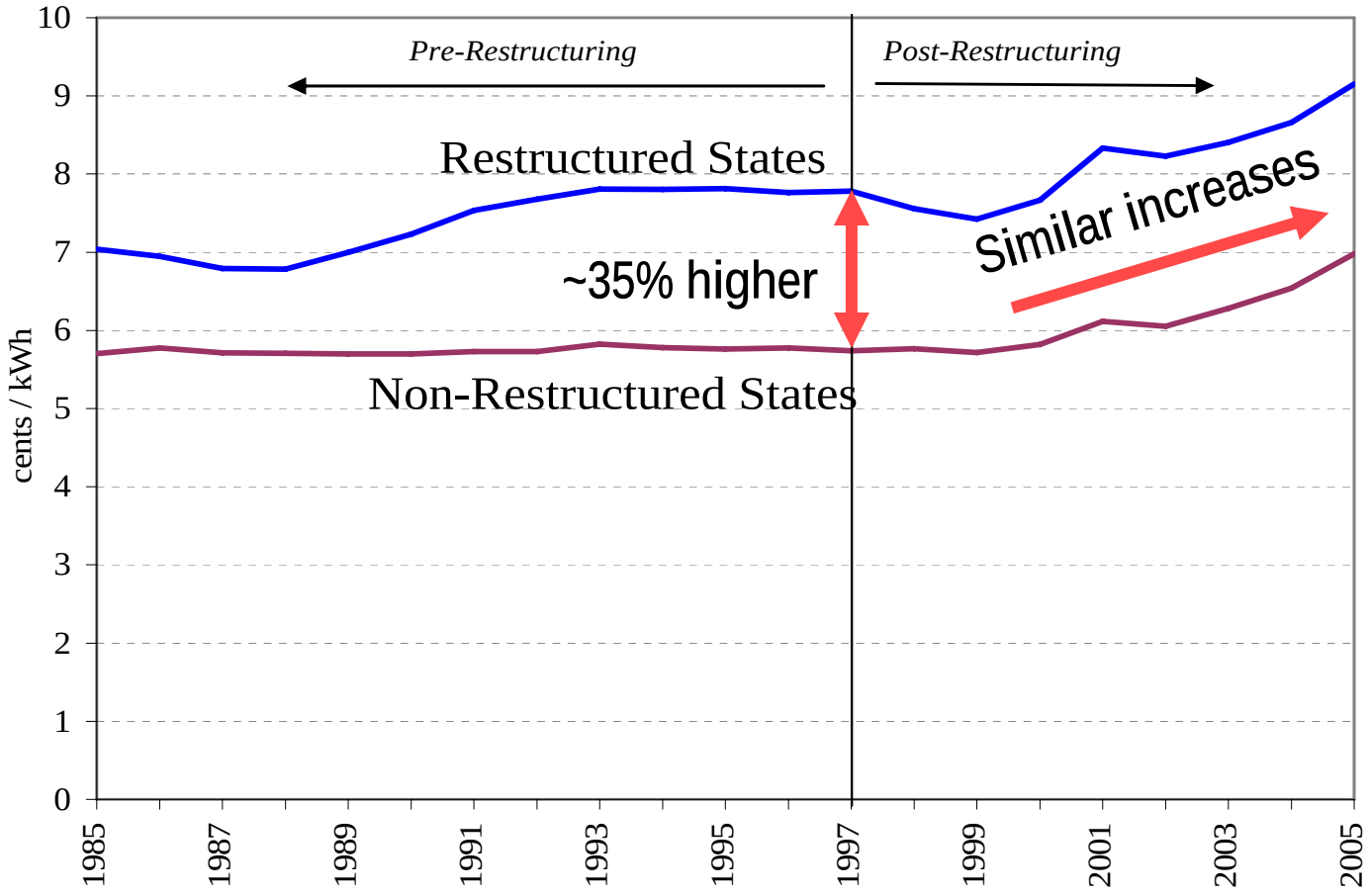


Source: EEI's National Public Opinion Monitor Q2 2006 Results

Where Are We?

- Changing supply / delivery picture
  - Generation margins shrinking / inadequate transmission in some regions
  - Concern over supply, price and quality for natural gas
  - Concern over coal transportation from Power River Basin
  - Greater scrutiny over markets and market behavior
    - Wholesale competition is a national energy policy – EPAct ‘92 and ‘06
    - Realization that markets are not perfect
  - Implementation of mandatory and enforceable reliability standards
  - More reliance on renewable resources, demand response and efficiency
  - Heightened concern over critical infrastructure - 9/11, natural disasters, aging infrastructure

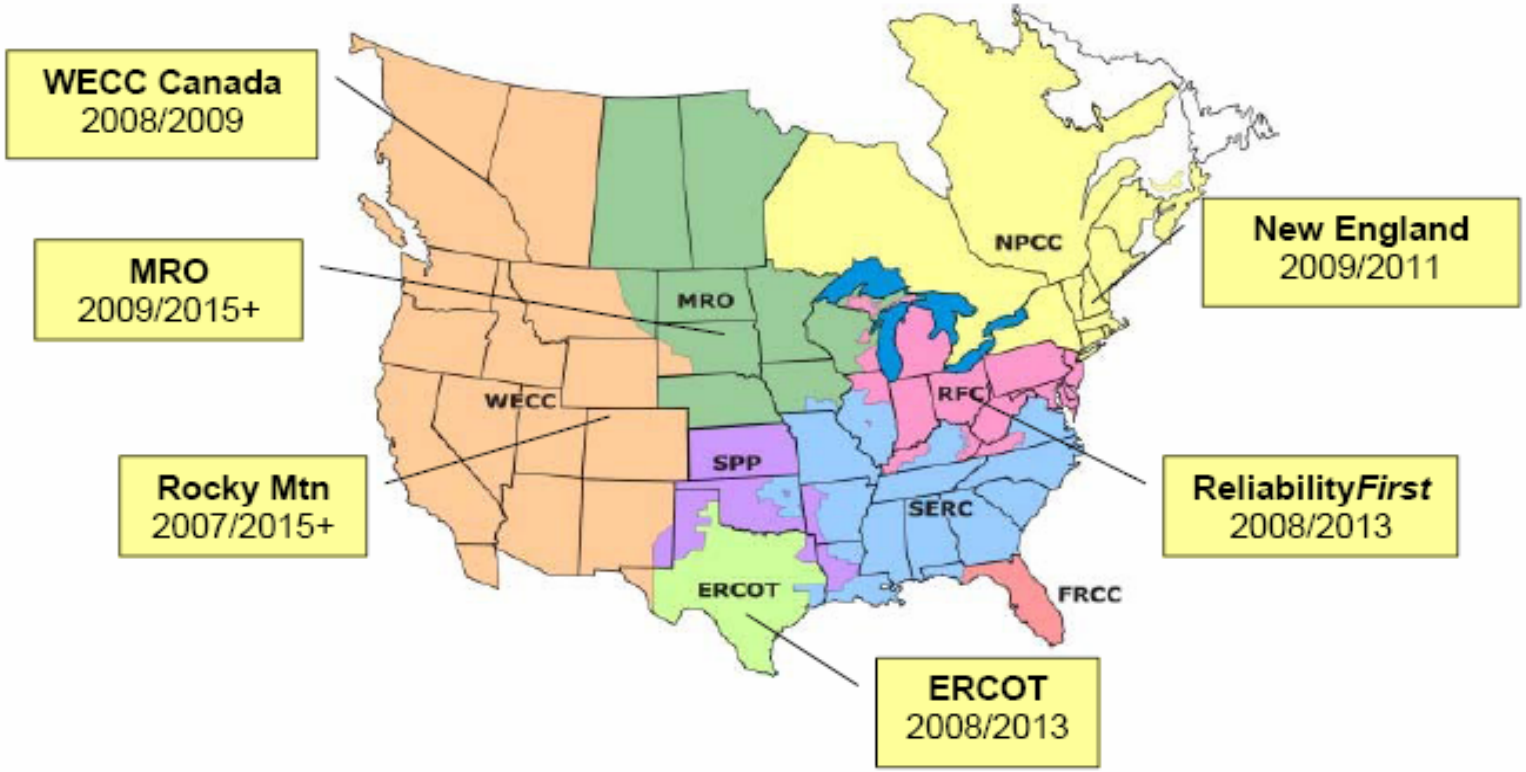
Rates Rising In Many States



Source: EIA Form 861, EIA Monthly Energy Review March 2006.

Urgent Need For Infrastructure Expansion

Electricity Supply Margins
Projected to Fall Below Minimum Target Levels
in Some Areas of North America in Next 2–3 Years



Areas Needing Additional Resources
XXXX/YYYY – 1st year additional resources needed
XXXX – beyond current projections
YYYY – beyond uncommitted resources

Source: NERC's *2006 Long Term Reliability Assessment*

The Perfect Storm of Energy Challenges

- Keeping energy demand and supply in balance
  - Projected doubling (or more) of energy use by 2030
- Providing energy security and availability
  - Geological and geopolitical realities of fuel supply
- Harmonizing energy use and the environment
  - Greenhouse gas emissions and climate change

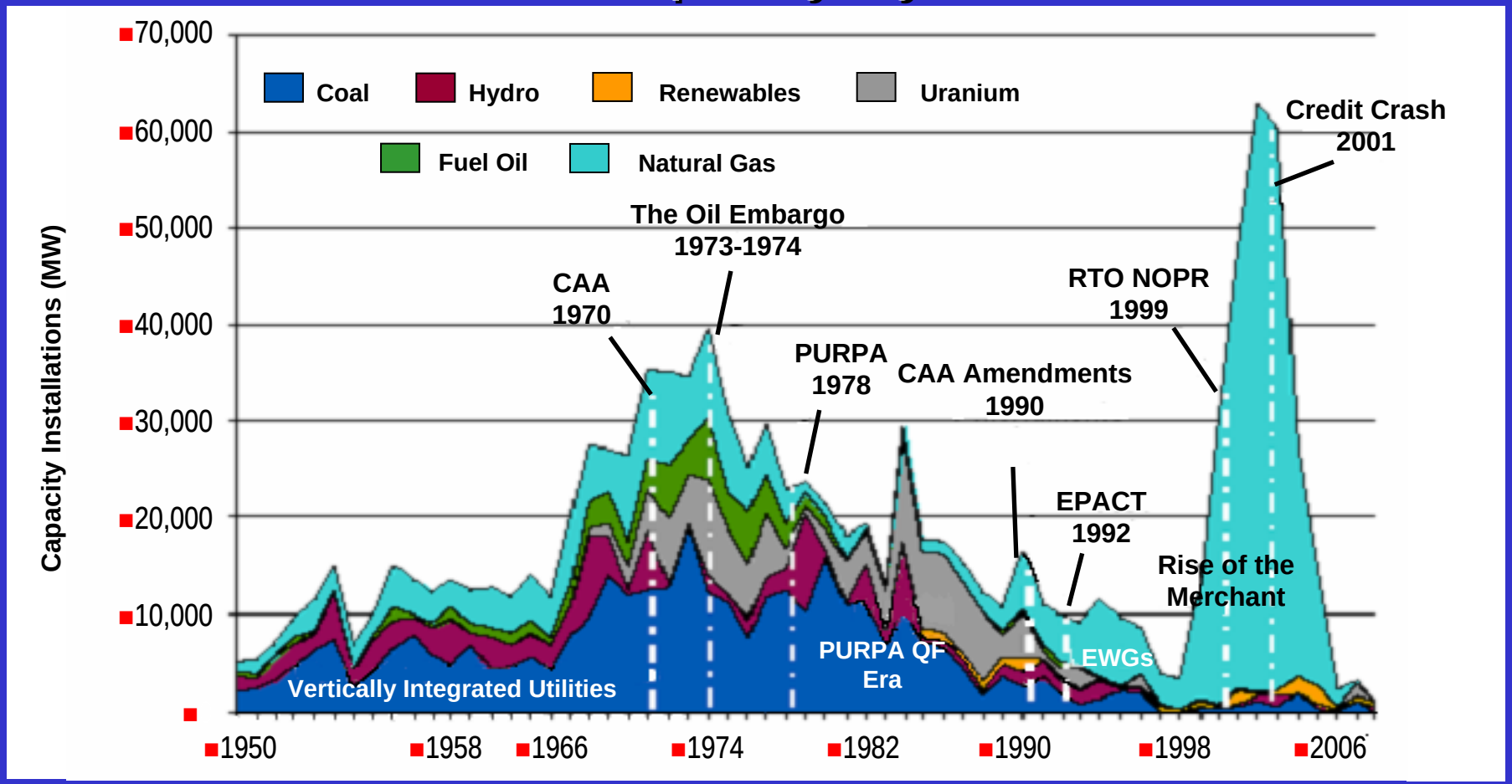
The Key Question

Can we develop the right mix of supply and demand side options?

What's Driving Today and Tomorrow's Electricity Prices?

Generation Options – Affected By Public Policy

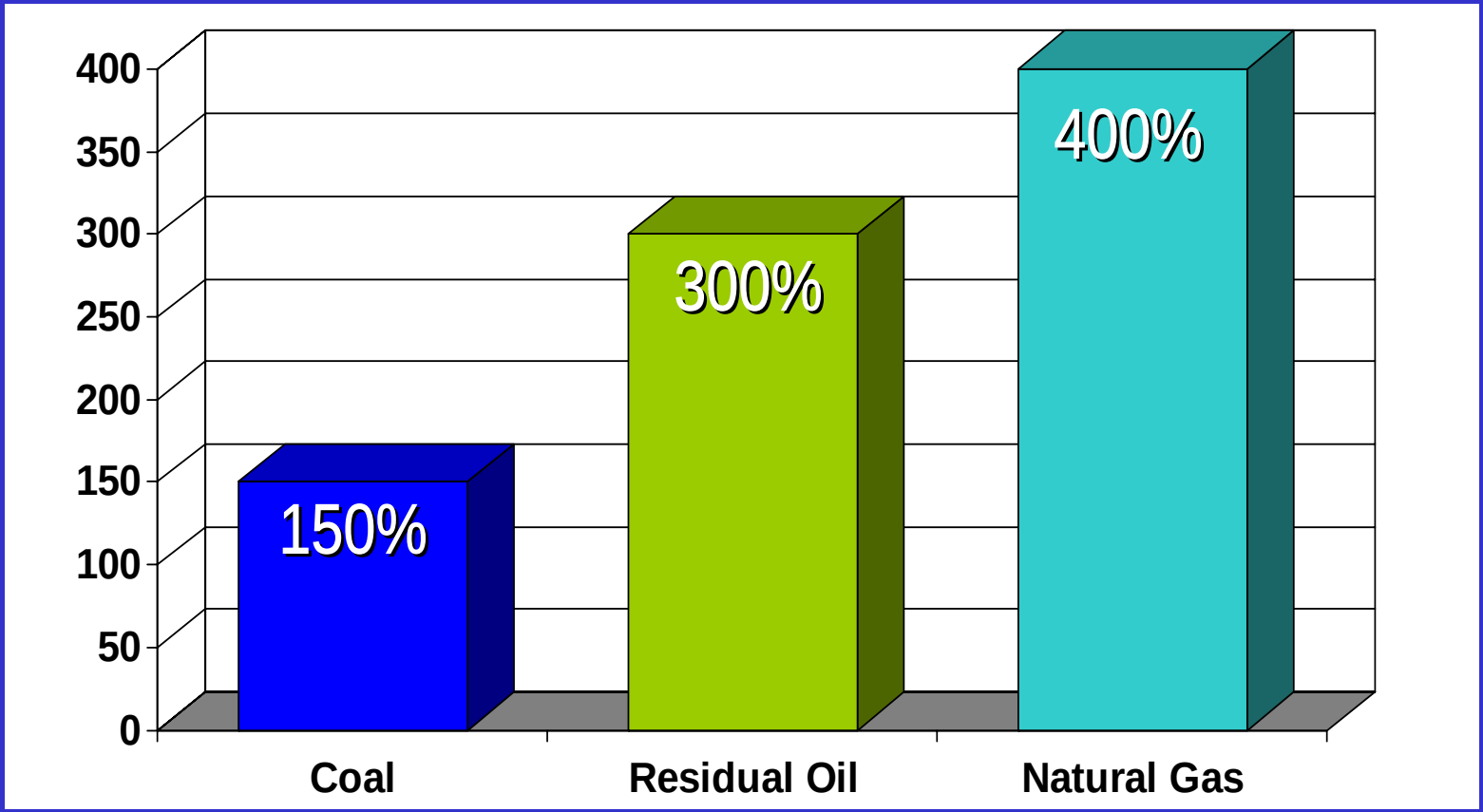
New Generation Capacity By Fuel Since 1950



Source: Henwood Energy Consulting

Fuel Costs Increasing Dramatically

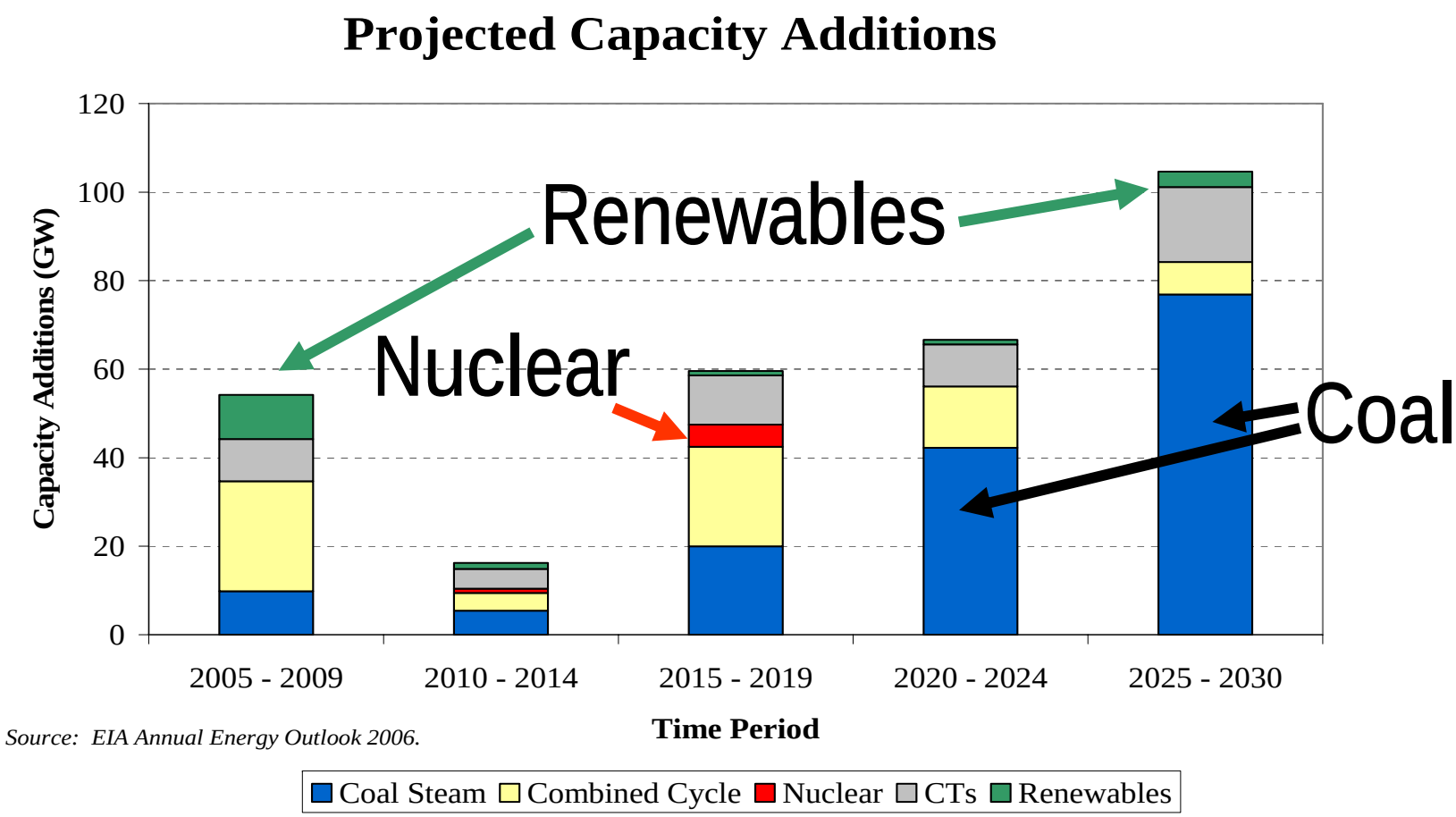
Percentage increase 1999 – 2005



Source: U.S. DOE/Energy Information Agency & U.S. DOL/Bureau of Labor Statistics (January 2006)

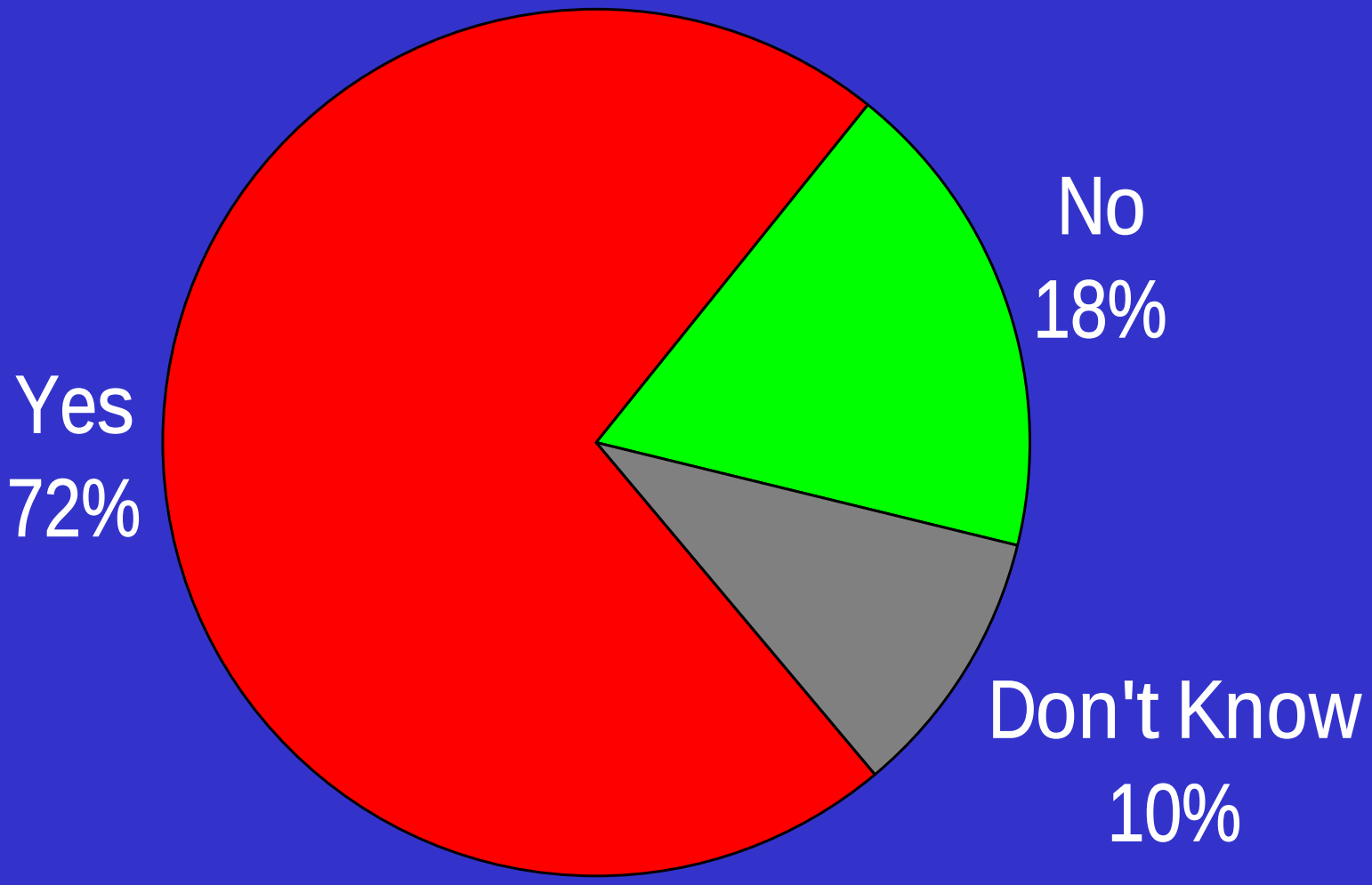
Needed Generation Investment

- $300 billion needed for new capacity
- Conservation and other measures reduced need by 60%



Source: EIA Annual Energy Outlook 2006.

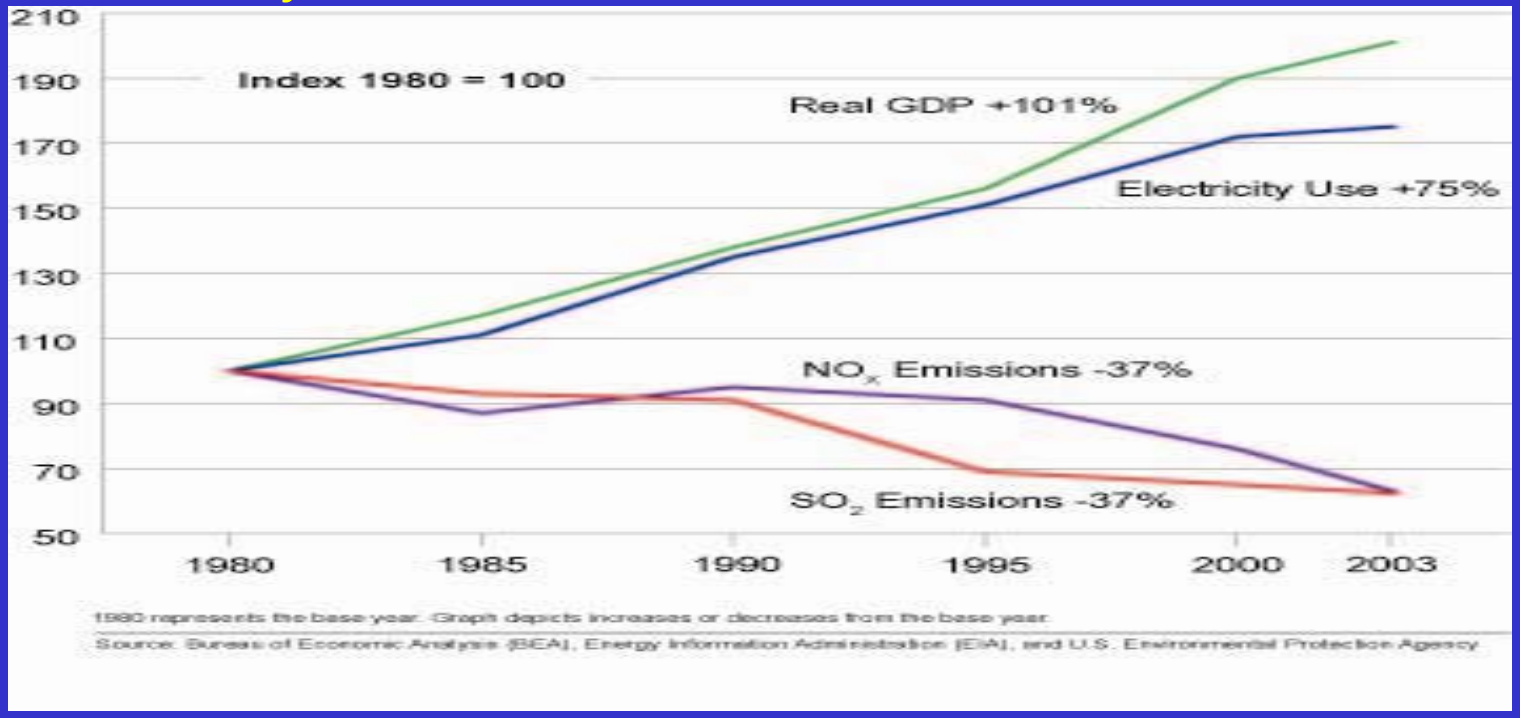
"Is Global Warming Really Happening?"
Consumer Survey



Source: EEI's National Public Opinion Monitor Q2 2006 Results

Environmental Costs Increasing

- $24 Billion on compliance with federal environmental laws (2004-2005)
- $47 Billion projected 2007-2025 for Nitrogen oxides, sulfur dioxides and mercury
- $14 Billion in scrubber upgrades being contemplated
- Since 1980, companies reduced air emissions while increasing electric production by 75%

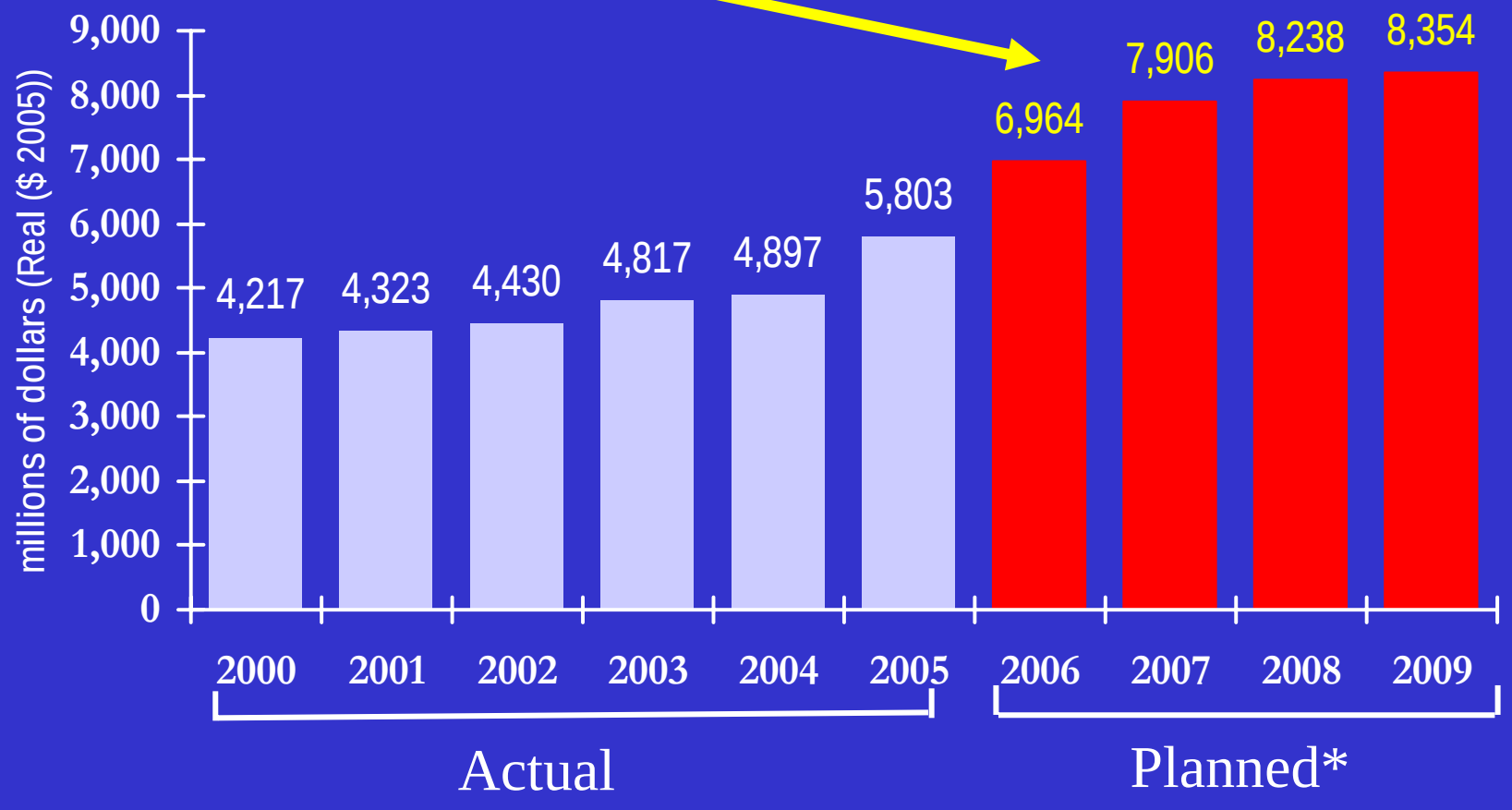


Needed Renewable Investments

- Renewables (wind, solar, geothermal, and biomass) will become a bigger part of the nation's fuel mix – *"20% by 2020"*
- Current and future challenges
  - Geographic limitations
  - Intermittent nature
  - Transmission availability
  - Expiration of production tax credit
- Wind and solar require more back-up capacity because their power output is intermittent
- Renewable technologies face high initial capital costs

Needed Transmission Investment

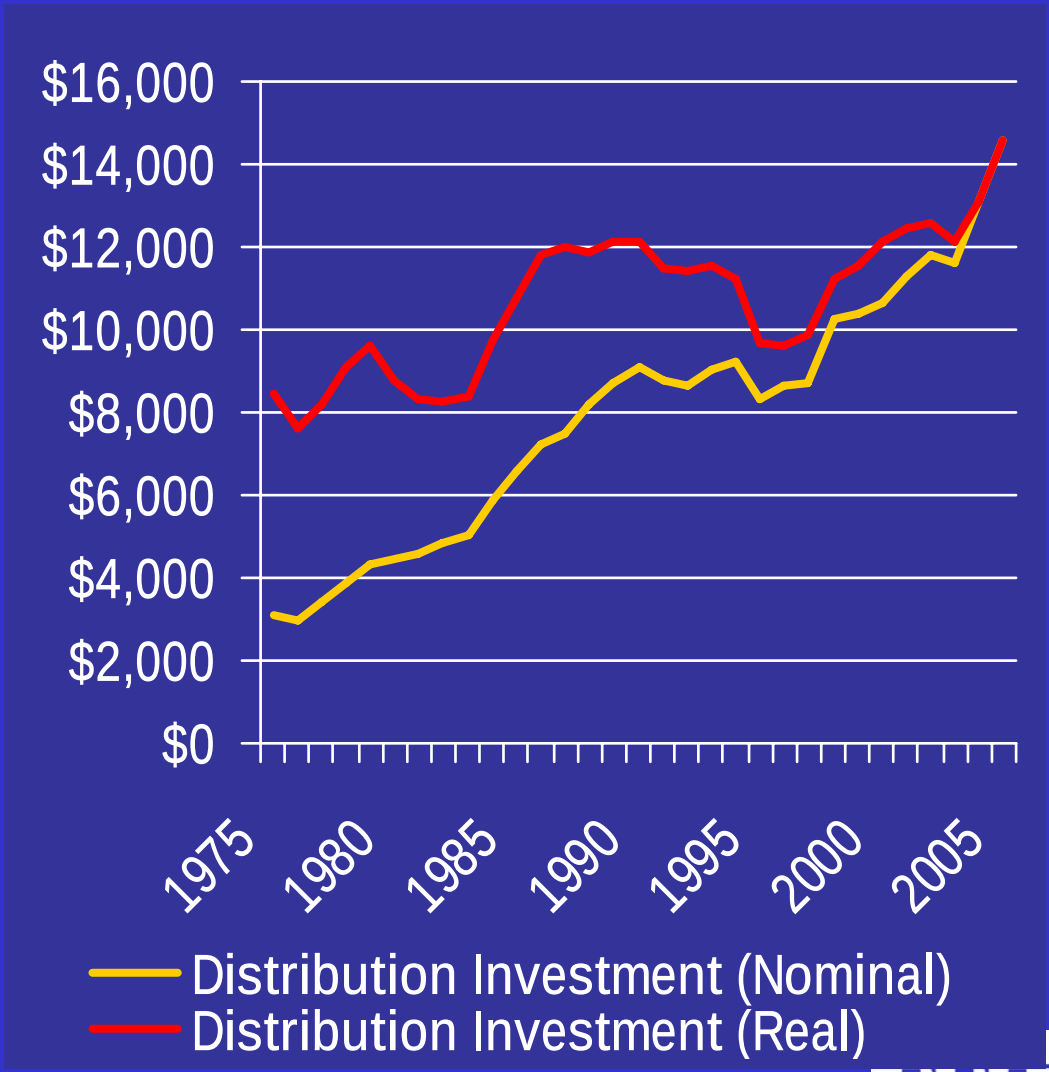
- $31.5 Billion planned



Note: In 2004 and 2005, the industry exceeded investment projections in their transmission capital budgets. *The Handy-Whitman Index of Public Utility Construction Costs* used to adjust for inflation from year to year. Data represents both vertically integrated and stand-alone transmission companies. *Planned total industry expenditures are preliminary and estimated from 90% response rate to EEI's Electric Transmission Capital Budget & Forecast Survey. Actual expenditures from EEI's Annual Property & Plant Capital Investment Survey & Form 1s.

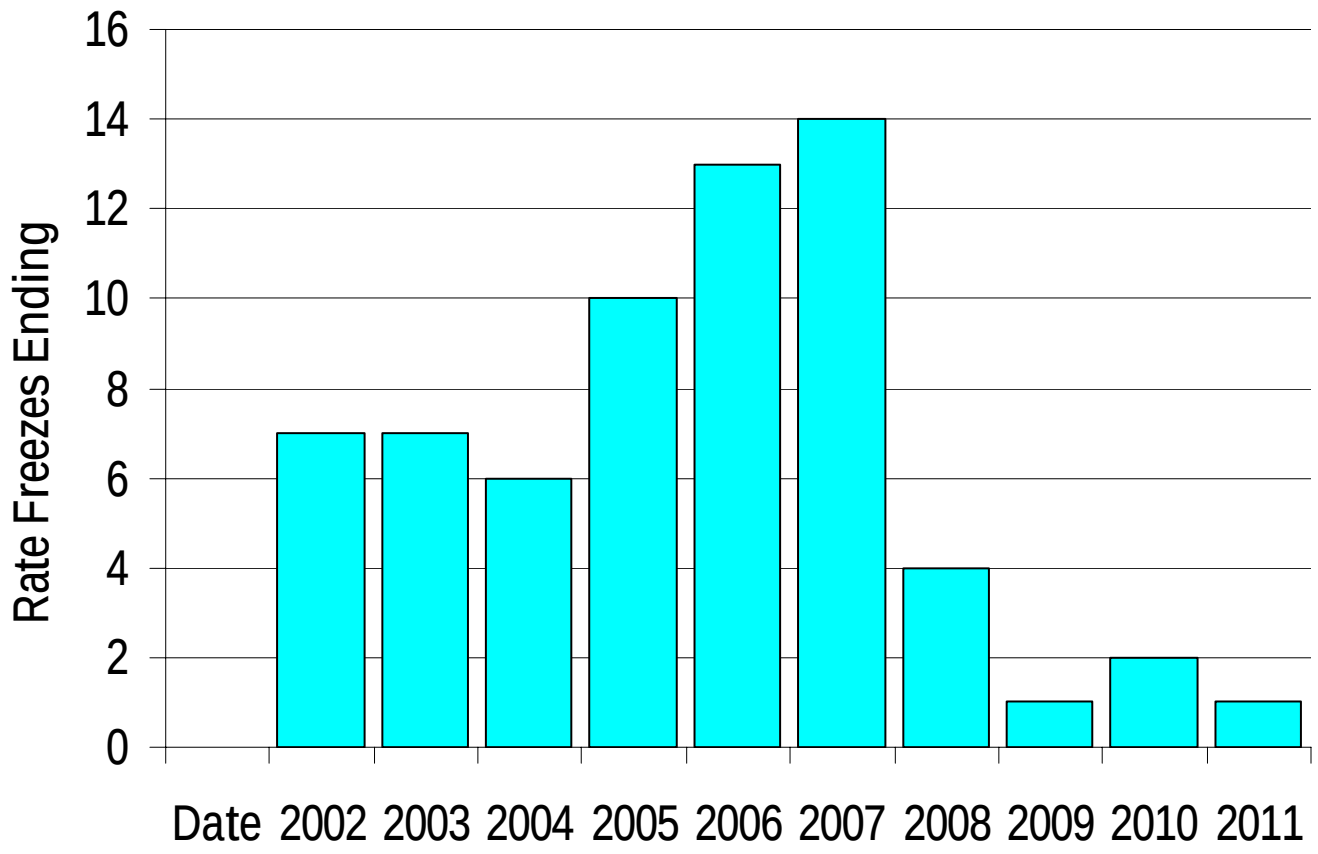
Needed Distribution Investment

- Average of $13 billion per year over next 10 years
- Replace aging infrastructure
- Modernize system management and control



Rate Caps Ending

Restructuring legislation reduced and froze rates from 2-10 years
but actual costs were increasing!

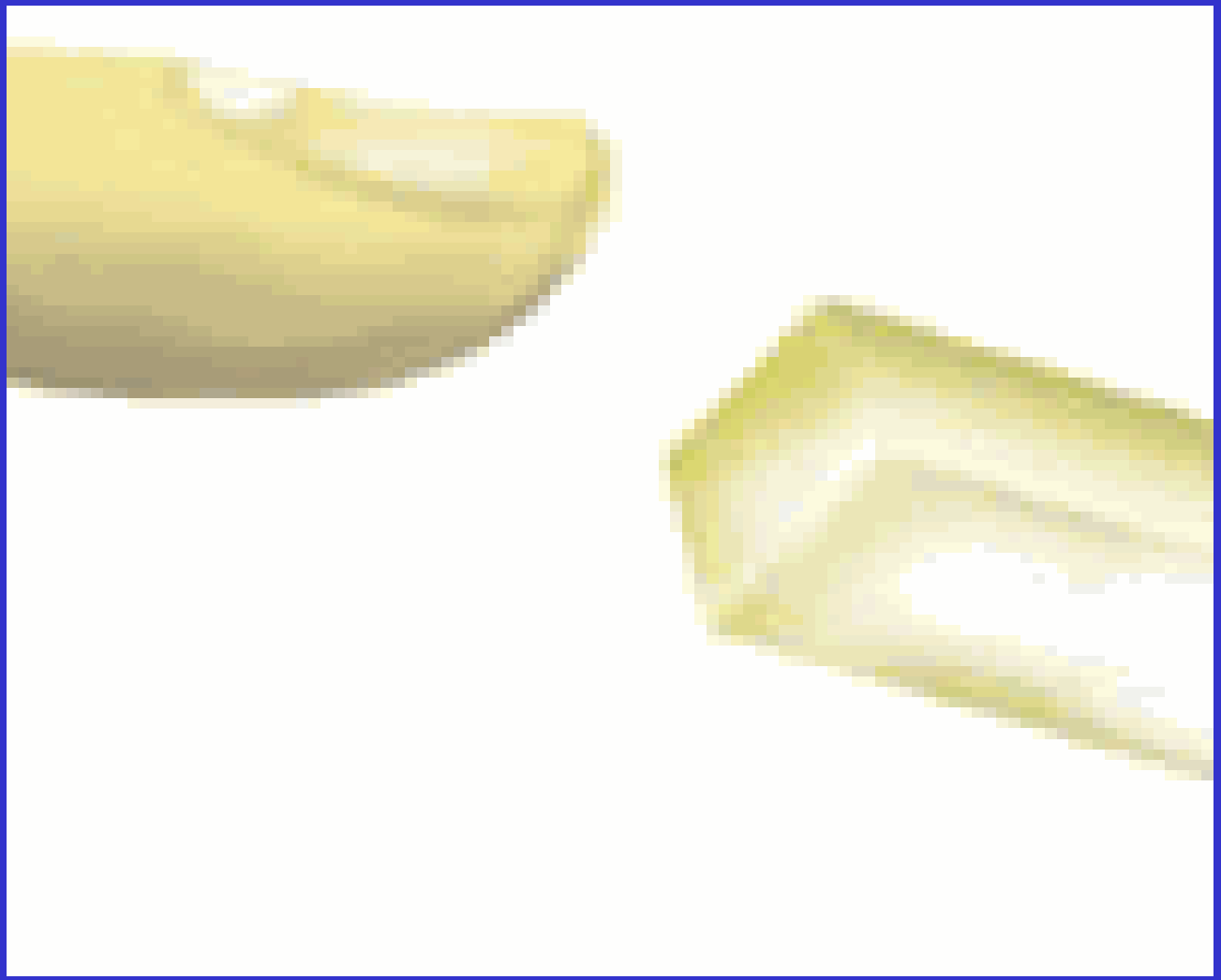


Other Factors Impacting Rates

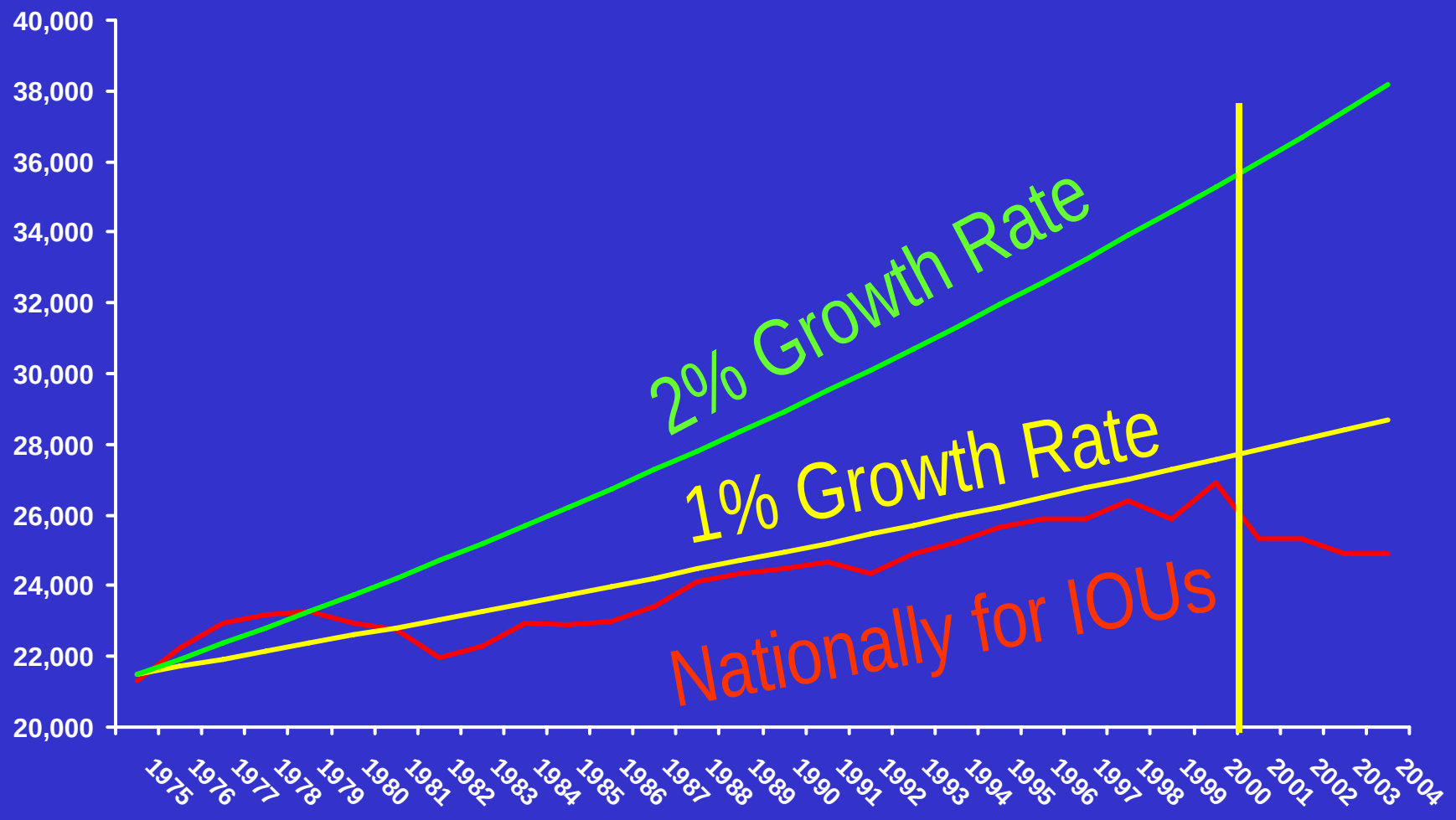
- Critical Infrastructure Protection / Post 9-11 realities
  - Secure infrastructure
- Regional Transmission Organization (RTO) costs
  - Enables efficient, competitive markets for customers
- Pension funding and rising health care costs
  - Critical, highly technical industry must recruit / retain the very best
- Disaster recovery
  - Enables swift future restoration efforts

Which Way Will We Wander?

Energy Efficiency

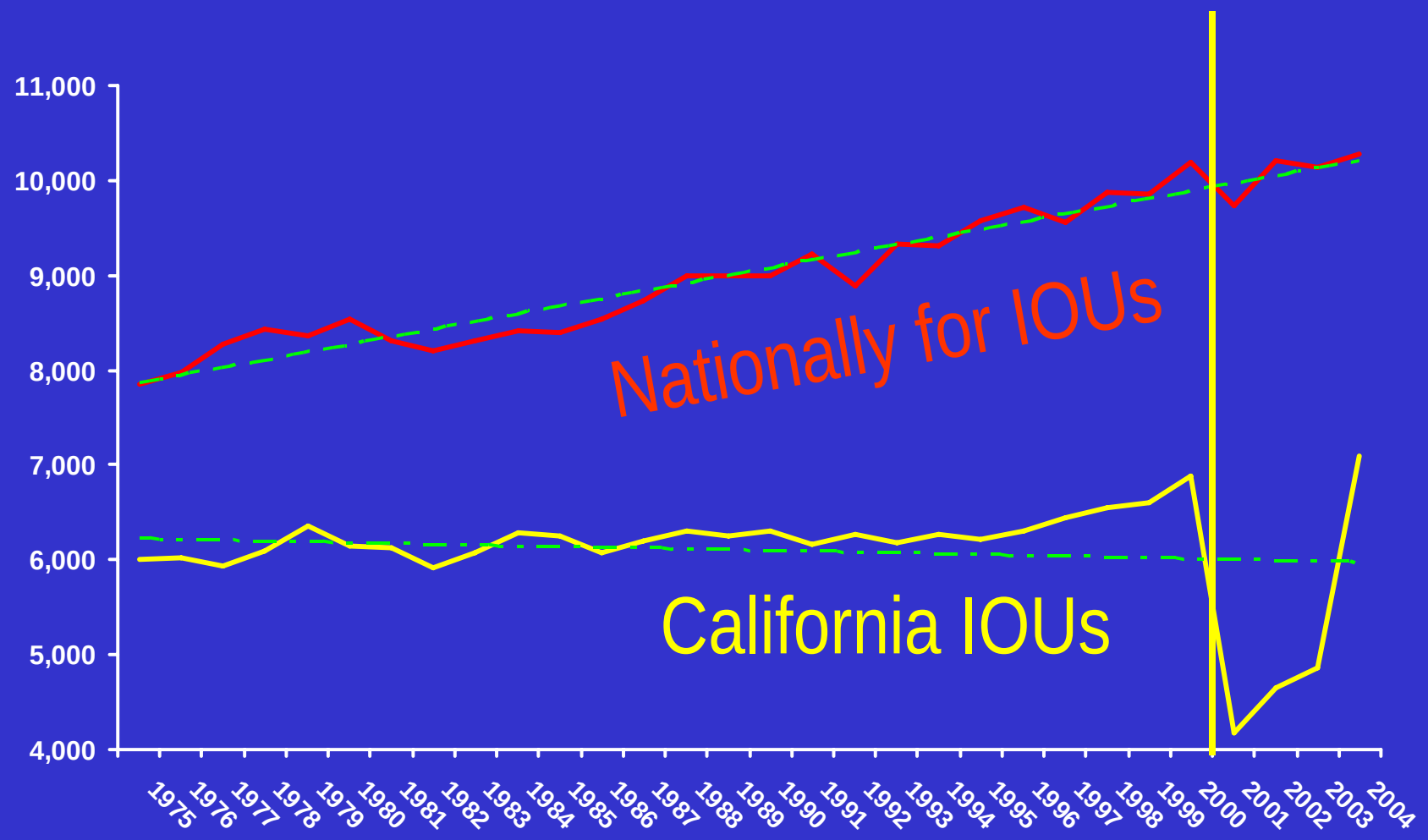


Average Annual Electric Use per Total Ultimate Customer, 1975-2004 (kWh / yr)



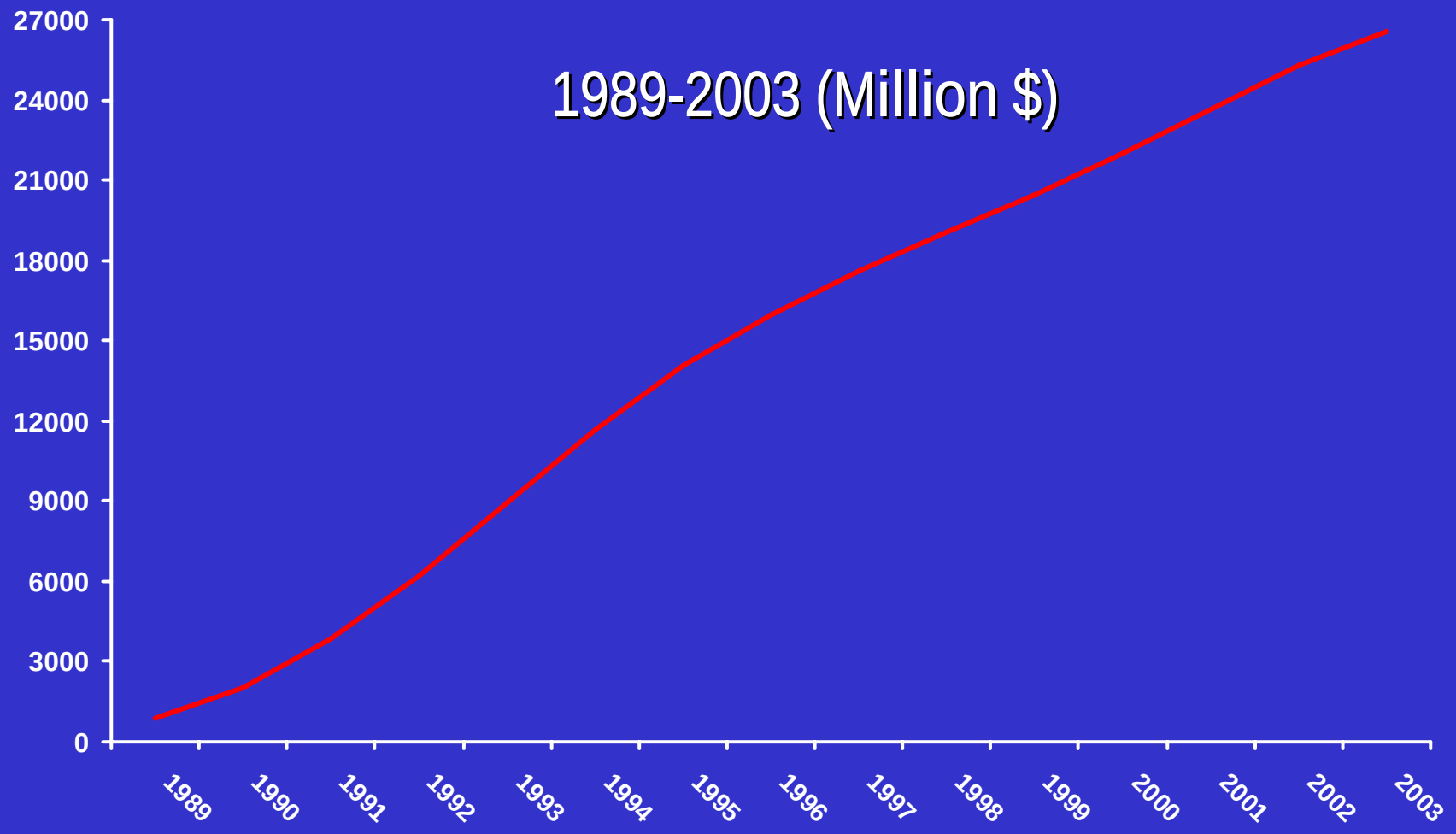
Sources: EEI Statistical Yearbooks 1980-2005,
Historical Statistics of the Electric Utility Industry through 1992

Average Annual Residential Electric Use per Customer, 1975-2004 (kWh / yr)



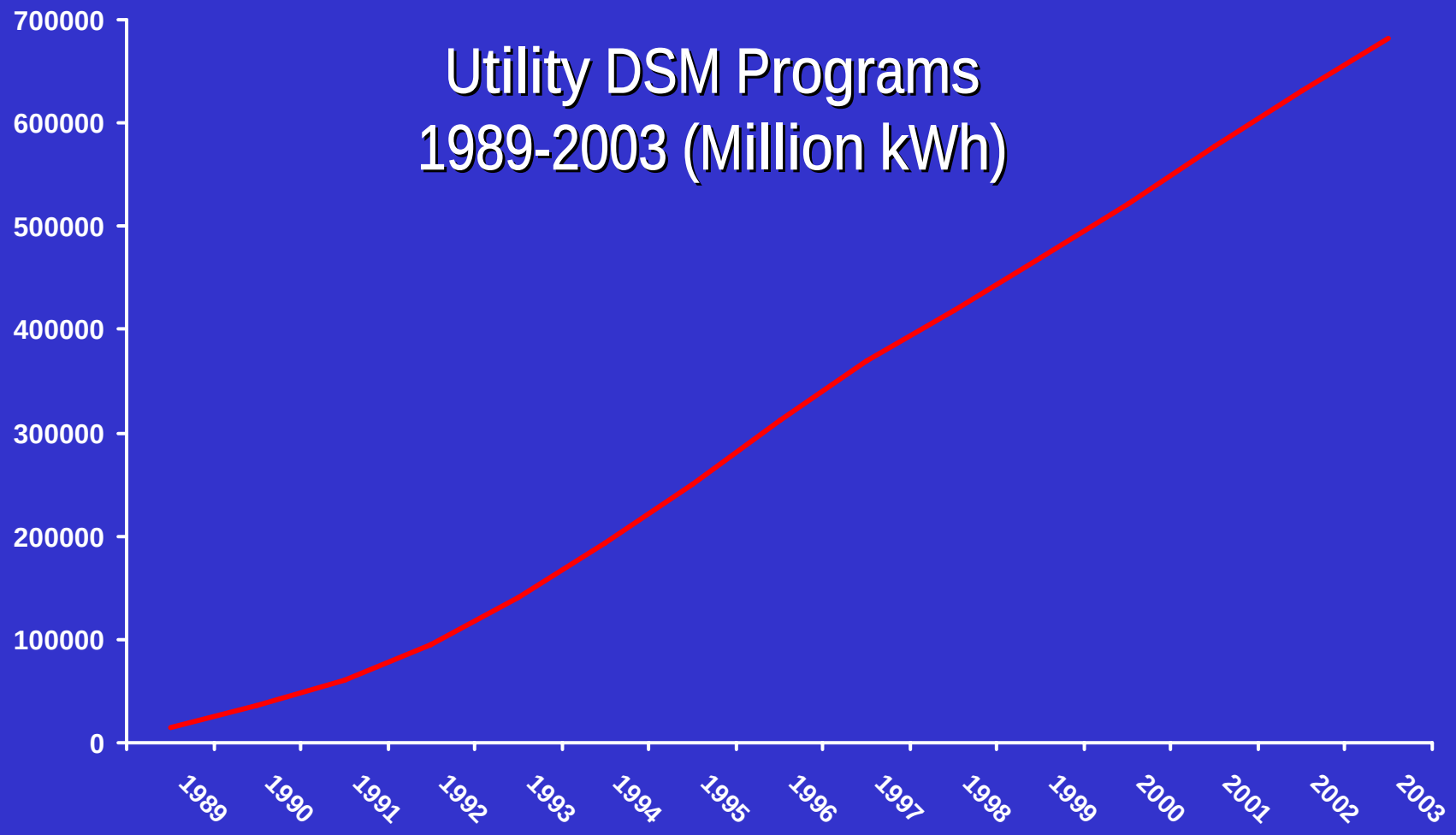
Sources: EEI Statistical Yearbooks 1980-2005,
Historical Statistics of the Electric Utility Industry through 1992

Utility Demand Side Management Program Expenditures Increasing



Source: Energy Information Administration. Some utilities were spending money on DSM as early as 1976. National data is not available for expenditures from 1976-1988.

Energy Savings Substantial



Source: Energy Information Administration

Other Energy Efficiency Efforts

- Appliance Standards
  - New Federal energy efficiency standards for appliances
- Equipment Standards
  - New Federal efficiency standards for equipment
- Commercial / Residential federal tax incentives
  - Commercial building efficiency and on-site distributed generation
  - Residential building and solar / fuel cell systems
  - Consumer hybrid vehicles (car or SUV)
- Manufacturer tax credits
  - For building high-efficiency appliances

See Appendix

Where Does This Leave Utilities?

- Utilities are uniquely positioned to increase end-use efficiency, develop new demand-responsive loads
  - Unique position to use economies of scope and scale
  - Knowledge of customers' loads & processes
  - Knowledge of wholesale market rules & needs
  - Provide rates, metering, billing
- But there are challenges
- Options
  - Rate structure reform – proper pricing signals
    - Appropriate customer charges, standby-rates, avoided costs
  - Broad revenue decoupling or true up mechanism
  - Contract demand

Where Does This Leave Utilities?
It Depends?

- Is full recovery dependent upon meeting sales expectations?
  - Has the PUC anticipated / compensated the utility for the reduction in sales?
  - Are rates designed to recover fixed costs regardless of thru-put?
- Is there some financial flexibility to maintain the system and meet growth?
- Is there a "true-up" mechanism or is a new rate case required?
- This is important!
  - A 10% reduction in sales can lead to bankruptcy for a wires only company
  - Adds a critical risk factor to credit ratings → increasing cost of capital
  - Increases revenue volatility
  - Undermines authorized revenue recovery between rate cases

EEI

True Up For Lost Revenues
Decoupling - Why and How

- Many different techniques – some not as good as others
  - Basic decoupling – adjustments to maintain constant revenues year to year
  - Full decoupling
    - ROE adjusted to interest rates
    - Operating costs tied to price indicies
    - Rate base adjusted reflects forecasted capital expenditures
- Revenue Surety
  - Ensures consistent collection of revenues between rate cases to recover costs and earn its allowed return
- Revenue Stability
  - Reduce earnings volatility and eliminate most if not all incentives to maximize energy sales or throughput
- "[S]tabilized utility's financial position, lowered … cost of capital, provided low-cost protection against reduced profitability" NRRI

National Regulatory Research Institute

NRRI 94-14 September 1994

- "… break[s] the linkage between sales, revenues and profits by precluding the utility from retaining any revenues that exceed the revenue requirement
- Utility has no "incentive to pursue sales opportunities beyond those contained in the forecast"
- Makes "the utility whole"
- Put DSM on a "more equal footing with supply-side energy sources because the utility is protected against reduced profitability as a result of the promotion of DSM"

How it Works

- Establish base year data (like traditional approach)
- First year's rates = $\frac{\text{total authorized revenues}}{\text{projected annual energy sales}}$
- Each year actual revenues are compared with calculated revenue needs
- Balancing account
  - Adjust (true-up) to future rates to compensate for under or over-collection as well as any fixed cost increases
  - Can be calculated for each rate class separately
  - New rate case every 3-5 years to update baseline cost and revenue reqmts

Electric Decoupling – Example

- Regulators establish an electricity sales forecast (e.g., 100 kWh)

- Determine an authorized revenue requirement
  - Fixed costs of production (e.g., $6.00)
  - Variable costs of production (e.g., 4¢ / kWh)
  - Total revenue requirement $10 ($6.00 + (100 kWh * 4¢ / kWh))

- Rate per kWh $= \frac{\text{total revenue requirement}}{\text{sales forecast}} = \frac{\$10}{100\ \text{kWh}} = 10¢ / \text{kWh}$

Below Forecast Example

- If actual sales fall short (efficiency / conservation programs work)
  - Forecasted 100 kWh Actual only 95 kWh
- Actual Costs
  - Variable cost = 4¢ / kWh x 95 kWh = $3.80
  - Fixed cost = $6.00
  - Actual cost = $3.80 + $6 = $9.80
- Actual revenues
  - 95 kWh x 10¢ / kWh = $9.50
- Utility under-collects its fixed costs by $0.30

Above Forecast Example

- If actual sales exceed forecast
  - Forecasted 100 kWh Actual 105 kWh
- Actual Costs
  - Variable cost = 4¢ / kWh x 105 kWh = $4.20
  - Fixed cost = $6.00
  - Actual cost = $4.20 + $6 = $10.20
- Actual revenues
  - 105 kWh x 10¢ / kWh = $10.50
- Utility over-collects its fixed costs by $0.30

The PG&E Experience

- Electric Revenue Adjustment Mechanism (ERAM) for non-fuel costs
  - (O&M, A&G, depreciation, taxes, and return)
- Energy Cost Adjustment Clause (ECAC) for fuel / fuel-related costs
- Attrition Rate Adjustment (ARA) to allow utility to earn authorized return in attrition year
  - Annual ARA mechanism recovers cost increases from customer growth, inflation, aging facility replacement
  - PG&E position
    - ARA essential for successful functioning of ERAM

PG&E Details

- Preparation
  - Costs are segregated by type (non-fuel, fuel)
  - Target revenues are set and authorized by regulators
- Operation
  - Actual revenues matched with authorized revenues
  - Difference reflects difference between actual / forecast sales
    - Weather, economy, conservation, energy efficiency, and rate design
  - Difference, plus interest, tracked and refunded to or recovered from, ratepayers in future rates
- Result
  - Earnings not affected by sales fluctuations, so no disincentives for energy efficiency or conservation

PG&E Restructuring

- California restructured in mid 1990s
- Electric rates frozen in 1996
- Transition Revenue Account (TRA) replaced ERAM in 1998 and effectively maintained decoupling*
- Skyrocketing commodity costs with capped rates led to financial instability, insolvency
- Utility declares bankruptcy in 2001
- State takes over electricity procurement

**Decoupling was maintained thru TRA; PG&E lost money due to frozen rates on headroom, commodity costs (collected all distribution and all / most generation revenue)*

PG&E Decoupling II – Post Bankruptcy

- Revenue adjustment mechanisms reinstituted in basically pre-restructuring format
- One difference: further segregation of costs
- Current cost categories include:
  - Energy resource costs (ERRA) *(fuel, fuel-related)*
  - Electric distribution costs (DRAM)
  - Retained utility generation costs (UGBA)
  - Public Purpose Program costs (PPPRAM)
  - Nuclear Decommissioning costs (NDAM)

PG&E Decoupling II – The Law

- Decoupling provision added to state law April 2001
- Public Utilities Code Section 739.10:
  - "The Commission shall ensure that errors in estimates of demand elasticity or sales to not result in material over or undercollections of the electrical corporations."
- Interpreted as requiring comprehensive application of revenue adjustment mechanisms
- All but about 6% of PG&E's electric revenues are now decoupled (exception: transmission)

San Diego Gas & Electric

- In 2004 switched to a rate indexing mechanism that includes decoupling

- Base revenues increase annually by increase in CPI within limits
  - Share base revenues that exceed authorized Rate of Return plus 50 basis points
  - If 175 basis points up or down, anyone can file for suspension of program
  - If 300 basis points up or down, automatic suspension
  - Formula-based performance measures for customer service, safety, reliability

Lawrence Berkley Lab Report

- Decoupling . . .
  - "has had a negligible effect on rate levels and has, for PG&E, actually reduced rate volatility" and
  - "the clearing of ERAM balances has accounted for only a small portion of total change in revenue requirements between 1983-1993"

Other States

- NY – Rejected because of negative impact on rate stability
- ME – Discontinued after 2 yrs due to large deferrals
- OR – Denied PGE proposal (2002) (Goals achievable in other ways)
- FL – Discontinued (~1997) moved to a rate cap and revenue sharing mechanism
- MT – Discontinued (~1997) with advent of restructuring

A New Regulatory Bargain?

- Not really! Still . . .
  - Recovery of investments dedicated to the public interest
  - Return on investments commensurate with the risks
- Decoupling helps to reduce utility risks
  - Without decoupling
    - Utilities must file for new rates reflecting lower usage
    - Rate cases worry investors, increase cost of capital
    - Consumer costs pay for increased risk
  - With decoupling
    - Utilities need not file
    - Revenues stabilized, risks reduced
    - Consumers benefit
- Requires regulator commitment to proper application

Things to Think About

- Recognize that utilities still make investments based upon long-term service lives
  - Utilities already have incentives to minimize investments that may not be the least cost alternative
  - Decisions not really based upon short-term profit impacts
- Undermine long-term settlement feasibility?
  - Removes incentives for cost reductions
    - Settlements provided opportunity to retain some savings as earnings
  - Utilities would be left with a fixed revenue level which would not provide funding for system growth or maintenance
    - Require more frequent rate cases

Things to Think About

- Rate stability
  - How long between adjustments to avoid passing through large deferrals
  - Can deferral be recovered within 2 years per GAAP or will utility be pressured to write-off decoupling related deferrals?
- Reliability
  - Holding revenues fixed without regard to customer / demand growth and need to replace aging infrastructure would limit cash flow available for delivery system infrastructure investments
  - Absent rate base adjustments for forecasted capital expenditures
- Rate Design
  - Is proper rate design the first step before decoupling?
  - Does decoupling reduce incentive for more efficient rate design?

More?

- Only have half the answer!
- Decoupling eliminates disincentive to pursue load reducing programs – energy efficiency, conservation, etc.
- Decoupling does not provide an incentive
  - Performance bonus examples
    - Annual Energy Efficiency / DSM performance incentive (AZ)
    - Incentive payments (CT,MA, NH, NY, RI)
    - Shared savings DSM (MN)
    - 5% incentive over allowed ROE (NV)
    - Restores ROE on DSM investments to overall return (WI)

Alternative Regulation
Earnings / Revenue Sharing / Incentives

- Revenue / Earnings sharing – most used
  - File if ROE below certain level or require refunds if above
  - Sharing above or below deadband
    - Deadband around ROE
    - Deadband around revenues
- Less used
  - Variable sharing
    - Savings above level split 90% R/Ps 10% S/Hs
    - Costs split 90% deferral account 10% R/Ps
  - Distribution reliability
    - Replace “reward / penalty” with incentives based on portion of distribution budget spent, unspent amount credited to R/Ps
  - S/Hs share first to offset AFUDC, then depreciation

Summary

- Costs are going up
- Supply margins are getting tighter
- Load reduction programs can create financial hardships for utilities
- Policies need to be developed that
  - Remove the financial disincentives to energy efficiency programs
  - Provide energy efficiency business opportunities for utilities

Appendix

Trends – Energy Efficiency Standards

- Recent rules and effective dates:
  - Room Air Conditioners 10/00
  - Refrigerators and Freezers 7/01
  - Commercial Gas & Electric HVAC, lighting power densities, envelope, water heating, etc. (ASHRAE 90.1-1999) 10/01
  - DOE certification of ASHRAE 90.1-1999 7/02
    - States have 2 years to upgrade building codes (EPACT)
  - Residential electric, gas, and oil-fired water heaters 1/04
  - Residential Clothes Washers, Tier 1 1/04
  - Commercial Fluorescent Lamp Ballasts 4/05
  - Residential split and packaged central heat pumps, A/C 1/06
  - Residential Clothes Washers, Tier 2 1/07

EPAct 2005 Mandated National Equipment Efficiency Standards

- Lighting (exit signs, fluorescent & mercury vapor ballast)
- Commercial Refrigerators and Freezers
- Rooftop Packaged Air Conditioners and Heat Pumps
- Dry-Type Transformers
- Commercial Ice Makers
- Refrigerated Beverage Vending Machines
- Commercial Clothes Washers
- Commercial Pre-Rinse Spray Valves (for dishwashers)
- Compact Fluorescent Lamps
- Torchiere lighting fixtures
- Ceiling Fans
- Ceiling Fan Light Kits
- Dehumidifiers
- Battery Chargers
- External Power Supplies ("wall packs")
- Unit Heaters (Only GAS product and No Oil products)

EPAct 2005 Commercial Tax Incentives / Strategies

- Summary:
  - Tax deduction for exceeding efficiency baseline by 50%
    - $1.80 per square foot for commercial buildings that exceed the energy efficiency of a “baseline” building in ASHRAE 90.1-2001 Building Code by 50%.
  - Tax deductions for increasing efficiency by 50%
    - “Sub systems” that increase efficiency by 50%, up to $0.60 per square foot.
  - Tax credits for on-site distributed generation systems
    - Must meet certain efficiency requirements
- NOTE: The window of opportunity for these tax credits and deductions opened on 1/1/06 and closes on 12/31/07

EPAct 2005 Consumer Tax Incentives - Summary

- Tax credits in 2006 and 2007 for:
  - New High-Efficiency Heating / Cooling Systems
  - New High-Efficiency Water Heating System
  - Upgrades to your Envelope (insulation, windows)
  - Solar Energy and Fuel Cell systems
  - Hybrid vehicle (car or SUV)
- Due to manufacturer tax credits, prices should be coming down for
  - High-efficiency dishwashers
  - Clothes washers
  - Refrigerators
- Builders get tax credits for high-efficiency new homes