Regulatory Principles and Regulatory Regimes

Ron Davis
Principal Economist
Colorado Department of Regulatory Agencies
Public Utilities Commission
1560 Broadway, Suite 250
Denver, CO 80202
P 303.894.2883 | F 303.869.0333
Email: ronald.davis@dora.state.co.us

Professional Background

- Worked in electric and gas industries since 1992
- Principal Economist at Colorado Public Utilities Commission since July 2005
  - Expert witness, policy advisor (rulemakings), researcher
  - Resource planning, energy efficiency, ratemaking, quality of service, franchise issues, and other matters
- Senior Analyst in the Rates and Regulatory Affairs at Commonwealth Energy System (NSTAR)
  - Rate design, cost of service, tariffs, terms and conditions
- Consultant at KEMA, E Source/Financial Times, Hagler Bailly Consulting (PA Consulting in US)
  - Market analysis, regulation, retail pricing, competition, utility operations, energy efficiency

Educational Background

- Master of Arts
  Economics
  University of Colorado at Boulder

- Bachelor of Arts
  Economics and French Literature
  University of Colorado at Boulder and
  Université de Bordeaux, France

Overview

- Electric Utility Regulation in the US
- Economic Rationale for Regulation
  - Natural Monopoly
- Public Policy Case for Regulation
  - Regulatory Compact
- Regulatory Tools
- Qualities of an Effective Regulator
- Colorado PUC Case Studies
  - The Fuel Clause
  - The New Energy Economy and the Climate Action Plan
  - Smart Grid Development

Electric Utility Regulation in the US

US Electricity Sector

- 42% of primary energy consumption
- 35% of US fossil fuel consumption
  (primarily coal and natural gas from North America)
- 40% of US carbon dioxide emissions (growing)
- Electricity usage growing faster than total energy usage

Source: Joskow

Colorado Electricity Snapshot

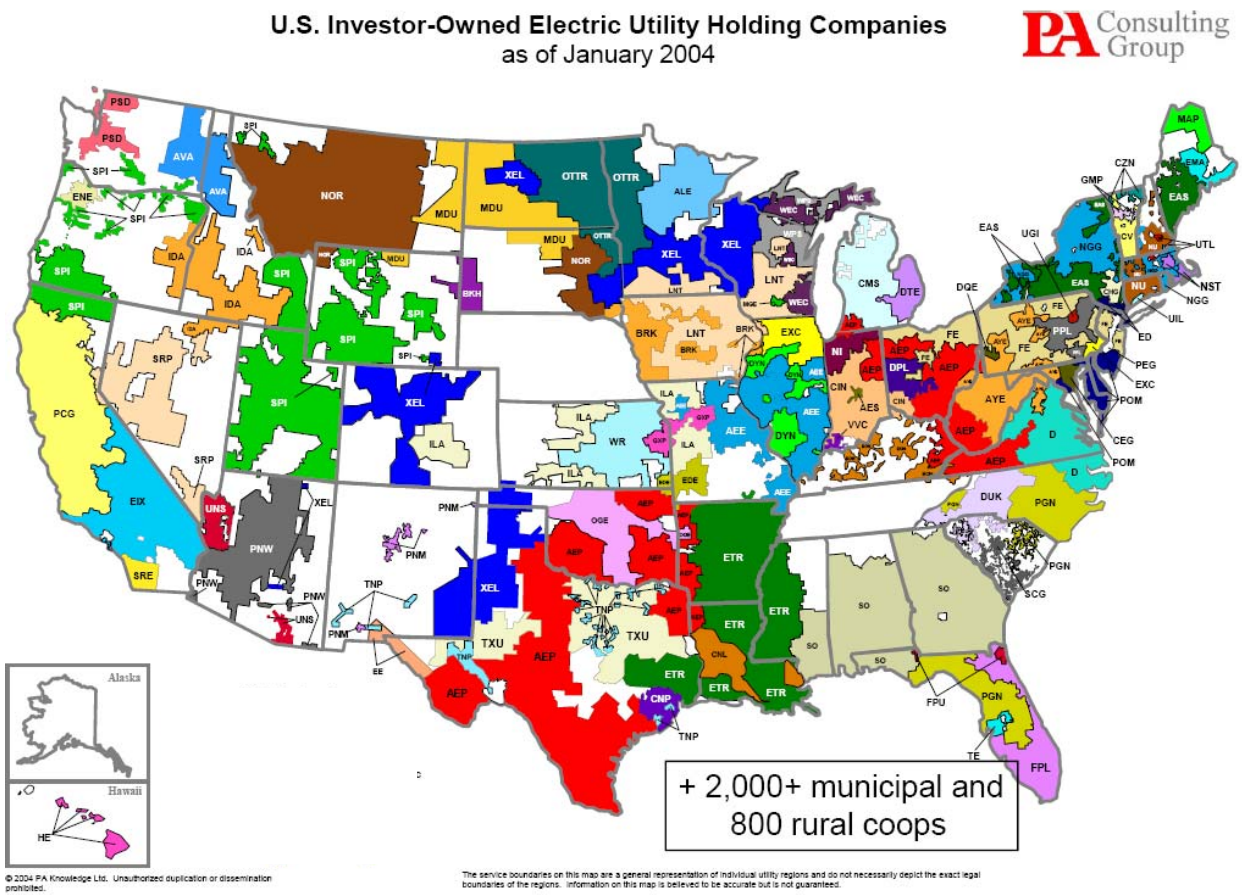
		US Rank	Period
Economy			
Population	4.9 million	22	2008
Civilian Labor Force	2.7 million	22	Jan-09
Per Capita Personal Income	$41,042	11	2007
Natural Gas Prices		**U.S Avg**	**Period**
Wellhead	$4.57/MCF	$6.37/MCF	2007
City Gat	$6.06/MCF	$7.93/MCF	Jan-09
Residential	$8.64/MCF	$12.41/MCF	Jan-09
Electricity Prices			
Residential	9.47 cents/kWh	10.99 cents/kWh	Dec-08
Commercial	7.78 cents/kWh	9.95 cents/kWh	Dec-08
Industrial	6.13 cents/kWh	6.89 cents/kWh	Dec-08
Energy Usage		**US Rank**	**Period**
Per capita	300 million Btu	39	2006
Environmental		**% U.S**	**Period**
Electric Power Carbon Dioxide Emissions	41,847,343 metric tons	1.7%	2006

Source: Energy Information Administration

Electric Utility Regulation in US

- Supplements regulation by competition
  - Competition regulates markets by raising price when supplies are scarce and lower price when supplies are plentiful
- Combines anti-trust, industry, and social regulation
- Supports an effective institutional framework to sustain economic growth (North)
  - Initially focused on providing sufficient service (capacity)
  - Transformed into improving technical efficiency, productivity, and quality of service
  - Increasingly addressing positive and negative "externalities" (e.g., jobs and climate change)

Investor Owned Utilities



- Approximately 70 IOU holding companies
- Serving ~ 72% of customers
- Generating ~ 50% of all electricity annually
- Total market capitalization of $514.5 billion (2007)

Source: EEI

Principal Regulatory Bodies

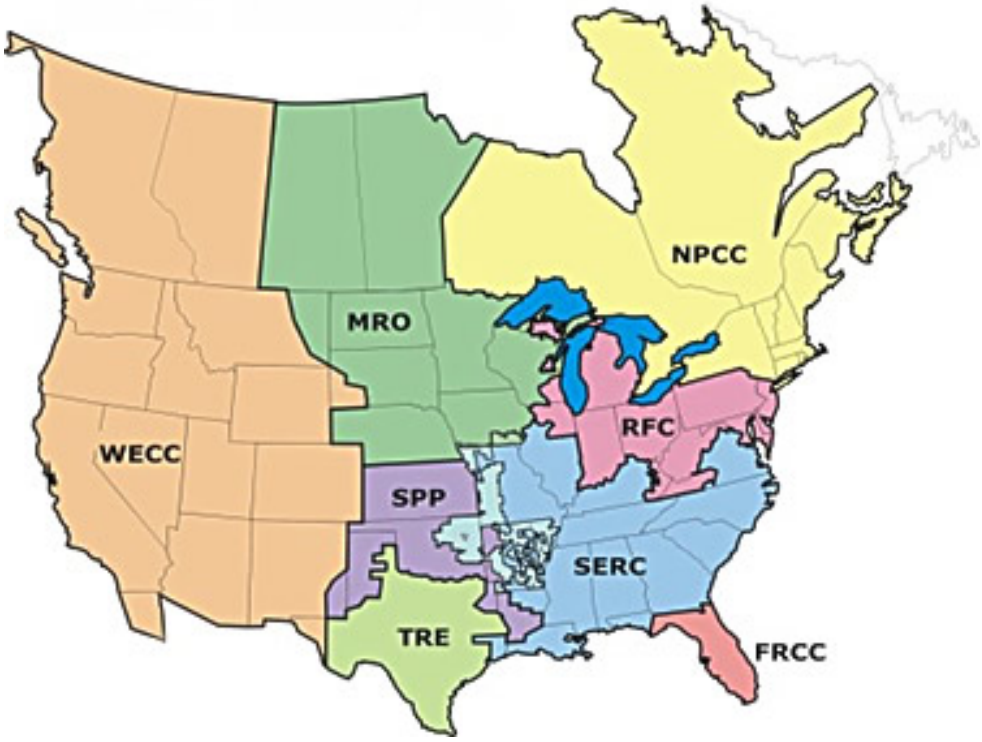
- Federal
  - Congress (policy)
  - FERC: Federal Energy Regulatory Commission (transmission, wholesale markets, inter-affiliate transactions, holding company books and records, holding records)
  - NERC: North American Reliability Corporation
    - Regional Reliability Organizations (Western Electricity Coordinating Council)
  - NRC: Nuclear Regulatory Commission
  - Others: Dept. of Energy, Security and Exchange Commission, Commodities and Futures Exchange Commission, Department of Justice, Federal Trade Commission
- State
  - Legislatures (policy)
  - Public Utilities Commissions (rates, facilities, market entry, siting)
  - Other state agencies (air permits, state codes)
- Counties, cities and towns codes
  - Codes
  - Permitting and siting
  - Municipal utilities

FERC's Electric Industry Roles

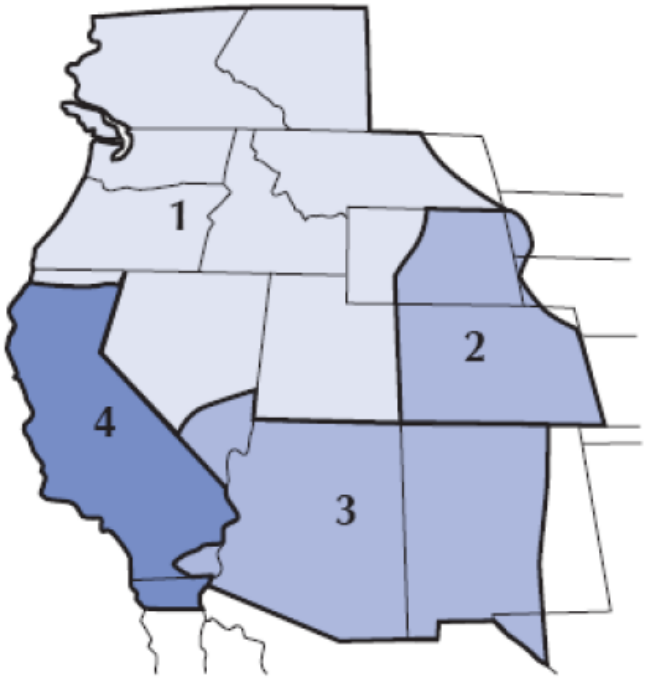
- Regulates the transmission and wholesale sales of electricity in interstate commerce
- Licenses and inspects hydroelectric projects
- Ensures reliability of transmission system
- Monitors and investigates energy markets
- Enforces rules in the energy markets
- Oversees environmental matters related to natural gas and hydroelectricity projects and major electricity policy initiatives
- Administers accounting and financial reporting regulations and conduct of regulated companies

NERC

- Reliability Standards
  - Planning and operating rules (NERC Standards Committee)
- Compliance & Enforcement
- Reliability & Adequacy Assessments
  - Long-Term Reliability– 10 years
  - Winter and Summer
- Events Analysis
- Readiness Evaluations
- Situation Awareness
  - Monitors bulk power system in real time
- Infrastructure Security
  - Physical and cyber threats
- Benchmarking
- Education
- Organization Registration and Certification



WECC



1 Northwest Power Pool Area

2 Rocky Mountain Power Area

3 Arizona, New Mexico, Southern Nevada Area

4 California / Mexico Power Area

- Western Electricity Coordinating Council
  - Coordinates and promotes reliability in the Western Interconnection
  - Efficient competitive power markets
  - Open and non-discriminatory transmission access
  - Coordination of operating and planning activities

Colorado Utility Regulation

Utility	Number	Regulator	CPUC Jurisdiction
Investor-Owned	2	PUC	Rates, CPCNs, Complaints
Co-ops	25	Members	CPCNs, Complaints Renewables Reporting
Municipals	29	Members	CPCNs, Complaints, Renewables Reporting
Generation & Transmission	1	Members	CPCNs, Resource Reporting
Municipal Power Authorities	3	Members	None
Western Area Power Authority	1	DOE	None
Non-Utility Generators	Several	None	None

Source: Colorado Energy Forum

Public Utilities Commission

The Public Utilities Commission's (PUC) mission is to achieve a flexible regulatory environment that provides safe, reliable and quality services to utility customers on just and reasonable terms, while managing the transition to effective competition where appropriate.

- Full economic and quality of service regulatory authority over intrastate telecommunication services and investor-owned electric, gas and water utilities
- Partial regulatory control over municipal utilities and electric associations
- Regulates railroad and motor carrier utilities for hire (taxis and limos) as well as public railroad-highway grade crossings

Commission Authority and Duties

- Authority from Article XXV of the Colorado Constitution and Title 40 of Colorado Revised Statutes
- Paramount consideration to the public interest balancing:
  - Needs of customers for safe and reliable utility services at reasonable rates
  - Needs of utilities to earn a reasonable profit and to sustain reliable infrastructure
- Authority quasi-legislative: Rulemaking proceedings that do not require stakeholders to be represented by an attorney in order to participate and have input into the process
- Authority quasi-judicial: litigated proceedings under formal administrative law process; conducted "on the record" where representation by an attorney is often necessary
- Colorado Sunshine Law requires business in public
- Sunset Review last legislative session– HB 08-1227

Administrative Processes

- Quasi-adjudicative proceedings to decide matters where:
  - Discrete, identifiable, adversarial parties
  - Factual and/or legal disputes
  - Findings of fact must underlay the Commission's decision
  - Examples: rate cases, complaints, territorial disputes, allegations of anti-competitive behavior
- Quasi-legislative proceedings:
  - Rulemaking
  - Policy pronouncements
  - Debates and investigations

Source: Brown

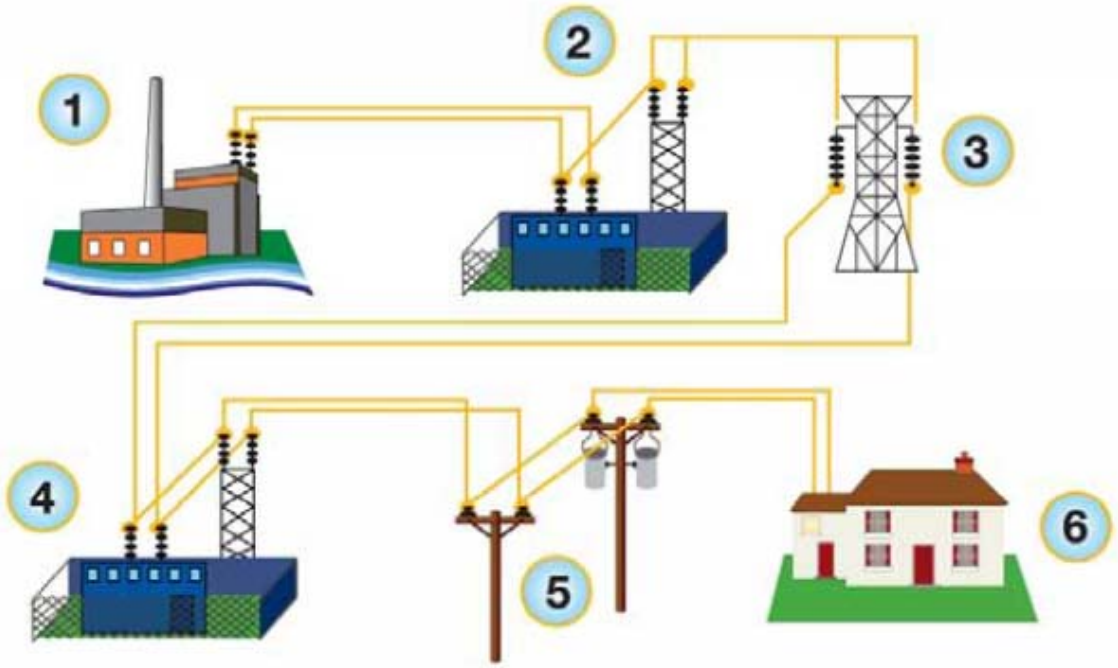
Federal versus State Regulation

- Both state and federal regulators derive their powers from laws from their own level of government
  - Congress: FERC, Colorado State Assembly: PUC
- No concerted, thought out regime for the relationships between federal and state institutions
  - Evolved through changes in law and practices
- Fundamental and accelerating change
  - From state dominance to federal dominance (transmission and market structure)

Source: Brown

Economic Rationale for Regulation

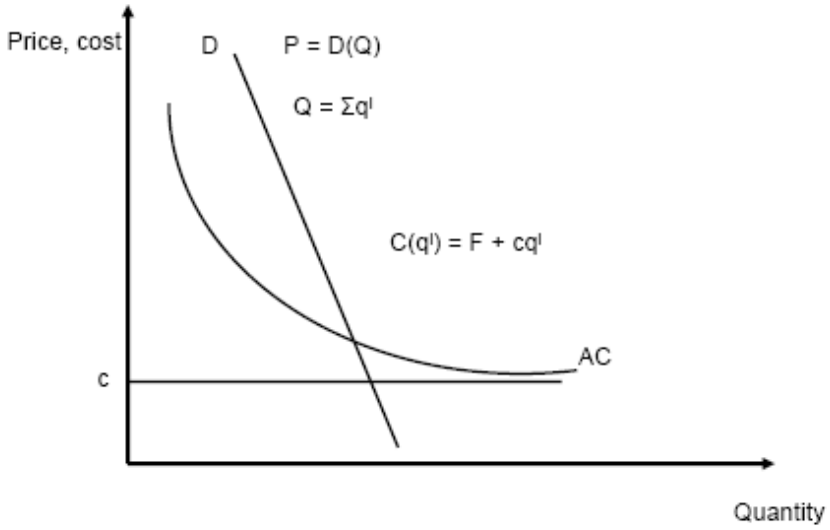
Natural Monopoly by Construction



1) A generation station, or power plant, produces the electricity
2) Voltage increased at a "step-up" substation
3) Electricity travels over transmission lines to area where needed (load area)
4) Voltage "stepped-down" at another substation
5) A distribution power line carries the electricity
6) The electricity reaches retail customers by passing through a service line and a meter– the "last mile"

Economics of Natural Monopoly

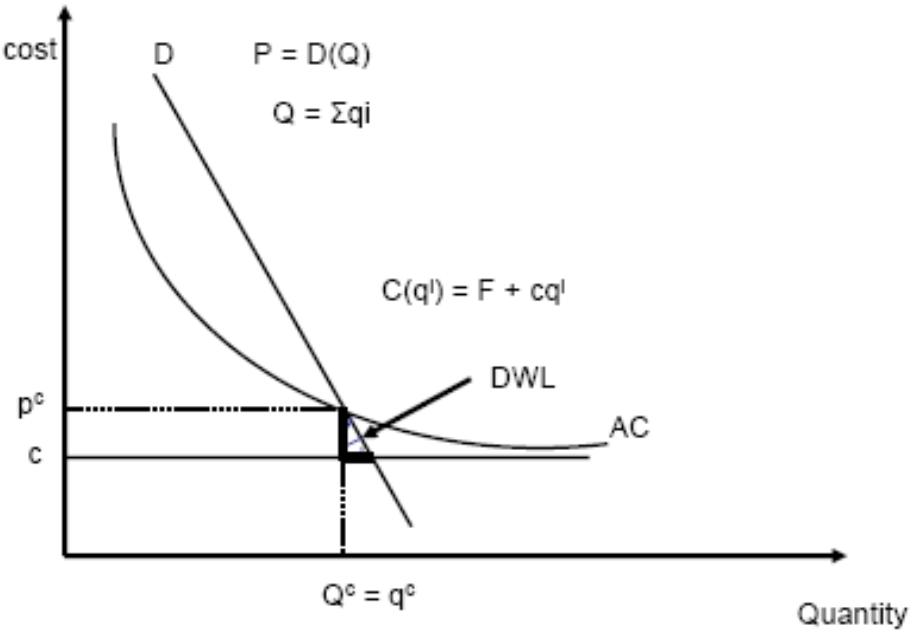
- Significant economies of scale
  - Subadditive cost function
  - An electric utility can produce a single homogenous product (delivered electricity) less costly being the only firm in the market
- The electric utility holds this cost dominance over the entire range of demand
  - Electric energy sales (GWh)
  - Demand (MW)



Source: Joskow

Economic Performance Problems

- Production inefficiencies
  - Deter entry
  - Rent seeking
  - Innovation
- Excessive prices
  - Inefficient price signal
    Price > MC
- Low innovation



Source: Joskow

The case for government regulation is that there are costly market failures whose social costs (consequences) can in principle be mitigated by implementing appropriate government regulatory mechanisms.

Monopoly Doctrine

- Significant increasing returns and significant costs associated with very long-lived assets
- Electricity is "essential"
  - Physical access and affordability
- Electricity is "non-storable"
- Electricity has economies of scale in a specific "geographic market"
- Ratio of fixed to variable costs high– "sunk cost"
  - Long-lived assets with low value outside of intended use
  - "Ruinous competition" and "contestable markets"
- Societal costs of "duplicated facilities"

Utility Regulation

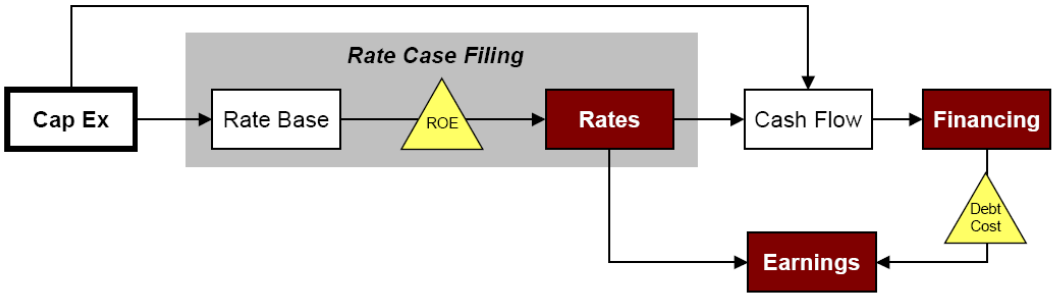
- Administrative regulation of prices, entry, and other aspects of utility behavior used to deal with real or imagined problems
- Rate regulation
  - Balance between efficient pricing (P = MC) and electric utility's viability (revenues < total cost)
  - "Break even prices" established by regulator in absence of government subsidies
- Entry regulation
  - Exclusive rights to serve (franchise)

Electric Utility Viability

- Conflict between efficient (marginal cost) pricing and financial viability
  - With economies of scale, marginal cost pricing will not produce enough revenue to cover the utility's total costs
  - Regulator strives to set prices that deviate from marginal cost in a way that minimizes efficiency losses
- Regulated utilities will only supply service if they can recover the costs of providing it
  - Materials and supplies
  - Attractive wages for talent
  - Return on investments that meet the opportunity cost of capital
  - Taxes

The General Rate Case

- A quasi judicial proceeding in which prices set
  - Triggered by request from the utility or by a complaint
- Review of reasonableness of costs
  - Uniform system of accounts
  - Test year point of reference



Source: CRA International

Bonbright Principles

- Rates should be:
  - Simple, understandable, and acceptable
  - Uncontroversial as to interpretation
  - Likely to yield the revenue requirement
  - Conducive to revenue stability
  - Conducive to rate stability
  - Fair across customer classes
  - Not unduly discriminatory
  - Economically efficient
- Difficult to optimize– often mutually exclusive
- Balancing these objective the role of the regulator

Hope and Bluefield

- Hope Decision: Regulated prices must be set at levels that give the regulated utility a reasonable opportunity to recover the costs of investments
  - Returns on equity should be commensurate with the returns on investments for other firms with similar risks
  - Returns on investment should assure the financial integrity of the utility to maintain credit and to attract capital

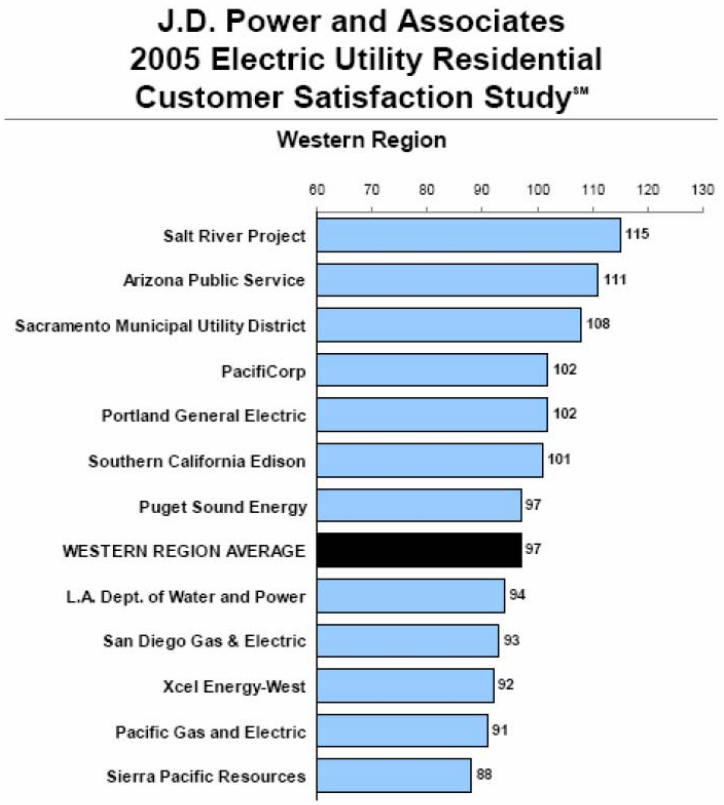
  (Federal Power Commission v. Hope Natural Gas Co., 320 US 591, 602(1944))

- Bluefield Decision: Rates that are too low are unjust, unreasonable and confiscatory, and their enforcement deprives a utility of Constitutional property rights

  (Bluefield Water Works v. Public Service Commission, 262 U.S. 679, 690 (1923))

Service Quality Problems

- Lower levels of reliability
- Lower levels of customer satisfaction
- Missed opportunities in innovation



Example Service Quality Metrics

- **Reliability**
  - System Average Interruption Duration Index (SAIDI)
  - Customer Average Interruption Duration Index (CAIDI)
  - System Average Interruption Frequency Index (SAIFI)
  - Service restoration times
  - Worst-performing circuits
  - Tree trimming frequency/budgets
  - Planned interruption frequency/duration/notification times
  - Outages per line mile
  - Service guarantees
- **Call Center**
  - Service level (% calls answered per unit time)
  - Call answer rate
  - Abandoned call rate
  - Busy signal rate
  - Average speed to answer
- **Safety**
  - OSHA statistics
  - Incidence rates for lost-time accidents
  - Employee injuries and illness rates
- **Field Service**
  - Appoints kept on time/within window
  - Average response time to emergency calls
  - Connect by guaranteed time
  - Customer satisfaction with service visit
  - Street light installation/replacement
  - Percent of first visit problem resolution
- **Billing and Complaints**
  - Complaint rates to regulators
  - Overall satisfaction
  - Accurate meter readings
  - Actual meter readings
  - Bill accuracy
  - Consecutive estimated bills
  - Bills not rendered monthly
  - Billing question response times
  - Complaint resolution times
  - Complaint response time
  - Power quality complaints

Quality of Service Plan (QSP)

Settlement	Year	Measure	Standard	Result	Bill Credit	Reward
First	1997	Telephone	70%	74%	$0	
		Complaints	0.8/1,000	0.38	$0	
		SAIDI	86	62.5	$0	$ 1.5 MM
Second	1998	Telephone	70%	74%	$0	
		Complaints	0.8/1,000	0.37	$0	
		SAIDI	83	78.9	$0	$0
	1999	Telephone	70%	74%	$0	
		Complaints	0.8/1,000	0.32	$0	
		SAIDI	79	83.8	$ 3 MM	
	2000	Telephone	70%	71%	$0	
		Complaints	0.8/1,000	0.32	$0	
		SAIDI	79	87.68	$ 2.1 MM*	
Fourth	2001	Telephone	70%	73%	$0	
		Complaints	0.8/1,000	0.66	$0	
		SAIDI	93	92.21	$0	
	2002	Telephone	70%	76%	$0	
		Complaints	0.8/1,000	0.67	$0	
		SAIDI	93	98.68**	$ 1.95 MM	
	2003	Telephone	70%	75%	$0	
		Complaints	0.8/1,000	1.11	$ 1.0 MM	
		SAIDI	93	304.3	$ 5.4 MM	
	2004	Telephone	70%	77%	$0	
		Complaints	0.8/1,000	0.69	$0	
		SAIDI	93	106.6***	$ 3.45MM***	

	Total	Telephone		$0	
		Complaints		$ 1.0 MM	
		SAIDI		$ 15.9 MM	$ 1.5 MM

- Introduced as a component of performance-based ratemaking
- Tied to mergers between Public Service Company of Colorado and other utilities
- Focus on reliability, complaints, and call center responsiveness

Electric QSP Framework

SAIDI

Average number of minutes of interrupted service experienced as sustained outages
(outages > 1 minute)

- Measures reliability
- Historically tracked for system operations
- Most common reliability measure nationally
- Calculable at various levels: feeder, substation, service area, total system

Telephone Response

Percent of calls answered within 45 seconds

- "Service level" measures the customer experience with PSCo's call center, the most typical point of contact for transactions aside from bills
- Historically tracked for system operations

Customer Complaints

Number of complaints per 1,000 customers

- Complaint rates
- Preliminary indicator to Commission for emerging service quality problems
- Historically tracked by Commission and reported to PSCo

Current QSP Provisions

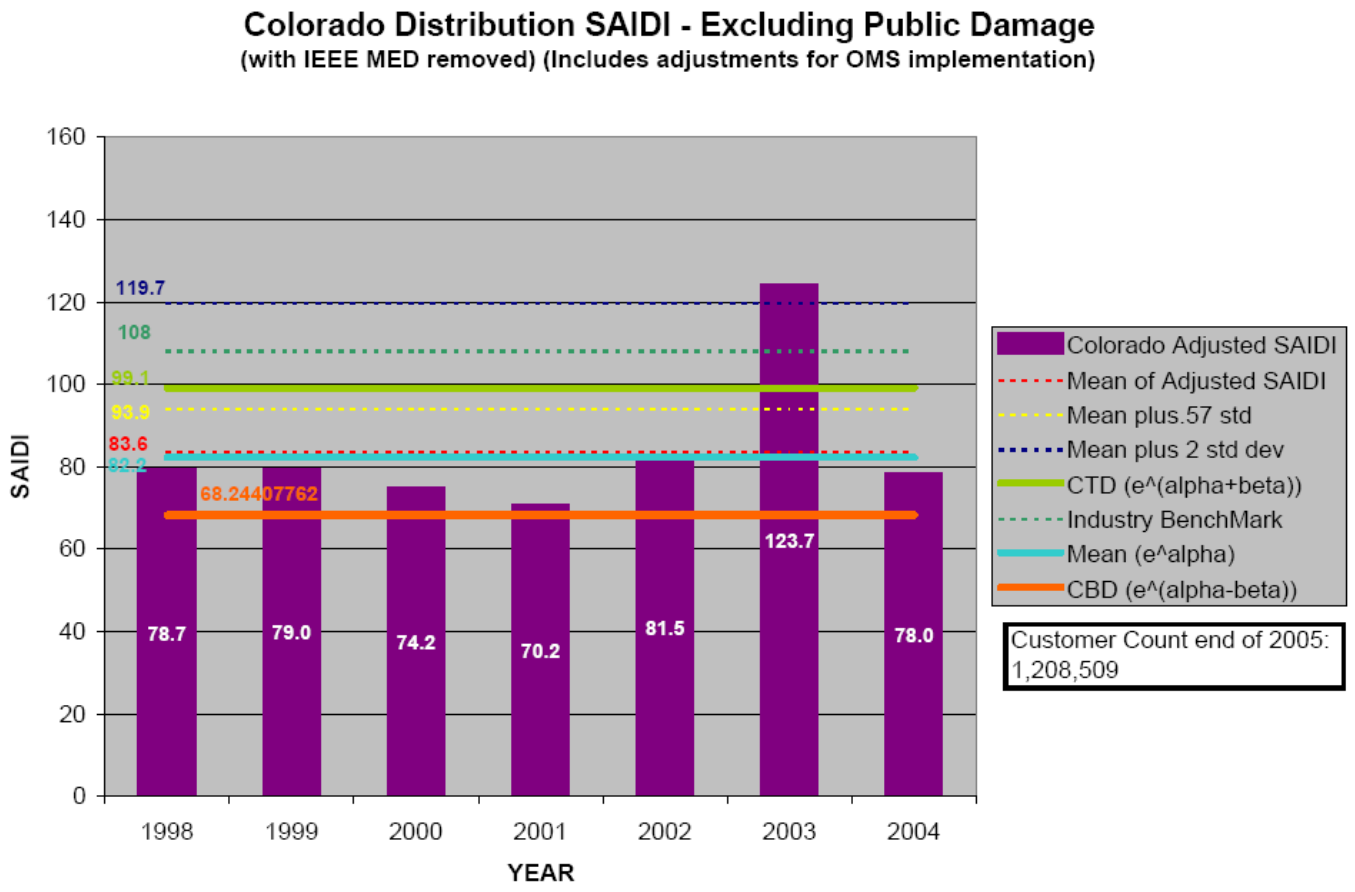
- The QSP shall be in effect for 2007 – 2010
- Customer Complaints: 0.8 complaints per 1,000 customers
- Telephone Response: 70% calls answered within 45 seconds
- Regional Reliability: SAIDI-ODI < Regional Warning Threshold (two years)
- Electric Service Continuity: No more than 5 sustained outages per year
- Electric Service Restoration: No more than a 24 hour outage per event
- Bill Credits

Customer Complaints	$1 million
Telephone Response	$1 million
Regional System Reliability	$7 million
Electric Service Continuity	$1 million
Electric Service Unavailability	$1 million
Total	$11 million

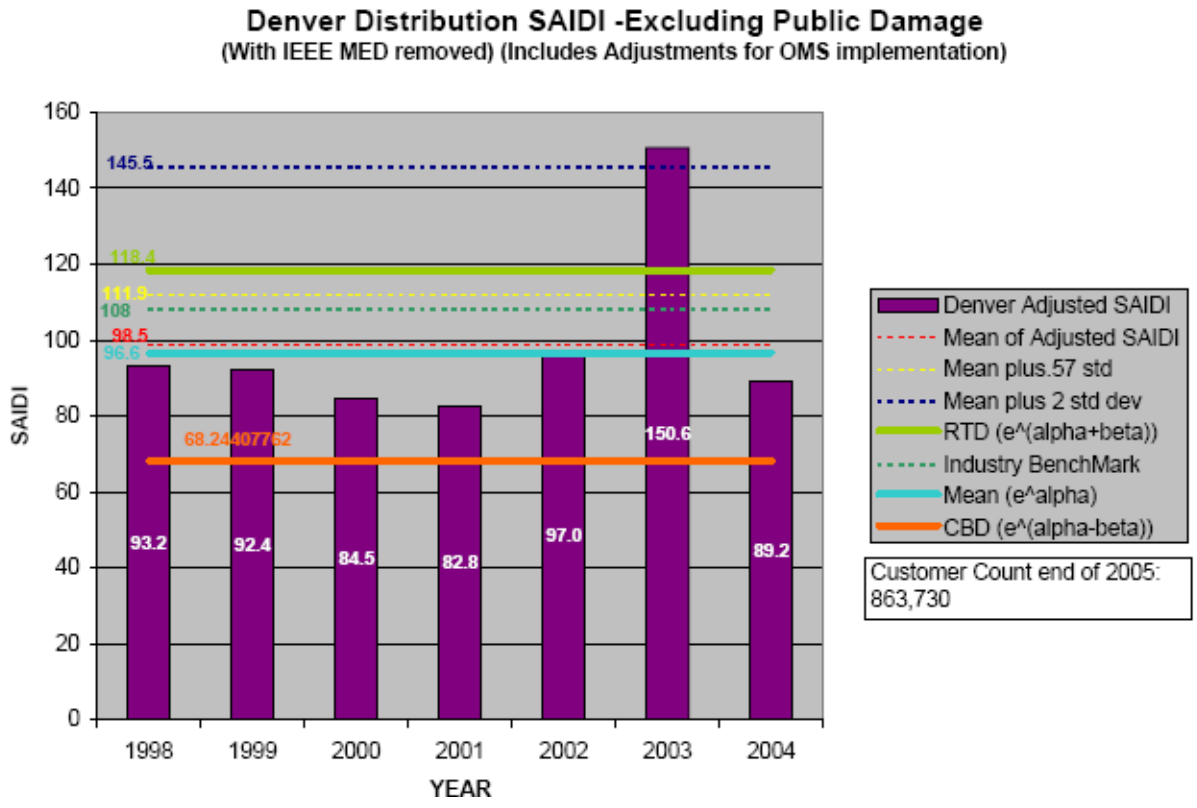
IEEE 1366

- IEEE 1366 Guide for Electric Power Distribution Reliability Indices introduced a statistically based definition for the classification of major outage events for the purpose of calculating SAIDI.
- IEEE is intended to provide a clearly view of distribution system performance on a daily basis, during major events, and for "performance years."
- Developed nationally by industry participants to improve the viability of cross-utility benchmarking
- "2.5 Beta methodology" identifies Major Event Days (MEDs)
  - MEDs are days when the daily system SAIDI exceeds a statistical threshold value
  - Allows for major events to be studied separately from daily operations to better reveal trends in daily operation that would otherwise be hidden by the statistical effect of major events
  - SAIDI data best represented by the log normal distribution
  - Improves the consistency of the calculation of SAIDI (and should reduce disputes over exclusions)
  - Provides regulators with a more accurate indication of a utility's controllable service quality results

Xcel Energy: System SAIDI

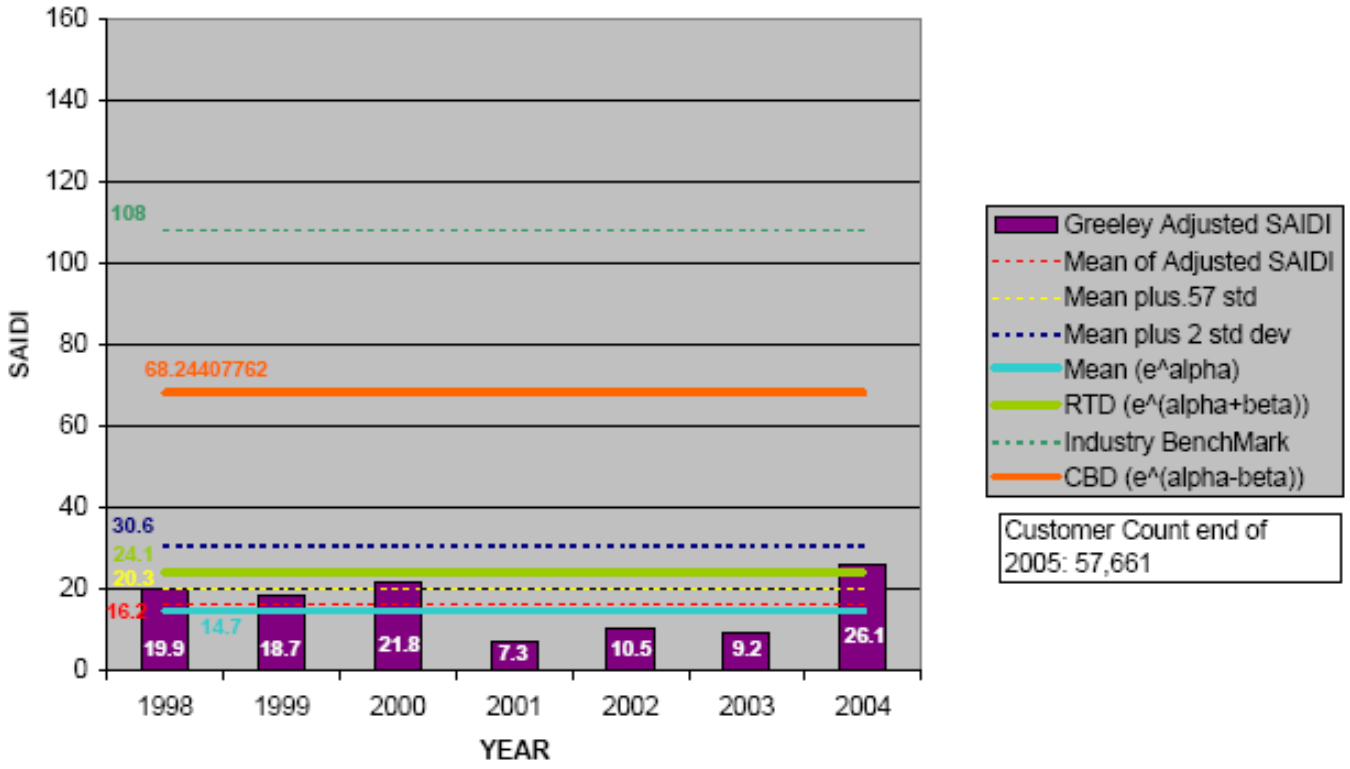


Denver Region SAIDI



Greeley Region SAIDI

Greeley Distribution SAIDI - Excluding Public Damage etc.
(With IEEE MED removed) (Includes adjustments for OMS implementation)



Customer-Focused Measures

- The new QSP introduces two customer-focused measures that provide $50 bill credits when reliability is poor.
- Electric Continuity– PSCo pays $50 bill credit to each customer in an OMS region who experiences > 5 interruptions
- Electric Restoration– PSCo pays $50 bill credit to each customer in an OMS region for each instance in which service not restored within 24 hours
- Excludes interruptions commencing on an MED and Public Damage interruptions
- Customers in non-OMS regions receive higher bill credits associated with SAIDI-ODI
- Corrects deficiency of old QSP where small bill credits paid to all customers, including those who received satisfactory service
- May highlight problem areas and the “worst-served customers”

QSP in Practice

- Xcel Energy subject to penalties for failing to meet certain standards
- QSP highlights service quality in a way that grabs media attention
- Dampened customer satisfaction stronger incentive than penalties

Xcel fights costly outages

Storm came just after $618,940 in fines for 2007-08

By Gargi Chakrabarty
The Denver Post

4/21

The weekend snowstorm that left thousands of customers without power for days comes less than three weeks after Xcel Energy was hit with major fines for failure to meet quality-of-service standards.

The state's largest utility is on track to pay $618,940 in penalties to 59,000 customers for prolonged outages in 2007 and 2008, according to an April 1 filing with the state Public Utilities Commission, which regulates Xcel.

About 22,500 Xcel customers lost power Saturday during a storm that dumped up to 3 feet in foothill communities. Outages included 11,000 homes in Evergreen, 7,000 in Boulder and

Consumer Complaints

- Commission hears complaints about utilities through telephone calls, email, and letters
- Utilities also take and respond to consumer complaints
- Complaints are often questions
- Database tracking
- Formal and informal resolution processes

Consumer Assistance Summary for Filed Contacts - Fixed Utilities

From: 7/1/2007 00:00:00 To: 6/30/2008 23:59:59

Name	Filed Consumer Contacts	Closed Contacts [A+B+C]:	Not in Compliance [A]	Request for Information [B]	Objections [C]	$ Saved
Other Water|WATER	22	22	0	20	2	0.00
Pacific Centrex Services, Inc.	1	1	1	0	0	246.82
Preferred Long Distance, Inc.	1	1	0	1	0	0.00
Primus Telecommunications, Inc.	1	1	1	0	0	0.00
Protel Advantage Inc.	1	1	0	0	1	20.25
Public Service Company of Colorado	1,149	1145	194	126	825	239,727.02
PUC	87	87	0	87	0	0.00
Qwest Corporation	573	586	43	272	271	14,921.04
Reduced Rate Long Distance, LLC	5	5	1	0	4	20.23
Rye Telephone Company	2	3	0	1	2	0.00
San Isabel Electric Association Inc	2	2	0	2	0	0.00
SILV COMMUNICATIONS, INC.	2	2	1	1	0	134.36
SourceGas Distribution LLC	58	53	24	6	23	9,634.18
South Park Telephone Company	1	1	0	1	0	0.00
Sovereign Telecommunications	1	1	0	1	0	0.00
Sprint Communications Company LP	23	25	8	11	6	3,825.54
Sprint Spectrum L.P.	11	11	0	11	0	145.26
Sunflower Telephone Company, Inc.	1	1	0	0	1	0.00
TDS Telecom	2	2	0	1	1	165.96
Tele Circuit Network Corporation	1	1	0	0	1	0.00
TeleUno, Inc.	2	2	1	0	1	24.22
T-Mobile West Corporation	3	3	0	3	0	0.00
Trinsic Communications, Inc.	3	3	0	1	2	0.00

d_cct_rslt_consumer_assist_summ_no_group | {Type(s):'ELECTRIC','GAS','MISCELLANEOUS','PUC','STEAM','TELEPHONE','WATER'} | 07/18/2008 09:07
Prepared by: PUC - Rey, Gladys | Page 4 of 5

Consumer Assistance Summary for Filed Contacts

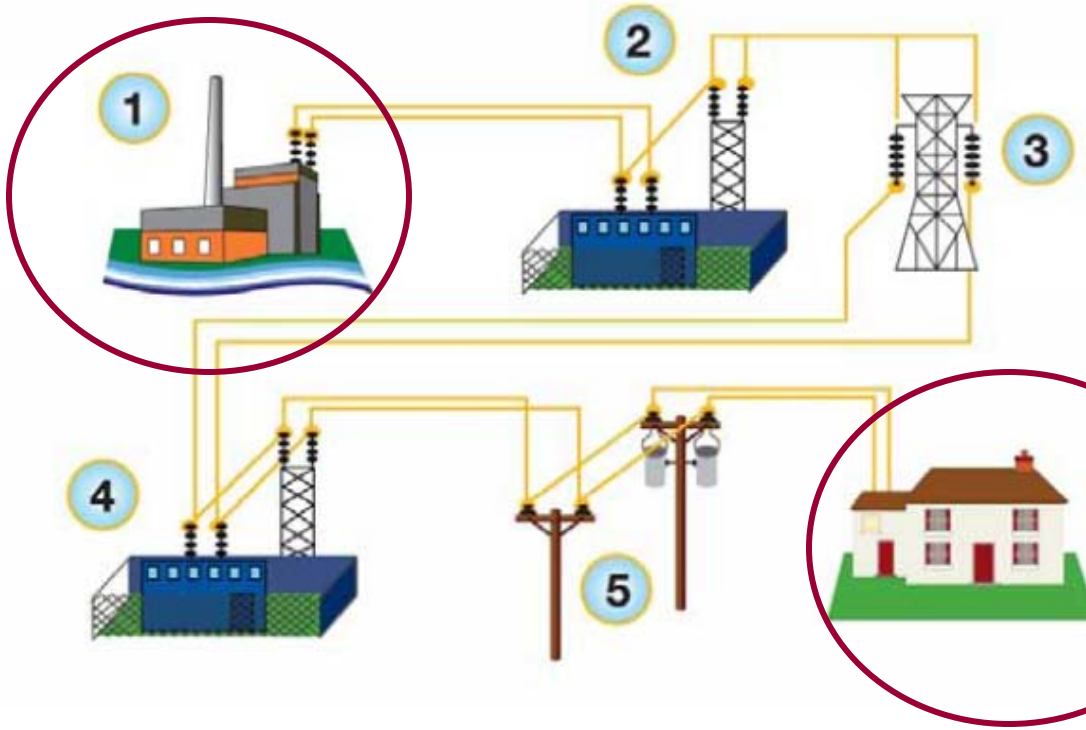
Utility Regulation Scorecard (1930s-1990s)

- Positives
  - Mobilized capital to build great machine to support society
  - Cheap, reliable, and ubiquitous power
- Negatives
  - Construction cost overruns
  - Poor (generating) plant performance
  - Inefficient retail pricing
  - Wide variations by region in price, performance, industry fragmentation
  - Little innovation
  - Growing negative environmental impacts

Potentially Competitive Elements

Wholesale Competition

Competitive Bidding for Supply



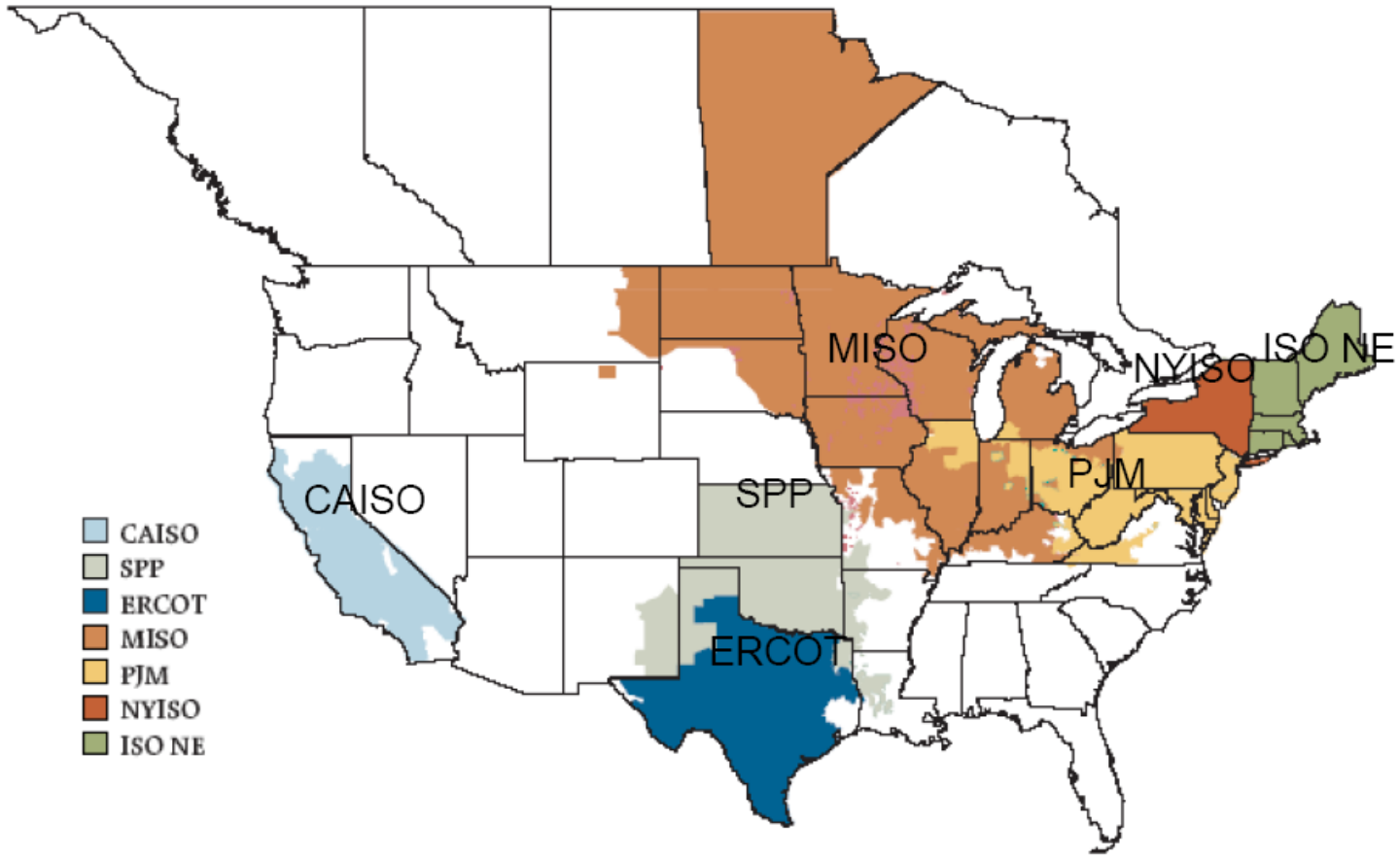
Retail Competition

Consumer Choice

Repeal of PUCHA 1935

- Congress repealed the repealed the Public Utility Holding Company Act (PUHCA) of 1935 and adopted PUHCA 2005 with Energy Policy Act of 2005
  - From “command and control regulatory policy
  - To increased reliance on capital markets and competitive forces
  - Eliminated Security and Exchange Commission’s controls over public utility holding company activities
  - Intended to facilitate market entry by new investment capital
- FERC has authority over holding company books and records and mergers
- State now has jurisdiction to regulate public utility member of affected holding company system

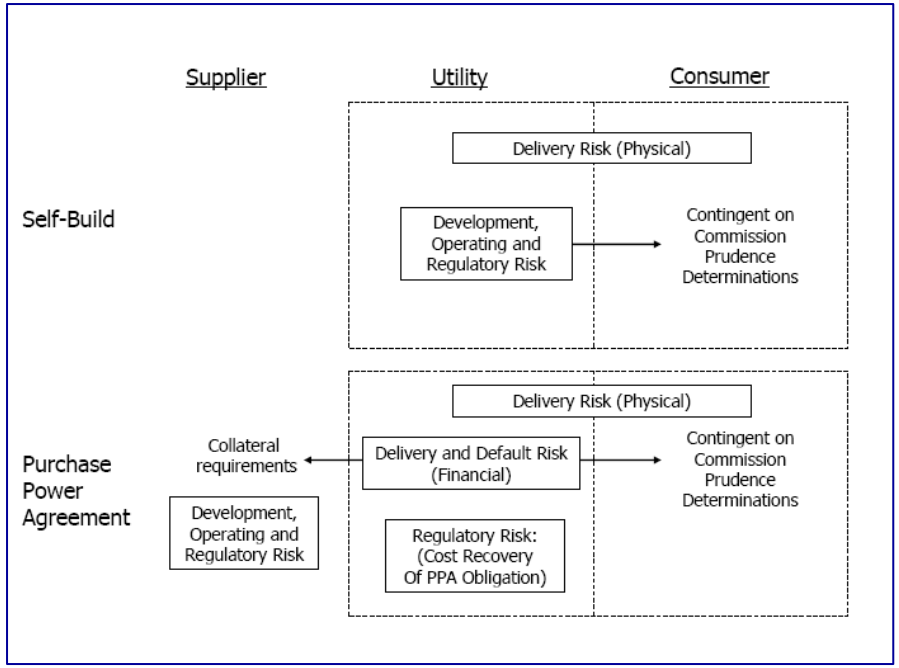
Organized Wholesale Markets



Source: FERC

Competitive Procurement

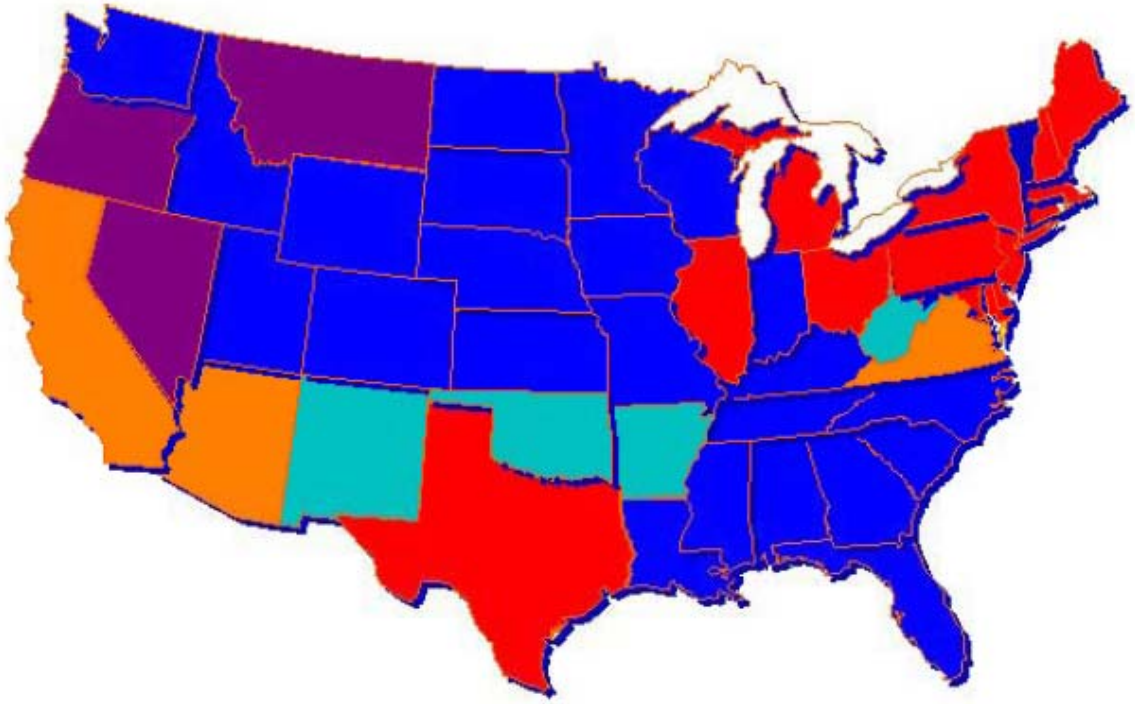
Self-Build and
Purchase Power Agreement Offers



Source: NARUC

- Competitive bidding used as the default means to acquire new generation resources
- Competition between bidders (IPPs and utilities) essential for acquiring resources at just and reasonable rates vis-à-vis unregulated entities
- Extremely challenging to establish and maintain a competitive environment

Retail Competition



- No Competition
- Retail restructuring repealed
- Retail competition for large customers
- Retail competition suspended
- Retail competition for all customers

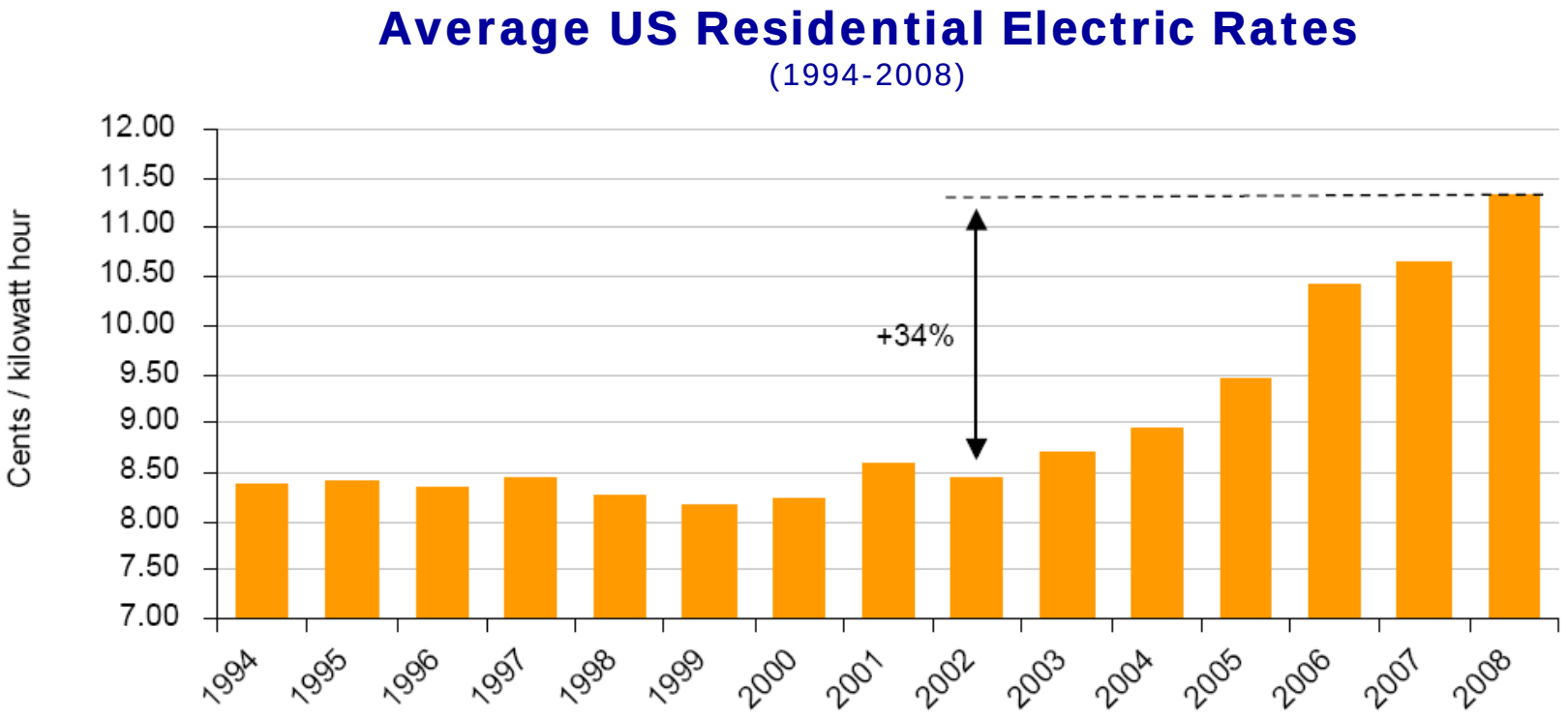
Source: Joskow

Effective (Workable) Competition

- "Workable" seldom defined
- Faith that market is on the path to perfection through design improvements
- Sufficient competition requires:
  - Efficient retail and wholesale prices
    - Hourly, marginal costs
  - Real open access to transmission and distribution networks
    - Non-discriminatory
    - Regulatory enforcement
  - Competitive procurement of new power supplies

Source: Kelly

Rise in Retail Rates Post Restructuring



Source: EIA, CRA International

Public Policy Case for Regulation

Public Policy Rationale

- Whether government regulation justified to mitigate economic performance problems in industry decided long ago
- Economic theory important each time society or "the market" asks whether an imperfect unregulated electricity markets better or worse than an imperfectly regulated market
  - Technology change
  - Political change (ideological)
  - Need for public financing absent ability to tax
  - Cross-subsidization among captive customers

Dimensions of Social Regulation

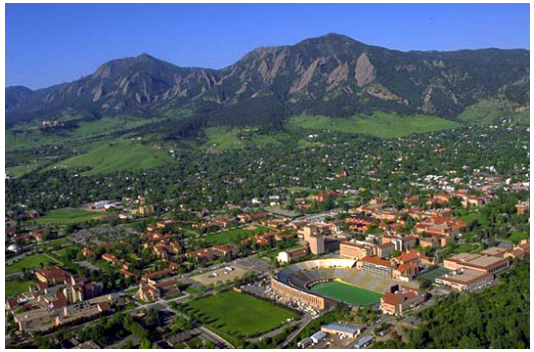
- Electric utility regulation has its roots in economic regulation but "social regulation" also important
  - Externalities increasingly significant– market transactions generate major external effects not reflected in the pricing of the transaction (pollution)
  - Imperfect information creates difficulty in market transactions (DSM)
  - Health, safety, environmental, consumer protection
- Chosen method of regulation stems, in part, from an economic analysis
  - *Ex post* (license) versus *ex ante* (performance standards)
  - Principal-agent theory: institutional and procedural arrangement selected based on efficacy and efficiency

Regulatory Compact

- Monopoly protections under entry and rate regulation in exchange for an obligation to serve load
  - Barriers to entry
  - Public interest ratemaking
  - Integrated resource planning

Regulatory Barriers to Entry

- Certificates of Public Convenience and Necessity
  - Service areas and franchise agreements
  - New transmission infrastructure
  - New generating plant



Exclusive right to serve Boulder

Permission to build and recover costs of new transmission lines

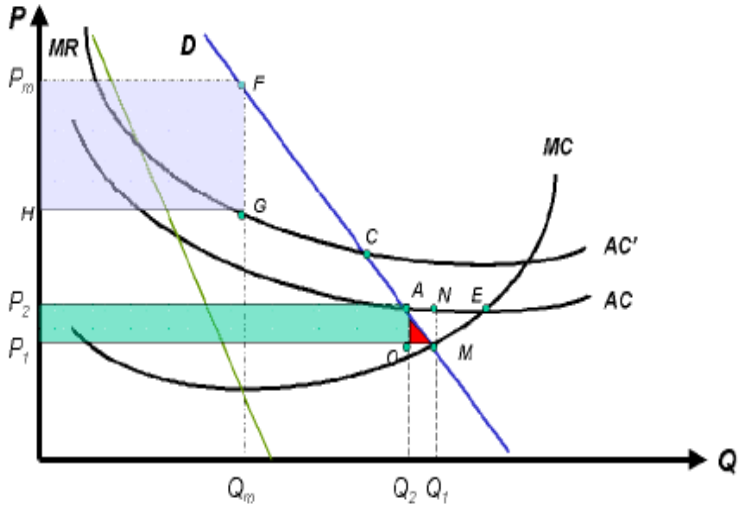
Permission to build and recover costs of new power plants

Public Interest Ratemaking

- Price setting process provides utility with adequate financial incentives to induce them to provide service
- Beyond that, the public interest considers the "just and reasonableness" of the rates
- Plus, regulators take into account the:
  - Affordability of service
  - Access to service (rural areas)
  - Public finance needs through rate revenues
  - Price discrimination where one group of customers subsidizes another group

Limits to Economic Regulation

- Applying economically efficient pricing determined through welfare maximization impractical and probably impossible
- Distributional issues surrounding costs and benefits usually more important that obtaining welfare maximization
- Experience shows:
  - Goals to improve efficiency should be modest
  - Scope of monopoly regulation should be narrow, allowing for competition where practical
  - Recognize that enforcing competition requires as much (if not more) effort by the regulator

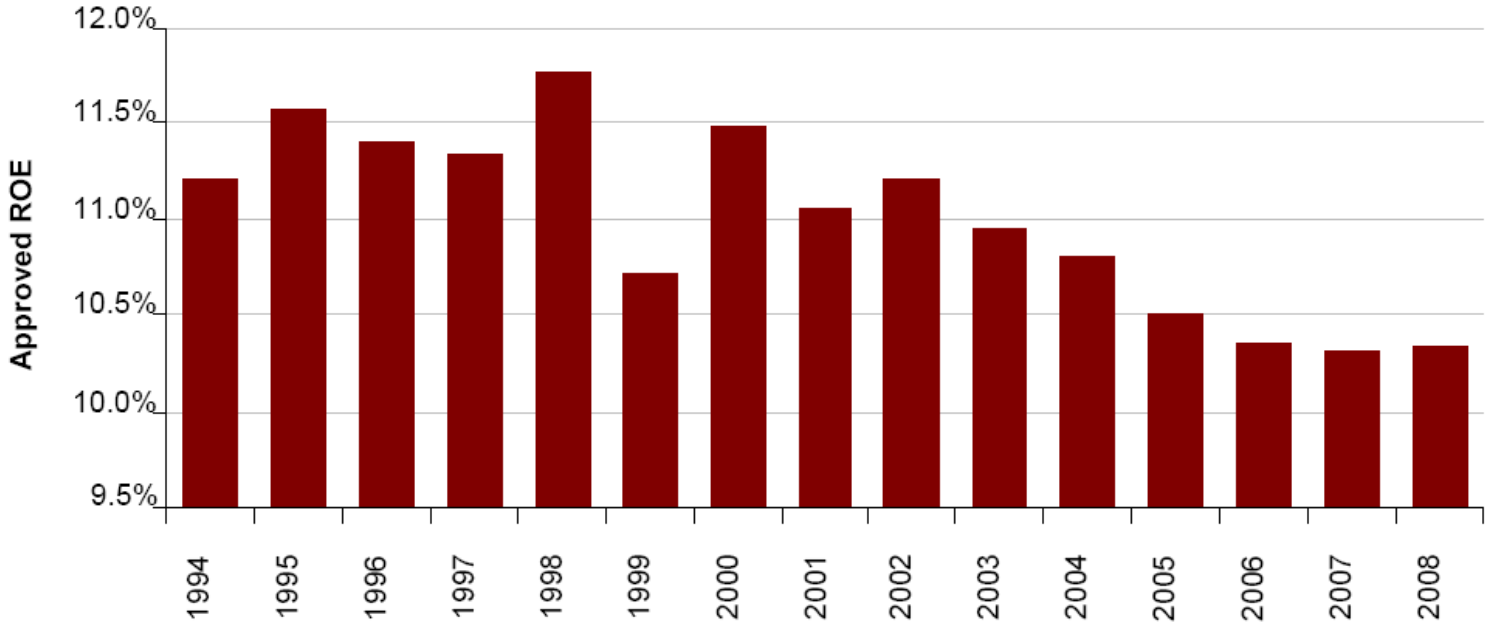


Source: Depoorter

Trends in Regulated Returns

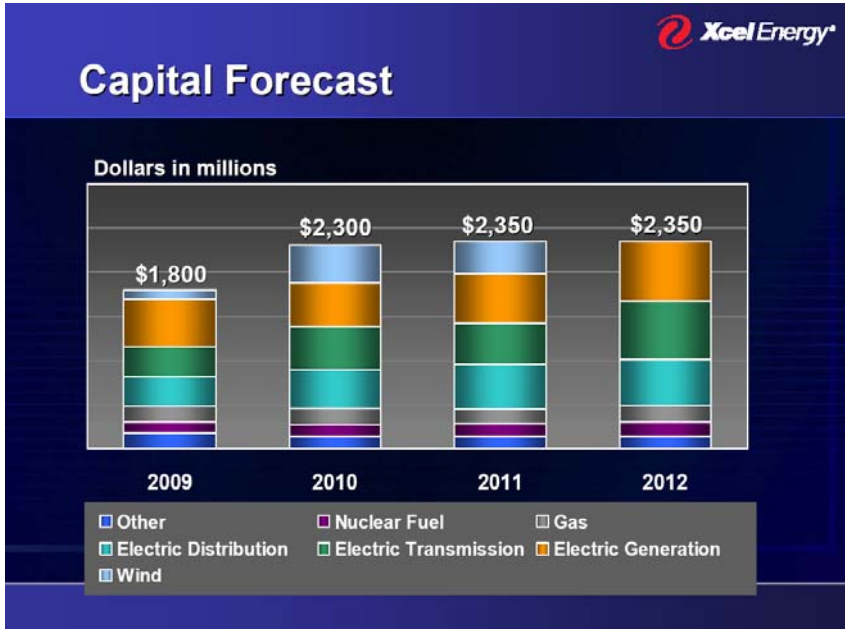
US Electric Rate Cases—Approved ROE

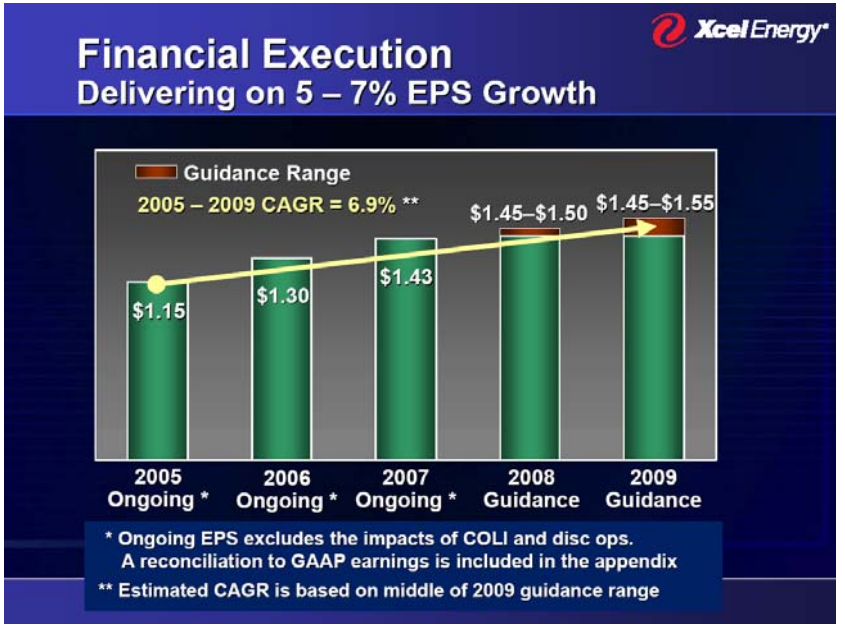
(1994-2008)



Source: Regulatory Research Associates, CRA International

Utility Growth Through Investment

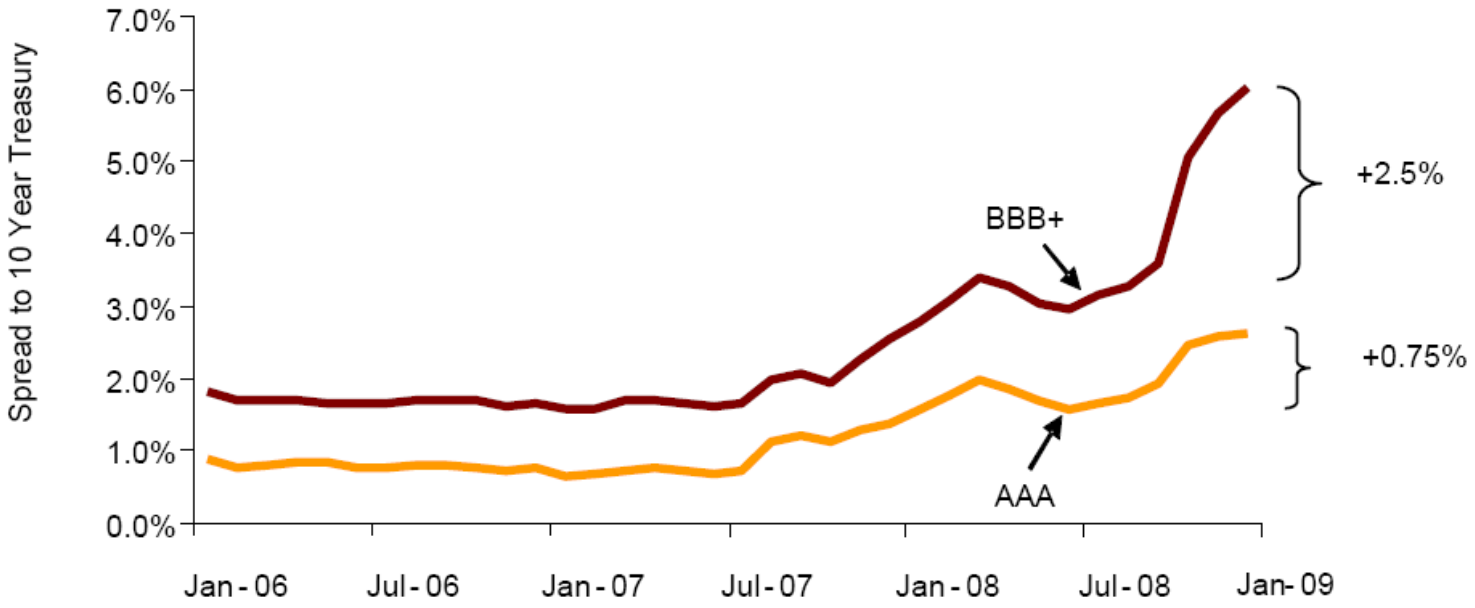




Source: Xcel Energy Website

New Pressures from Credit Crisis

Treasury Spreads to AAA and BBB+ Rated Debt



Source: CRA International

Other Public Policy Challenges

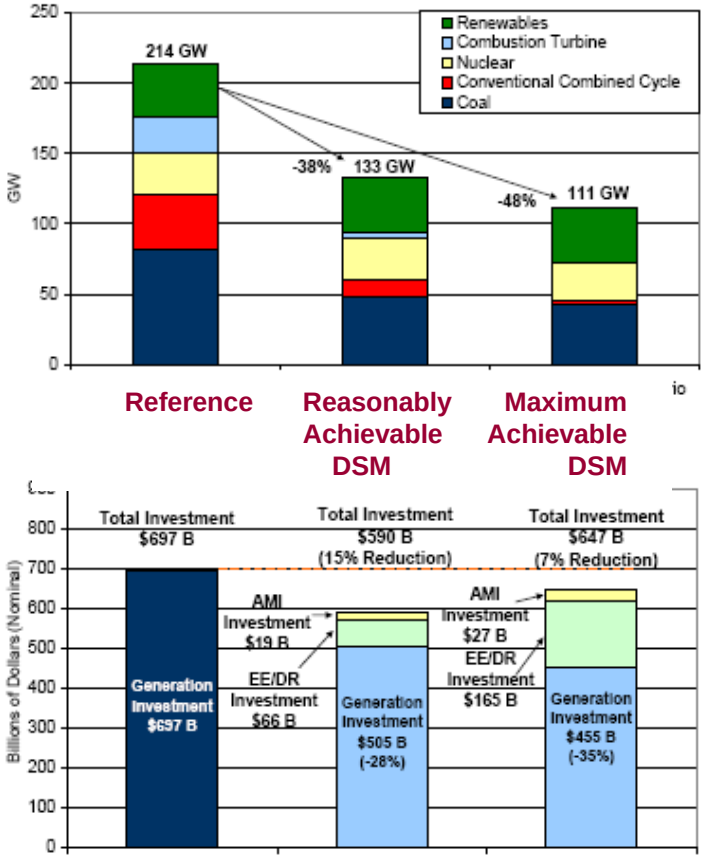
- Uncertain demand for electricity– but likely to grow again in near future
- Increasing costs of new utility generation
- Fuel prices
- Carbon risk
- Rising utility bills
- Aging infrastructure and aging workforce
- Regulatory fatigue: sequential sizeable requests for rate relief leads to greater scrutiny and disallowances

(Integrated) Resource Planning

- Systematic review of future generation needs and the utility's ability to meet them
  - Load forecasts (numbers of customers, demand, sales)
- Acquisition process for acquiring new utility resources (generation and transmission)
- Historically a least-cost paradigm
- Competitive bidding
  - Unregulated wholesalers (independent power producers)
  - "Buy versus Build" debate
- Resources: demand-side versus supply-side
- Externalities– emissions and "non-energy benefits"
- Cost-effective: "reasonable cost and rate impact"

Supply – Demand Balance

Impacts of DSM on Generation Build



Source: The Brattle Group

- By 2030, US would need total infrastructure investment of $1.5 - $2 trillion
- A supply-side focus would entail 214 GW of additional generation ($670 million)
- Significant reductions in generation investment possible with investment in DSM
  - Smart grid
  - Energy efficiency
  - Demand response
- DSM most effective if carbon regulation assumed

Political Economy Dimensions

- Role of regulator extends far beyond price and entry regulation to correct for market failures
- Regulatory process introduces political dynamics through lobbying among various interest groups
  - Governor, legislators, executive directors, staff
  - Utilities, utility vendors, consultants
  - Ratepayer advocates (residential, large commercial)
  - Environmental organizations
  - Independent power producers
  - Retail marketers, small generation providers (solar)
- Due process procedures (rules of practice) and the courts serve as checks

Decision-Making Dynamics

- No regulatory agency completely independent of political influences
- Public interest regulation conveys costs and benefits on groups as compared to alternatives
- Regulatory results often a function of:
  - Sophistication of utility's regulatory strategy
  - Stakeholder groups' ability to organize
  - Available resources to participate effectively in:
    - Governmental institutions' decision making (legislative, executive, judicial)
    - Regulatory proceedings
    - Settlement negotiations

Regulatory Philosophies

- Each Commissioner and each member of the Staff holds his or her own regulatory philosophies
- Does the regulator "fix an outcome" or does the regulator "enforce the rules?"

Public Policy Snapshots

- Ability to Pay / Energy Poverty
- Reducing Barriers to Energy Efficiency
- Induced Market Development

Ability to Pay for Service

- Household Energy Security
  - Access to enough energy for a healthy and safe life
  - Ability to heat/cool home and operate lighting, refrigeration, and appliances
  - Ability to afford other necessities beyond energy:
    - Housing (rent)
    - Food
    - Clothing
    - Transportation
    - Medical care

Energy Outreach Colorado

Energy $aving Partners

E$P

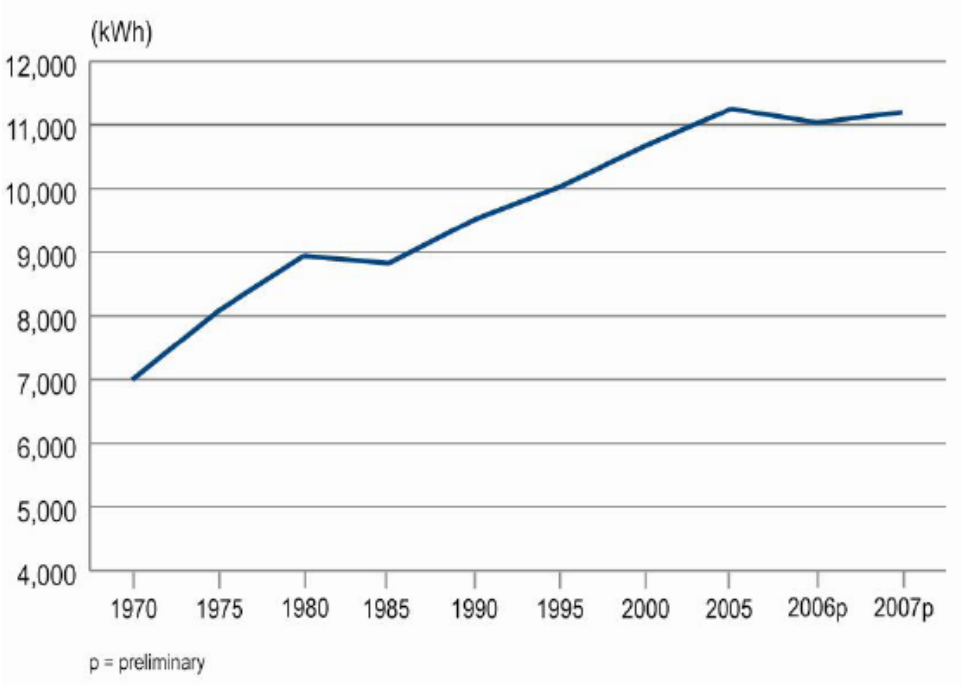
PUBLIC SERVICE ENERGY ASSISTANCE PILOT (PEAP)

Xcel Energy®
RESPONSIBLE BY NATURE™

- Insecurity measured by disconnect notices, shut offs, and days without heating or cooling

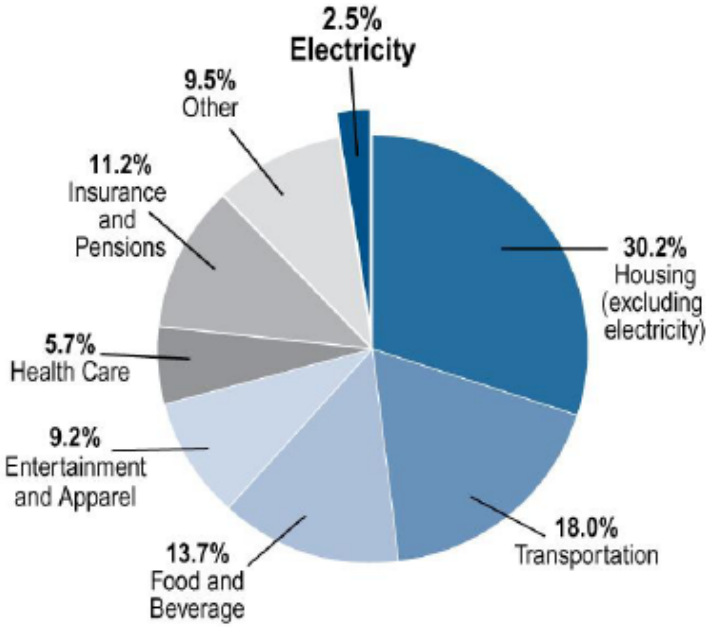
Small "Wallet Share" for Most

Average Household Annual Electricity Usage



Average Household Expenditures

(2005)



Source: EEI

Barriers to Energy Efficiency

- Lack of information
- Lack of interest
- Insufficient funding
- Suspicions about efficiency as a resource
- Ratemaking policies that discourage utility investment

National Action Plan for Energy Efficiency

Recommendations

1. Recognize energy efficiency as a high-priority energy resource.
2. Make a strong, long-term commitment to implement cost-effective energy efficiency as a resource.
3. Broadly communicate the benefits of and opportunities for energy efficiency.
4. Provide sufficient, timely and stable program funding to deliver energy efficiency where cost-effective.
5. Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments.

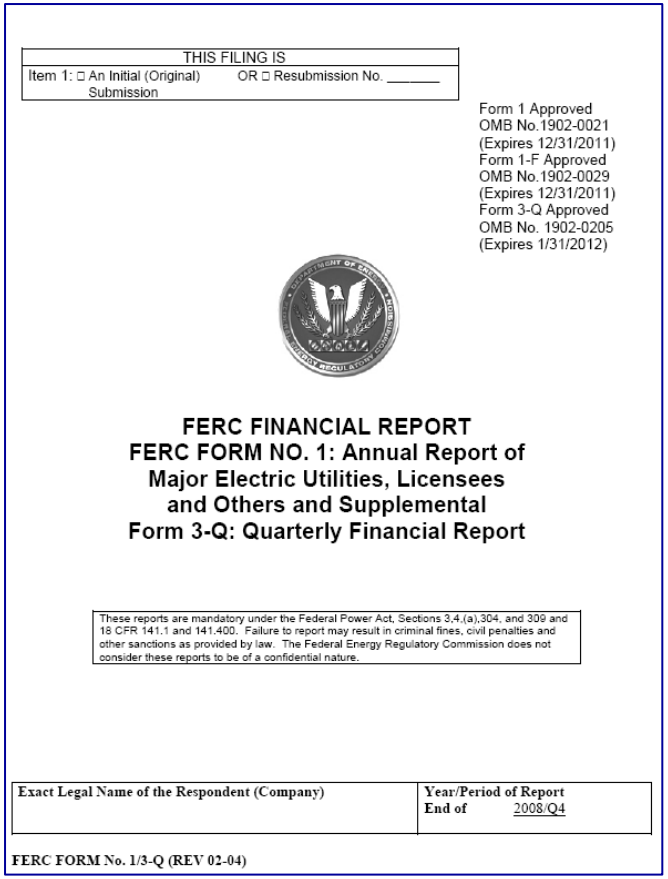
Induced Market Development

- On-site solar market
  - Renewable Energy Standard set asides
  - Statutory standard rebates
- New clean energy technologies
  - Set aside for concentrating solar thermal with storage
- Economic stimulus funding
  - Technology subsidies (tax policy)
  - Investment expenditures
  - Job training

Regulatory Tools

Uniform System of Accounts

- Cost-reporting protocols
- Specific accounting rules for reporting capital expenditures and operating costs
  - Capital asset valuation
  - Depreciation schedules
  - Taxes
  - Ongoing operating cost categories (cost of sales, salaries, benefits, incentives)
  - Allocation of costs between lines of business (regulated and unregulated)
  - Financial instruments (think Enron)



THIS FILING IS

Item 1: ☐ An Initial (Original) Submission OR ☐ Resubmission No. _____

Form 1 Approved
OMB No.1902-0021
(Expires 12/31/2011)
Form 1-F Approved
OMB No.1902-0029
(Expires 12/31/2011)
Form 3-Q Approved
OMB No. 1902-0205
(Expires 1/31/2012)

FERC FINANCIAL REPORT
FERC FORM NO. 1: Annual Report of Major Electric Utilities, Licensees and Others and Supplemental Form 3-Q: Quarterly Financial Report

These reports are mandatory under the Federal Power Act, Sections 3,4,(a),304, and 309 and 18 CFR 141.1 and 141.400. Failure to report may result in criminal fines, civil penalties and other sanctions as provided by law. The Federal Energy Regulatory Commission does not consider these reports to be of a confidential nature.

Exact Legal Name of the Respondent (Company)	Year/Period of Report End of 2008/Q4

FERC FORM No. 1/3-Q (REV 02-04)

The FERC Form 1

- Three-digit whole number system by cost category
- Consistent, year-to-year record keeping
- Accounts create income statements and balance sheets
- Accounts feed into ratemaking "models"

100-199	**Assets and other debits**
200-299	**Liabilities and other credits**
300-399	**Plant accounts**
400-432; 434-435	**Income accounts**
433; 436-439	**Retained earnings accounts**
440-459	**Revenue accounts**
500-599	**Production, Transmission, and Distribution accounts**
900-949	**Customer, Customer Service and Information, Sales, and Administrative and General Expenses**

Standard Financial Filings

- Annual reports
- Annual and quarterly financial statements

PUBLIC SERVICE CO. OF COLORADO AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF INCOME
(amounts in thousands of dollars)

	Year Ended Dec. 31		
	2008	2007	2006
Operating revenues			
Electric	$ 2,982,929	$ 2,605,388	$ 2,505,445
Natural gas	1,373,732	1,186,106	1,262,295
Steam and other	36,383	36,006	38,089
Total operating revenues	4,393,044	3,827,500	3,805,829
Operating expenses			
Electric fuel and purchased power	1,818,772	1,435,680	1,489,714
Cost of natural gas sold and transported	994,221	831,826	938,380
Cost of sales — steam and other	15,507	15,646	21,043
Other operating and maintenance expenses	605,008	607,467	569,059
Demand-side management program expenses	32,990	18,010	15,860
Depreciation and amortization	252,384	247,232	224,056
Taxes (other than income taxes)	84,597	85,261	88,878
Total operating expenses	3,803,479	3,241,122	3,346,990
Operating income	589,565	586,378	458,839
Interest and other income (expense), net	16,748	(2,400)	(14,223)
Allowance for funds used during construction — equity	36,158	14,179	2,650
Interest charges and financing costs			
Interest charges — includes other financing costs of $5,754, $5,599 and $6,029, respectively	154,313	180,230	137,493
Allowance for funds used during construction — debt	(18,266)	(13,324)	(13,386)
Total interest charges and financing costs	136,047	166,906	124,107
Income before income taxes	506,424	431,251	323,159
Income taxes	166,628	134,357	81,701
Net income	$ 339,796	$ 296,894	$ 241,458

See Notes to Consolidated Financial Statements

Public Utility Regulation

Summary of Regulatory Agencies and Areas of Juris
rates, accounts, services and issuance of securities. PS
operations, accounting practices, hydroelectric licensin
interstate commerce. PSCo has received authorization
prices; however, PSCo withdrew its market-based rate
company control areas.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE
934
ended December 31, 2008

Or

ION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES
GE ACT OF 1934
umber 001-03280

PUBLIC SERVICE COMPANY OF COLORADO
(Exact name of registrant as specified in its charter)

Colorado	84-0296600
State or other jurisdiction of Incorporation or organization	(I.R.S. Employer Identification No.)

1225 17th Street, Denver, Colorado 80202
(Address of principal executive offices)

Registrant's Telephone number, including area code: 303-571-7511

Securities registered pursuant to Section 12(b) of the Act: None

Securities registered pursuant to section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
☐ Yes ☒ No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.
☐ Yes ☒ No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. ☒ Yes ☐ No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulations S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and " smaller reporting company" in Rule 12b-2 of the Exchange Act.

☐ Large accelerated filer ☐ Accelerated filer ☒ Non-accelerated filer ☐ Smaller Reporting Company
(Do not check if a smaller reporting company)

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). ☐Yes ☒ No

As of March 2, 2009, 100 shares of common stock, par value $0.01 per share, were outstanding, all of which were held by Xcel Energy Inc., a Minnesota corporation.

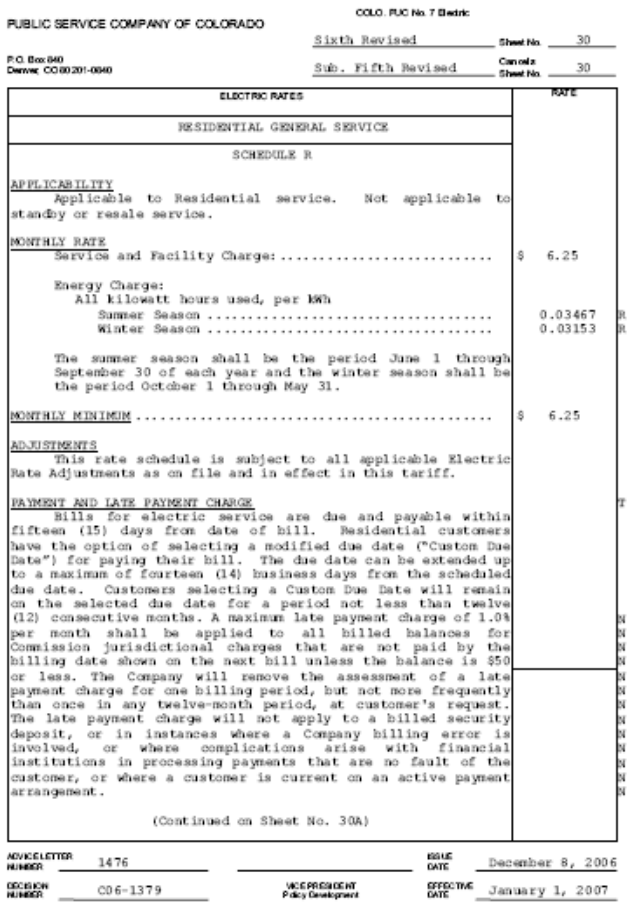
DOCUMENTS INCORPORATED BY REFERENCE

Xcel Energy Inc.'s Definitive Proxy Statement for its 2009 Annual Meeting of Shareholders is incorporated by reference into Part III of this Form 10-K.

Public Service Company of Colorado meets the conditions set forth in General Instructions I(1)(a) and (b) of Form 10-K and is therefore filing this form with reduced disclosure format permitted by General Instruction I(2).

Tariffs

- The contract between the utility and the consumer
- Establishes prices
  - Charges are fixed and nonnegotiable until next rate case
  - Customers must be served at these prices
- Sets forth terms and conditions for service
  - Defines obligations on both sides of the meter
- Changes require regulatory approval



PUBLIC SERVICE COMPANY OF COLORADO

COLO. PUC No. 7 Electric

P.O. Box 840
Denver, CO 80201-0840

Sixth Revised Sheet No. 30
Sub. Fifth Revised Sheet No. 30

ELECTRIC RATES	RATE
RESIDENTIAL GENERAL SERVICE	
SCHEDULE R	
APPLICABILITY Applicable to Residential service. Not applicable to standby or resale service.	
MONTHLY RATE Service and Facility Charge:	$ 6.25
Energy Charge: All kilowatt hours used, per kWh Summer Season	0.03467 R
Winter Season	0.03153 R
The summer season shall be the period June 1 through September 30 of each year and the winter season shall be the period October 1 through May 31.	
MONTHLY MINIMUM	$ 6.25
ADJUSTMENTS This rate schedule is subject to all applicable Electric Rate Adjustments as on file and in effect in this tariff.	
PAYMENT AND LATE PAYMENT CHARGE Bills for electric service are due and payable within fifteen (15) days from date of bill. Residential customers have the option of selecting a modified due date ("Custom Due Date") for paying their bill. The due date can be extended up to a maximum of fourteen (14) business days from the scheduled due date. Customers selecting a Custom Due Date will remain on the selected due date for a period not less than twelve (12) consecutive months. A maximum late payment charge of 1.0% per month shall be applied to all billed balances for Commission jurisdictional charges that are not paid by the billing date shown on the next bill unless the balance is $50 or less. The Company will remove the assessment of a late payment charge for one billing period, but not more frequently than once in any twelve-month period, at customer's request. The late payment charge will not apply to a billed security deposit, or in instances where a Company billing error is involved, or where complications arise with financial institutions in processing payments that are no fault of the customer, or where a customer is current on an active payment arrangement.	T N N N N N N N N N N N N
(Continued on Sheet No. 30A)	

ADVICE LETTER NUMBER 1476
DECISION NUMBER C06-1379
VICE PRESIDENT Policy Development
ISSUE DATE December 8, 2006
EFFECTIVE DATE January 1, 2007

Qualities of an Effective Regulator

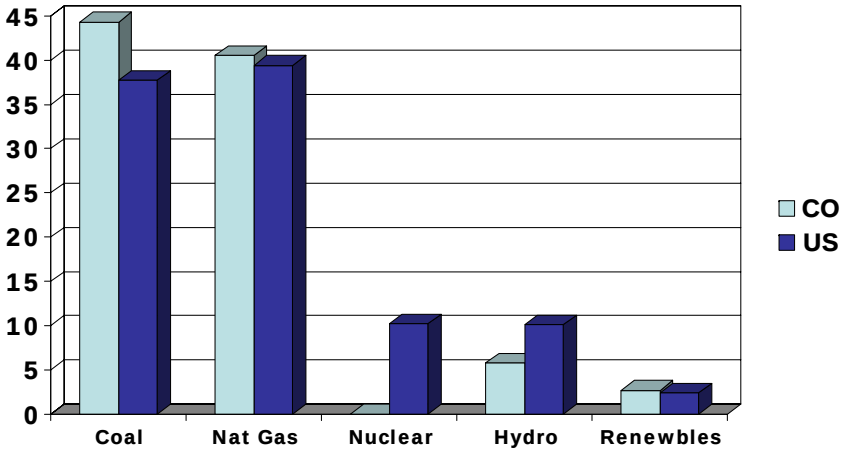
Qualities of an Effective Regulator

- Autonomy
  - Rule of law, not unduly political, fair
  - Free standing agency and cash funded through assessments
  - Free to make own final decisions (subject to appellate process)
- Authority
  - Broad
  - Adjudicative, Enforcement, Rulemaking, Administrative
- Accountability
  - Good practices, good governance
  - Makes few mistakes, corrects mistakes quickly
  - Accountable in different ways to legislature, courts, and governor

Credibility and Longevity

- Once costs are “sunk,” the electric utility expects the regulatory to “hold them up”
- Long-term credibility essential to give utilities confidence
- Fear of industry restructuring led to significant development of third-party gas production in Colorado in mid to late 1990s

Percent of MW Capacity
(2006)



% of Total Generation from Natural Gas
(Based on MWh)

1993	1997	2002	'93 - '02
4.4%	8.7%	19.8%	44.0%

Source: Energy Information Administration

High Equity Investor Appraisal

Normal Distribution Rankings of State Utility Commissions

Tier 1 "Most Shareholder Oriented"				Tier 5 "Most Consumer Oriented"
		Arkansas		
		District of Columbia		
		Idaho		
		Illinois		
		Kansas		
		Maine		
		Maryland		
		Michigan		
		Mississippi		
		New York		
		North Carolina		
		North Dakota		
	Delaware	Oklahoma	California	
	Florida	Oregon	Connecticut	
Alabama	Georgia	Rhode Island	Hawaii	Arizona
Colorado	Iowa	South Carolina	Louisiana	Nevada
Indiana	Massachusetts	South Dakota	Minnesota	New Hampshire
Kentucky	New Jersey	Texas	Missouri	New Mexico
Ohio	Pennsylvania	Virginia	Montana	Vermont
Wyoming	Wisconsin	Washington	Utah	West Virginia

Source: Lehman Brothers (2004)

- Elected versus appointed commissions
- Incentives to perform and share the benefits with customers
- Relatively generous allowed Returns on Equity (ROEs), e.g., based on last five rate cases relative to 10-year treasury notes
- Tendency for settlement
- Relatively low rate levels, thus lower the potential for regulatory fatigue
- A favorable track record, Staff reputation and influence, and ability to recognize and address emerging trends

High Debt Investor Appraisal

Public Service Company of Colorado
Support for Credit Quality Upfront; A Viable Model for the Electric Industry?

As more and more U.S. electric utilities plan for additional generation capacity in the next few years, managements must consider strategies that will gain them the support of many diverse constituencies, many of whom will otherwise assuredly oppose their related rate requests before state regulators.
A recent example of a successful outcome in this respect is a late 2004 agreement that the Colorado Public Utility Commission (CPUC) approved between Public Service Co. of Colorado (BBB/Stable/--) and the major groups representing environmentalists and the utility's customers.
Among other things, this Comprehensive Settlement Agreement was specifically designed to ensure that the utility's credit profile does not weaken as a result of pending stress related to its sizable construction program.
With this agreement, PS Colorado has effectively addressed the future costs associated with adequate supply and environmental compliance with a plan that will permit timely recovery of those costs. This is a major step forward in eliminating the tug-of-war over cost recovery that, in the past, has plagued the credit of so many utilities when the time comes to build again.
The major points of the settlement that concern credit quality are:

- PS Colorado will be allowed to increase equity up to 60% of capital to reflect the economic cost incurred by its existing purchased-power contracts,
- PS Colorado will be allowed to add "construction work in progress" (CWIP) to rate base in amounts that will be determined by current senior unsecured debt ratings and the capital structure,
- Plant construction costs (up to a confidential cap) and environmental control costs related to the 750 MW coal-fired Comanche Project are deemed prudent and are recoverable in rates, and
- The major costs associated with implementing this agreement are to be deemed prudent and recoverable in rates.

Source: Standard & Poors (2005)

Institutional Underpinnings

- Public utility law
  - Operation of contracts
  - Constitutional protections
  - Defined scope of regulation of monopolies
  - Due process and transparency
  - Judicial review
- License fee funding
  - Independence from government and industry
- Staff of civil servants
  - Neutrality vis-à-vis decision-makers
  - Professional with expertise

Information Gathering Powers

- Reporting requirements
  - Annual financial reports (SEC 10-Ks, FERC Form 1s)
  - Production reports (system supply)
  - Service quality reports (outages, complaints, metering)
  - Miscellaneous reports (RESA budget, street lighting)
- Audit and inspection
  - Books, records, assets
  - Verification and litigation
- Subpoenas
  - Enforceable by courts
- Voluntary
  - Just ask!

Electric Service Reliability Reports

- Quarterly Reports: SAIDI, SAIFI, and CAIDI values for each classification of interruption for each operating region (April 1-Annual; 15th of May, August, November)
  - Electronic copy of outage reporting database used to calculate indices
  - If SAIDI-ODI > RWT for previous year, monthly reports filed for region
  - Customer Complaints and Telephone Response, Electric Continuity, and Electric Restoration
- Annual Reports: In addition to above:
  - Narrative of reliability management activities for prior year and upcoming year
  - Distribution Feeder Unavailability Summary
  - Frequent Sustained Interruptions Annual Summary
  - Electric Service Restoration Annual Summary
  - Regional Electric Service Reliability Remediation Summary if SAIDI-ODI > RWT in single year
  - Substation Power Transformer Failure Report
- Bulk Power System Disturbance Report DOE Form OE-417
- Voice of Customer– Transaction Study
- Customer Call Center Notification if event results in busy signal to > 10% calls in hour

Public Hearings

- Interested stakeholders permitted to participate
  - Formally through intervention in the regulatory process (with or without legal counsel)
  - Informally for obtaining feedback from consumers
- Information and evidence used in decision-making part of the public record available for public inspection
  - Some exceptions include personnel records, material used by the Commission in preparation for litigation, trade secrets, security matters, draft and advisor documents used in preparation of a final decision
- "Sunshine Laws"
  - Statutory prohibitions on non-public meetings to discuss matters pending before the Commission

Solving Technical Challenges

- Regulators best at addressing technical challenges
  - Agreement on existence of an issue and on the nature of the problems
  - Alternative solutions are identifiable by technical experts
  - Solutions can be implemented
  - Decisions can be made through traditional hearings and legal proceedings
  - Negotiations often suitable

Source: Jamison, Rowe, and Perlman

Getting on the Balcony

- Seeing “what is going on” outside of the regulator’s usual range of vision
- Understanding the causes that underlay each stakeholder group
  - Often not evident by the formal positions they take in formal proceedings
- Workshops, investigations, and dialogues facilitate learning but can be very awkward
- Avoid marginalizing capable staff during important debates
- Ensure work is being done by staff willing to learn and rethink their traditions

Source: Jamison, Rowe, and Perlman

Regulator Vulnerabilities

- Commissioner and senior staff appointments or re-appointments depend on general policy views that are acceptable to the Governor
- Regulators may have career ambitions
- Staff may be underfunded, weak, time constrained, and morale troubled (furloughs)
- Information may be asymmetric or insufficient
- Ex parte rules may not be enforceable
- Administrative process is too slow
- Illicit sale of political influence (industry capture)

Fuel Clause

Basic Rate Mechanisms

- Base rates recover:
  - Expenses such as operations, maintenance, administrative, general expenses, taxes, and depreciation
  - Returns on rate base (RoR)
  - Not fuel expenses and not purchased energy expenses
- Adjustment clauses recover:
  - Fuel (coal and natural gas)
  - Purchased energy (from IPPs through long-term Purchased Power Agreements or PPAs) and from others through short-term market purchases
  - Purchased capacity (from IPPs through long-term PPAs)
  - Energy efficiency
  - Renewables

Reconciliation to Actual Costs

- Base rate revenues generally not reconciled with actual costs incurred
- Adjustment clauses generally fully reconcilable with actual costs incurred
  - Riders set at levels to recover current levels of costs
  - Based on projections made before rate takes effect

Electricity Bill

- Base rates:
  - Customer charge — $/month ($/bill)
  - Usage charge — $/kWh
  - Demand charge — $/kW (large customers)
- Adjustment clauses:
  - Electric Commodity Charge (ECA) — $/kWh (fuel clause)
  - Purchased Capacity Charge (PCCA) — $/kWh or $/kW
  - DSMCA — $/kWh or $/kW
  - Renewables — 2% of sum of above

Generation Revenue Requirements

- Base rates
  - Net generation plant $1.7 billion
  - Return on net generation plant ~ $125 million
  - $181 million expenses for operations and maintenance

- Adjustment clauses
  - ECA
    - $500 million fuel
    - $676 million purchased energy
  - PCCA: $390 million
  - DSMCA: $50 million
  - Renewables Surcharge: $50 million

Initial ECA

- Recovered fuel costs
  - Coal for utility-owned plants
  - Natural gas for utility-owned and IPP plants
- Purchased energy
  - From IPPs with long-term PPAs
  - From others with short-term economic energy purchases
- Uniform $/kWh charge for all customers
- Changed annually
- Interim changes if over or under recoveries of $40 million or more

Current ECA

- Recovers fuel costs and purchased energy as previous ECA
- Recovers portion of the total costs of renewables (equivalent to the cost of avoided fossil fuel resources)
- Incentives to the utility
  - Baseload incentive to maximize use of coal plants
  - Economic energy purchase incentive
- Uniform $/kWh charge for all customers
- Changes each quarter (every three months)

Proposed ECA

- Similar to current ECA in terms of types of costs and incentives recovered
- Class specific ECA charges
  - Residential customers would pay different fuel charge than non-residential and industrial customers
- Largest customers would pay time-of-use (TOU) ECA
- Every charge would change monthly

Colorado's New Energy Economy

Colorado's New Energy Economy

- Voters: Amendment 37
- Governor Ritter ran his 2006 campaign on an energy-intensive platform
- Appointed three new commissioners
- 2007 and 2009 legislative sessions resulted in several new laws concerning renewable resources and energy efficiency
- Climate Action Plan

"Gov. Ritter is building a New Energy Economy for Colorado, establishing the state as a national and international leader in the production and manufacturing of traditional and renewable energy. The New Energy Economy leader has stimulated economic opportunity and created jobs throughout the state, including rural agricultural areas. Gov. Ritter's focus has led to a doubling of Colorado's renewable energy requirement and to creation of Colorado's first Climate Action Plan. The New Energy Economy is securing Colorado's energy future, economic future and environmental future."

Source: Office of the Governor Website

Amendment 37 (Modified)

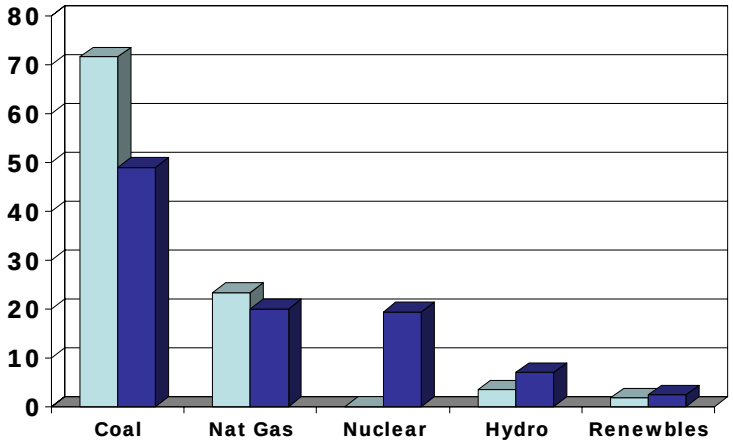
- Renewable energy standard (RES)
- Requires Xcel Energy and Black Hills to obtain 20% of sales from renewables by 2020
- Four percent (4%) of mandated amount must come from solar
- Half of the solar must come from customer on-site solar photovoltaic (PV) systems
- Net bill impact capped at 2%
  - Renewable Energy Standard Adjustment (RESA) on bills

"Energy is critically important to Colorado's welfare and development, and its use has a profound impact on the economy and environment. Growth of the state's population and economic base will continue to create a need for new energy resources, and Colorado's renewable energy resources are currently underutilized.

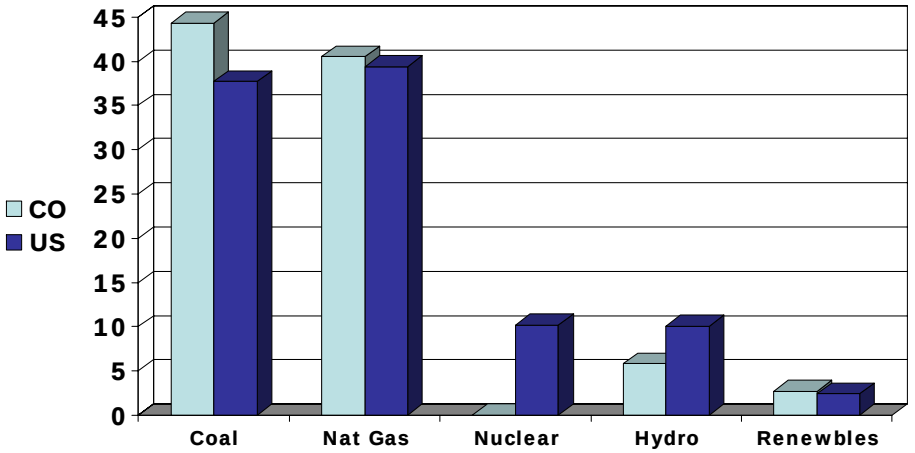
Therefore, in order to save consumers and businesses money, attract new businesses and jobs, promote development of rural economies, minimize water use for electricity generation, diversify Colorado's energy resources, reduce the impact of volatile fuel prices, and improve the natural environment of the state, it is in the best interests of the citizens of Colorado to develop and utilize renewable energy resources to the maximum practicable extent."

Old Energy Economy Generation

Percent of GWh Produced
(2006)



Percent of MW Capacity
(2006)



Baseload Resources
Higher Sunk Costs/Lower Fuel Costs
Higher CO2 Emissions

Intermediate and Peaking Resources
Lower Sunk Costs/Higher Fuel Costs
Hourly Marginal Cost

Source: Energy Information Administration

Xcel Energy's Current Position

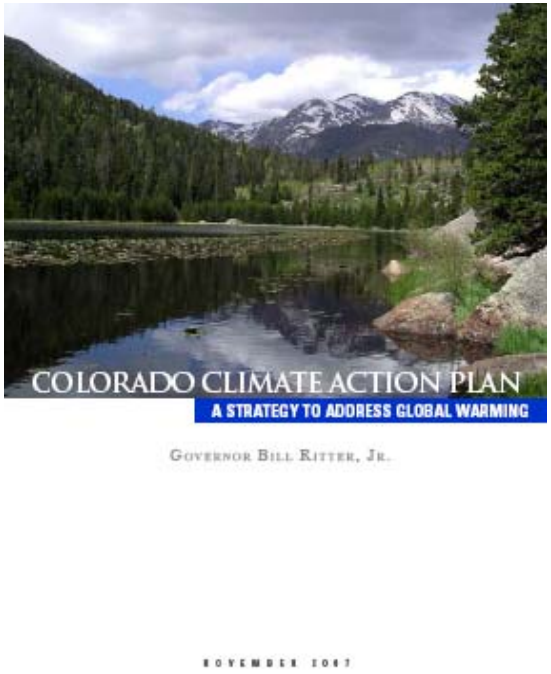
PSCo Loads & Resources Balance Summer 2008-2015

September 2008 Demand Forecast Update

	2008	2009	2010	2011	2012	2013	2014	2015
Existing PSCo Capacity								
Installed Net Dependable Capacity	*3,838*	*3,838*	*3,838*	*3,838*	*3,838*	*3,838*	*3,838*	*3,838*
PSCo Share of Comanche 3			500	500	500	500	500	500
Fort St. Vrain CTs		261	261	261	261	261	261	261
Retire Zuni 1&2			-39	-39	-39	-107	-107	-107
Retire Cameo 1&2				-73	-73	-73	-73	-73
Retire Arapahoe 3 & 4							-156	-156
Firm Purchased Capacity								
Basin Electric Power Cooperative No.1	100	100	100	100	100	100	100	100
Basin Electric Power Cooperative No.2	75	75	75	75	75	75	75	75
Tri-State G&T No.2	100	100	100	100	100	100	100	100
Tri-State G&T No.3	25	25	25	25	25	25	25	25
Tri-State G&T No.5	100	100	100	100	0			
PacifiCorp (w/ reserves)	166	157	171	161	150	150	150	176
Wheeling Losses	(10)	(10)	(10)	(10)	(8)	(8)	(8)	(8)
Subtotal	556	547	561	551	442	442	442	468
ManChief Power Company	261	261	261	261	261	261	261	261
Black Hills Valmont 7 & 8	79	79	79	79	79	0	0	0
Black Hills Arapahoe 5, 6, 7	122	122	122	122	122	0	0	0
Black Hills Fountain Valley Midway	238	238	238	238	238	0	0	0
Brush 1&3	76	76	76	76	76	76	76	76
Brush Cogen Partners (Brush 2)	68	68	0	0	0	0	0	0
Brush 4D	135	135	135	135	135	135	135	135
Tri-State Limon	63	0	0	0	0	63	63	63
Tri-State Brighton	132	132	0	0	0	132	132	132
Front Range Power	133	133	0	0	0	0	0	0
Cogentrix Plains End	226	226	226	226	226	226	226	226
Calpine Blue Spruce	271	271	271	271	271	0	0	0
Calpine Rocky Mountain Energy Center	587	587	587	587	587	587	90	90
Thermo Fort Lupton	279	129	129	129	129	129	129	129
Thermo Greeley (Monfort)	32	32	32	0	0	0	0	0
Thermo Power (UNC)	69	69	69	69	69	69	0	0
Invenergy Spindle CT	269	269	269	269	269	269	269	269
Small QFs	34	34	33	31	31	31	29	29
WM Landfill Gas	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Subtotal	3,086	2,837	2,552	2,498	2,498	1,983	1,416	1,415
Wind								
FPL Wind	50	50	50	50	50	50	50	50
Cedar Creek Wind	38	38	38	38	38	38	38	38
Twin Buttes Wind	9	9	9	9	9	9	9	9
Colorado Green Wind	20	20	20	20	20	20	20	20
enXco Ridge Crest Wind	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Invenergy Spring Canyon Wind	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Subtotal	128	128	128	128	128	128	128	128
Solar								
Alamosa Solar (On-Peak estimate)	5	5	5	5	5	5	5	5
On-Site PV Solar (On-Peak estimate)	7	17	25	29	32	35	38	41
Subtotal	12	22	30	34	37	40	43	46
SPS Diversity Exchange	101	101	101	101	101	101	101	101
2007 Resource Plan								
Biomass		4	4	4	4	4	4	4
2008 Early Wind (12.5% of 150 MW nameplate)			19	19	19	19	19	19
2008 Solar PV RFP Bids (56% of ~20 MW DC nameplate)				11	11	11	11	11
Subtotal	0	4	23	34	34	34	34	34
PSCo Net Dependable Capacity	*7,715*	*7,738*	*7,935*	*7,834*	*7,728*	*7,148*	*6,428*	*6,456*
PSCo Load								
Sept 2008 Native Load w/100% CPUC DSM Goals	6,870	6,958	6,906	7,136	6,977	7,095	7,206	7,309
(DSM embedded in Native load above)	17	42	63	129	178	233	293	358
Interruptible Load	126	155	196	222	227	227	227	236
Saver's Switch	101	114	126	138	148	156	154	149
Firm Load Obligation (Dec 1st filing)	6,642	6,689	6,583	6,776	6,601	6,712	6,824	6,925
Anticipated Increase in Wholesale Load Obligation	0	0	10	10	0	0	0	0
Adjustment to reduce Interruptible Load Forecast	0	-15	-15	-15	-15	-15	-15	-15
Additional Demand Response estimate (Docket No. 07A-469E)	0	20	40	40	40	40	40	40
Firm Obligation Load	*6,642*	*6,684*	*6,568*	*6,761*	*6,576*	*6,687*	*6,799*	*6,900*
Base Reserve Margin %	16.0%	16.0%	16.3%	16.3%	16.3%	16.3%	16.3%	16.3%
DSM Above Enhanced DSM (Decision No. C08-0560 & 0929)	0	0	5	13	27	45	68	90
Added Reserve Margin % (Decision No. C08-0560 & 0929)		0.0%	0.0%	0.1%	0.2%	0.3%	0.4%	0.5%
Reserve Margin % for Phase II Process	16.0%	16.0%	16.3%	16.4%	16.5%	16.6%	16.7%	16.8%
Reserve Requirement (MW)	1,063	1,069	1,074	1,110	1,086	1,111	1,136	1,159
IREA & HCEA Backup	0	0	40	40	40	40	40	40
Actual Reserve Capacity	1,073	1,054	1,367	1,072	1,151	461	(372)	(444)
Resource Need MW (long)	*(11)*	*15*	*(253)*	*78*	*(25)*	*690*	*1,547*	*1,642*
	2008	2009	2010	2011	2012	2013	2014	2015

- 3,838 MW utility-owned net capacity at peak (2008)
  - Mostly coal and gas
  - 261 MW new gas in 2009
  - 500 MW new coal in 2010
- 2,837 MW purchased net capacity at peak from mostly conventional resources (2009)
- 128 MW of wind (2009) at peak (~1,000 MW nameplate)
- 22 MW of solar (2009) (of which 17 MW on-site)
- 4 MW new biomass (2009)

Climate Action Plan



Provide greener electricity

- Establish a goal for major electric utilities to reduce greenhouse gas emissions by 20 percent by 2020
- Give utilities flexibility to meet the 2020 goal while encouraging broad implementation of energy efficiency measures that are cost effective, create jobs, and save consumers money
- Expand renewable energy resources and make use of new clean coal technologies

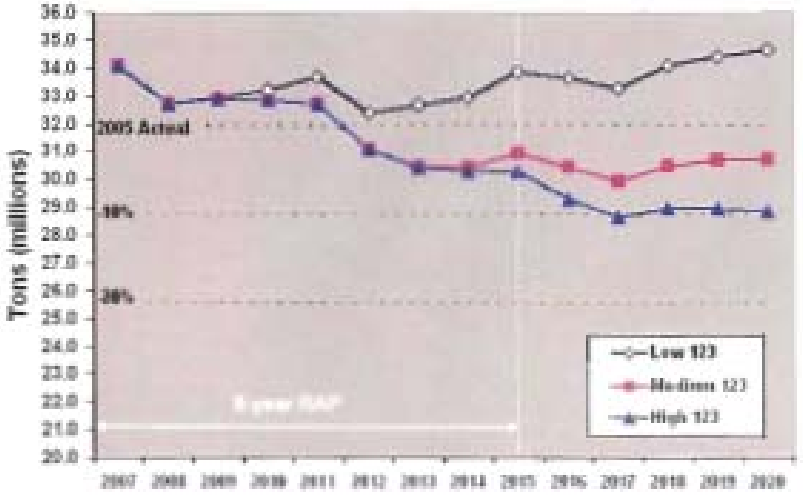
2007 Colorado Resource Plan

- Retire early two small, inefficient coal plants for "carbon reduction purposes" (refurbishment cost effective)
  - Repower one closed facility as new, utility-owned gas plant
  - Acquire new coal plants only if 50% carbon capture (IGCC)
- Acquire more renewables (wind and solar) than required by the RES, up to 2% cap on the retail rate impact
  - Targeted solicitations instead of all-source bidding
  - Set aside for utility scale concentrated solar thermal
- Increase utility ownership of generation resources
  - Own new renewable facilities under HB 1281
  - Purchase existing facilities from IPPs ("reverse auction")
  - Own new plants built by third-parties ("build transfer")

2007 CRP Carbon Reduction Plan

High Section 123 Plan: *Preferred PSCo Resource Plan*

Proposed RAP	Year	Section 123 Resources MW: DSM EE	On-Site Solar	Solar	Bio-mass	Geo Therm	Wind	IGCC	Retire (last operating month/year)	Other	Generic
	2007										
	2008	29	16								
	2009	37	4		4						
	2010	40	1				100		Zuni 1 (12/09)		
	2011	49	2	25			100		Cam 12 (12/10)		
	2012	49	1				100		Arap 34 (12/12)		
	2013	40	2				100		Zuni 2 (12/12)	Arap CC	2 CT
	2014	49	1				200				1CT 1CC
	2015	49	2	200			200				
	2016	49	0	200		20	200	150			1CT
	2017	49	0				200				3CT
	2018	49	1				200				2CT
	2019	49	1				200				2CT
	2020	49	1				200				2CT
	Total	603	32	425	4	20	1800	150	-336	400	2148
	2007-2046 Present Value of Revenue Requirements ($ millions)								$ 42,348		



- Retire old coal plants
  (and expect more in the future)
- Increase DSM
- Increase renewables
- Assume IGCC in 2016
- Discontinue wholesale contract with Black Hills
- Assume future cost of carbon regulation

Phase I: Decision No. C08-0929

- Savings of 1,744 GWh (energy) and 421 MW (demand) by 2015 via DSM programs
- Minimum of 200 MW (up to 600 MW) of developmental renewable resources, such as concentrating solar thermal with storage
- Additional 850 MW of established intermittent renewable resources
- Closure of the two coal plants to reduce carbon dioxide emissions, citing substantial health and environmental benefits
  (Climate Action Plan)

Phase II: Resource Selection

- Commission found that the following externalities shall be factored qualitatively into its Phase II decision:
  - Economic development (rural impact; job development; tax base)
  - Resource diversification; and
  - Environmental benefits (particularly health benefits/costs) associated with emissions reductions and other environmental impacts beyond permit compliance
- The Commission will compare the cost differential (net present value of future revenue requirements (NPVRR) and rate impact) of the likely scenarios with other risks and benefits of the various portfolios, including those with a relatively better status regarding externalities
- Parties will weigh in
- Commission will make a judgment as to the portfolio that has the best overall balance of costs, benefits, and risks; to properly consider those resources that provide increased externality benefits and minimum additional costs

Price Effects

- Rates have increased as a result of certain new energy economy policies
  - DSM rates have increased and are projected to increase
    - $13 MM 2006, $48 MM 2009, up to $180 MM in 2017
  - RES Adjustment increased to full 2%
    - Collections increase as components of bill increase
    - Xcel Energy asking for $
  - Old Energy Economy price increase from Comanche 3 coal plant
    - Rate Case: $159.3 MM increase (~10%)
    - Savings reduced gas burn expected but will CO2 emissions increase with more coal?

Affordability of Renewables

- 2009 cost of sales ~ $1.6 billion
- RESA collections at 2% rise from $50 MM in 2009 to $83 MM in 2020
- Relative cost effectiveness of renewables depend heavily on natural gas prices, carbon costs, and tax policies

Projected Costs of Renewables

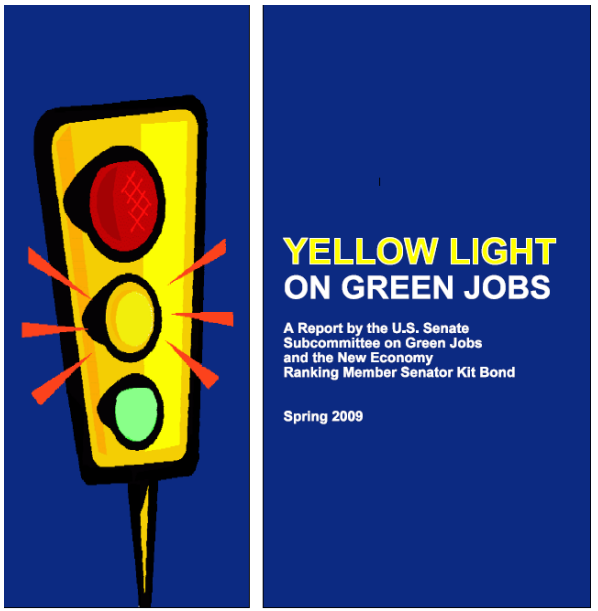
($ 000)

Year	No RES Plan	RES Plan	Incremental Costs	Total Renewable Energy Costs	Estimated ECA Costs	WindSource Revenues	Ongoing Costs
2009	$1,758,445	$1,813,858	$55,413	$61,708	$6,295	$7,084	$5,260
2010	$2,274,491	$2,311,399	$36,908	$79,469	$42,561	$8,359	$4,050
2011	$2,417,723	$2,446,675	$28,952	$101,030	$72,079	$9,530	$3,867
2012	$2,352,797	$2,381,790	$28,993	$128,566	$99,573	$10,673	$3,937
2013	$2,542,696	$2,574,144	$31,449	$157,169	$125,720	$11,740	$4,148
2014	$2,746,325	$2,796,611	$50,287	$282,468	$232,182	$12,680	$3,986
2015	$2,892,341	$2,967,493	$75,152	$413,931	$338,779	$13,314	$3,923
2016	$3,157,492	$3,237,662	$80,171	$502,207	$422,036	$13,979	$3,856
2017	$3,362,787	$3,453,504	$90,717	$590,709	$499,992	$14,678	$3,669
2018	$3,603,750	$3,695,766	$92,016	$684,899	$592,883	$15,355	$3,529
2019	$3,826,080	$3,963,061	$136,981	$784,728	$647,747	$16,037	$3,434
2020	$4,041,996	$4,206,825	$164,829	$890,253	$725,424	$16,720	$3,077

Source: Xcel Energy, Public Service Company of Colorado, Docket No. 08A-532E

Questions about Job Effects

- Significant economic development and job development opportunities expected from proponents
  - Solar and wind believed to produce more jobs per average MW (3-5 times) than coal and gas (Kammen, Kapadia, & Fripp)
  - "Green Collar Jobs in the US and CO" (American Solar Energy Society)
- Certain economists and political opposition skeptical about net job creation from green jobs
  - Sensitivity to assumptions about fuel prices, capital costs, and plant availability
  - Focus on new energy economy may shift investment away from other sectors that could create relatively more employment (*e.g.*, roads, infrastructure, health care)
  - Benefits in dispute
    - Low paying jobs often created
    - Highest paying jobs do not necessarily need to stay in Colorado after created

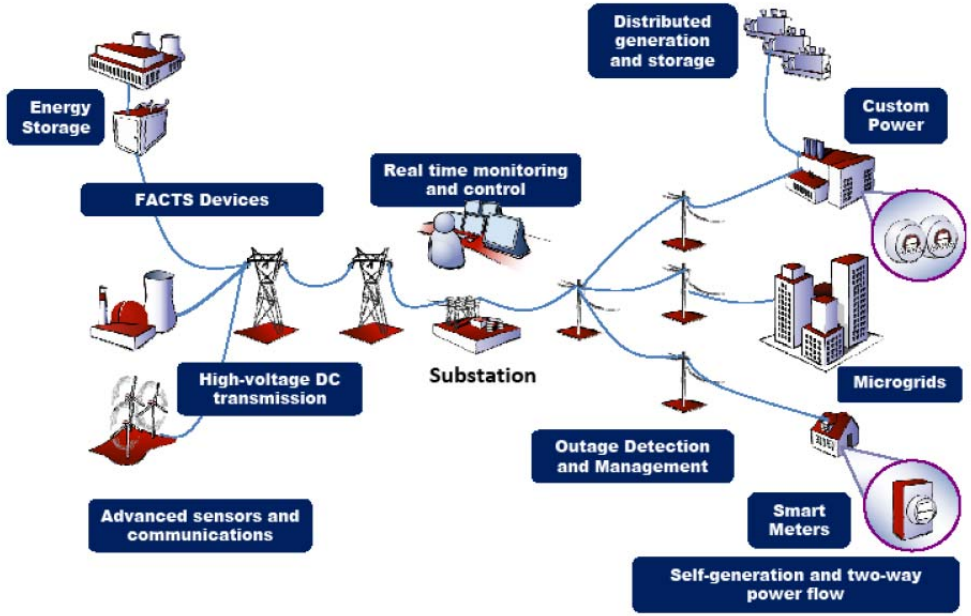


Implications of Carbon Regulation

- Carbon may trump natural monopoly
- Over 3,000 electric utilities in the US within three aging, poorly organized bulk power systems (integrated generation and transmission)
- Relatively cheap electricity (coal generated) fails to account for societal costs of global warming, negative health effects, environmental damage
- Electrification of the transportation sector
- Further consolidation of industry ownership
- Taxes, emission caps, adaptation strategies, energy R&D, nuclear subsidies, energy security under federal purview

Smart Grid Initiatives

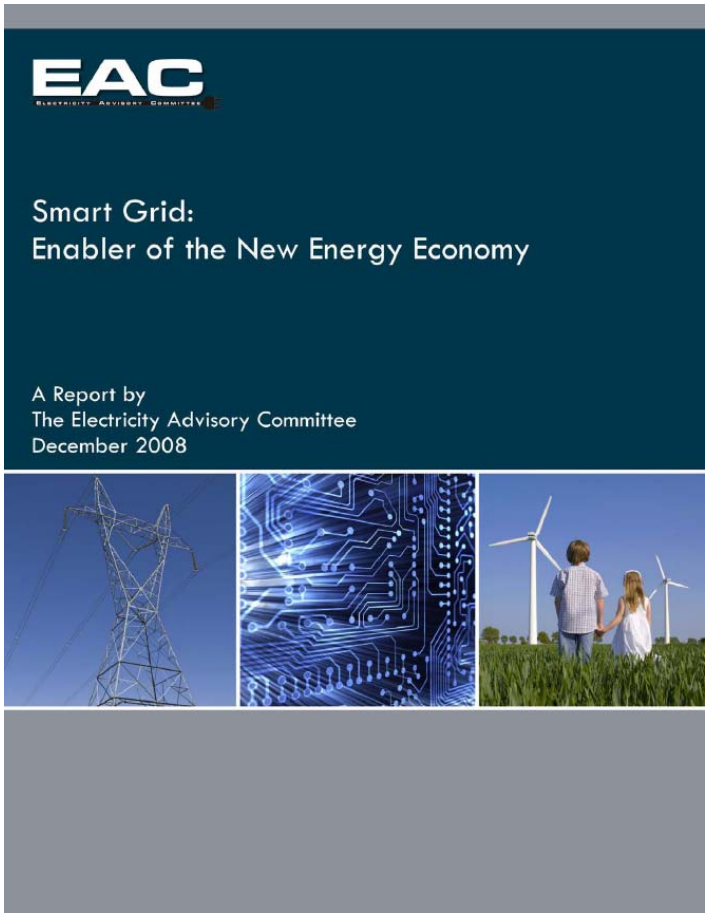
Smart Grid Initiatives



- $4.5 billion of economic stimulus money targeted to improving the nation's electricity delivery grid
- Commission encourages utilities to aggressively seek some of this funding for projects in Colorado

Source: Department of Energy

Enabler of the New Energy Economy



Utility Benefits

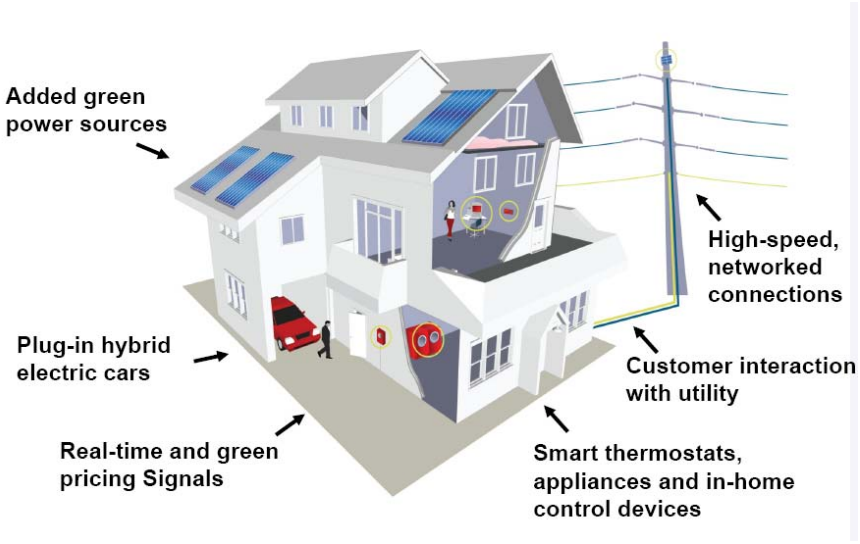
- Improved reliability
- Deferred capital spending
- Reduced operations and maintenance costs
- Increased efficiency of power deliver
- Improved integration of renewables
- Improved system security

Consumer Benefits

- Consumption management
- Cost savings from peak load reduction
- Increased convenience of renewables
- Enhanced customer services

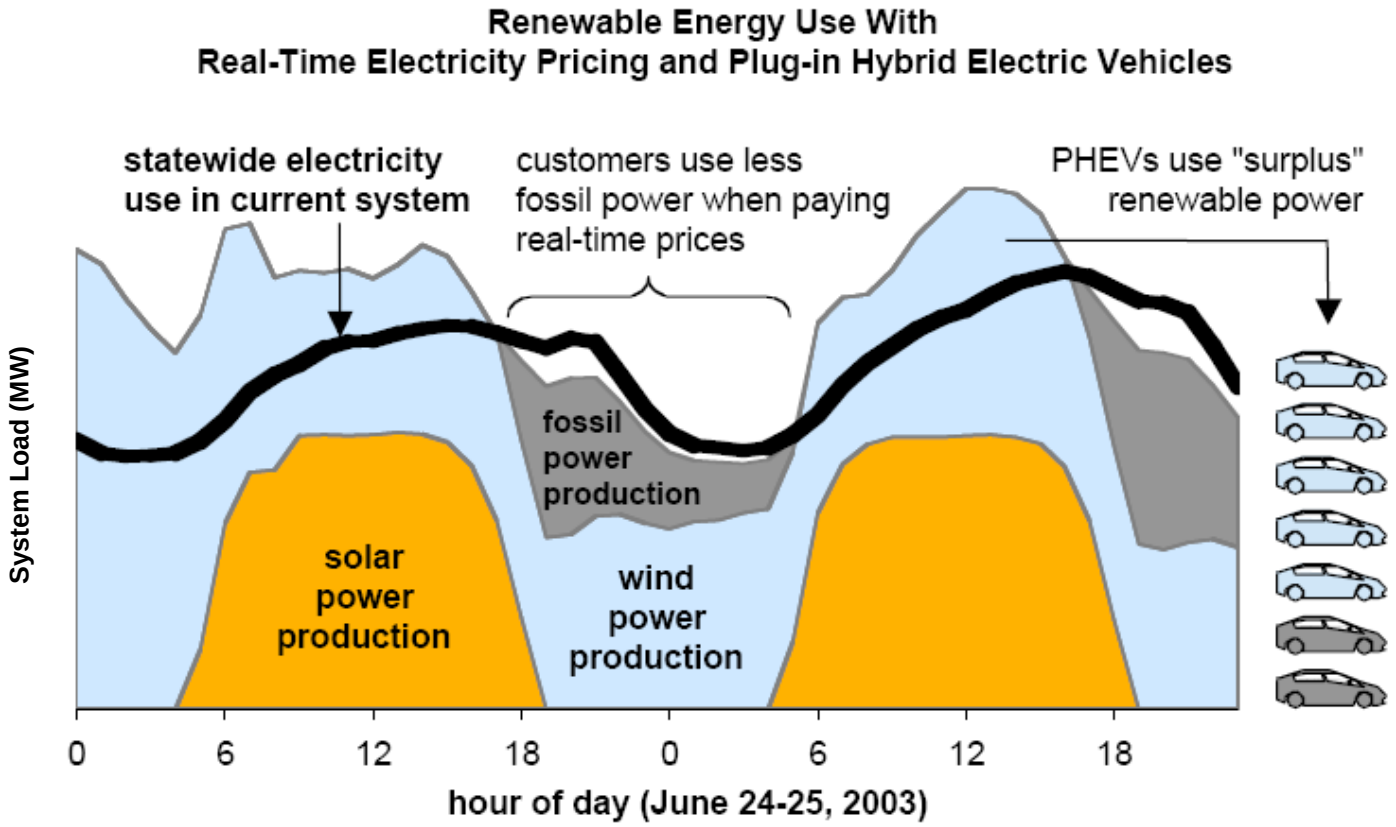
Xcel Energy's Smart Grid

- First major U.S. deployment of an integrated Smart Grid
- Software platform will aggregate and manage a network of distributed energy resources that controls load, stores energy, and produces power
  - Involves the entire energy pathway from the power source to the premise and all points in between
  - Rich in IT
  - High-speed, real-time, two-way communications
  - Sensors enabling rapid diagnosis and corrections
  - Dispatched distributed generation (PHEVs, wind, solar)
  - Energy storage
  - In-premise energy controls
  - Automated premise energy use



Source: Xcel Energy, Presentation to CPUC May 29, 2008

Electric Vehicle Refueling



Source: Matthias Fripp, Dan Kammen

Strategic Benefits to Xcel Energy

SmartGridCity™ Anticipated Benefits (cont.)

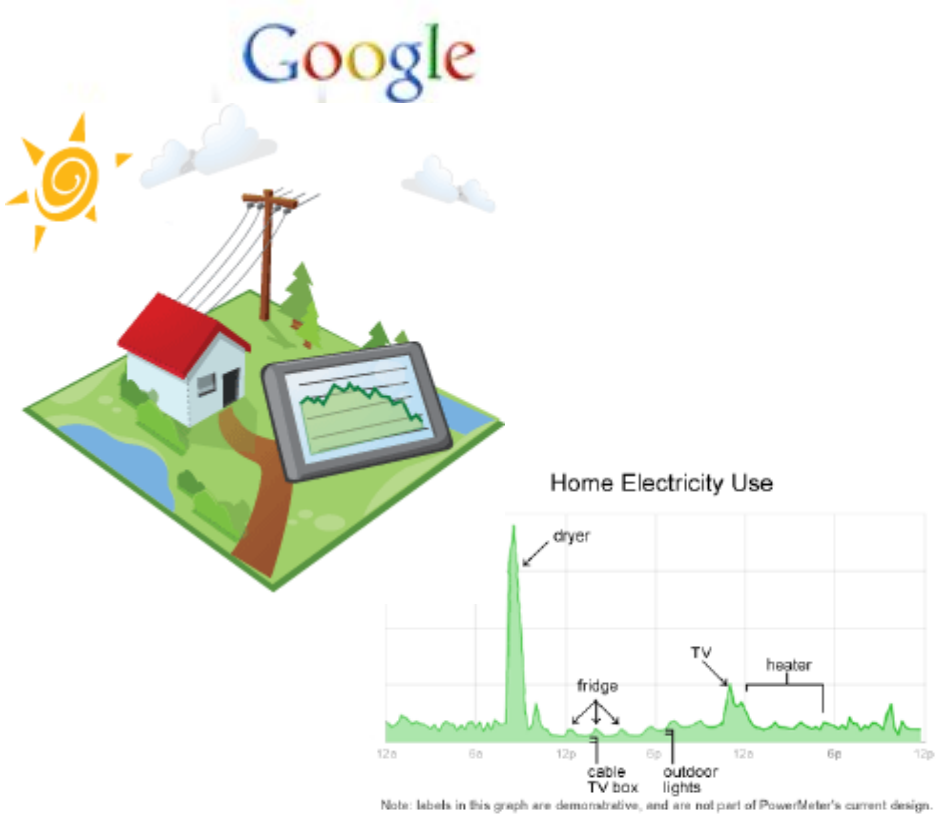
- **Environmental**
  - Carbon management capabilities
  - Other emissions that can be valued
- **Other Strategic**
  - Position for future acquisitions through enhanced business model
  - Protection of business position
    - Competitive advantage of first mover
    - Unplanned investment avoidance
    - Industry/standards leadership
    - Influence on rate and regulatory structures

10

Xcel Energy®

Google Concept Launch

- Google PowerMeter intends to use data from utility metering systems and consumer energy management
- Would allow customers to analyze and control usage remotely
- Depends on interoperability: provide and receive information and to use the exchanged information to operate effectively together in predictable ways without significant user intervention



Boulder the Smart Grid City

- Selection associated in part with renewal of franchise
- At least $100 MM investment

dailycamera

Boulder's leaders consider driving harder bargain with Xcel

City pondering carbon tax increase to meet climate goals

By Ryan Morgan
Thursday, April 9, 2009

BOULDER, Colo. — Boulder's elected leaders want to ask some big-picture questions before deciding whether to raise the city's carbon tax.

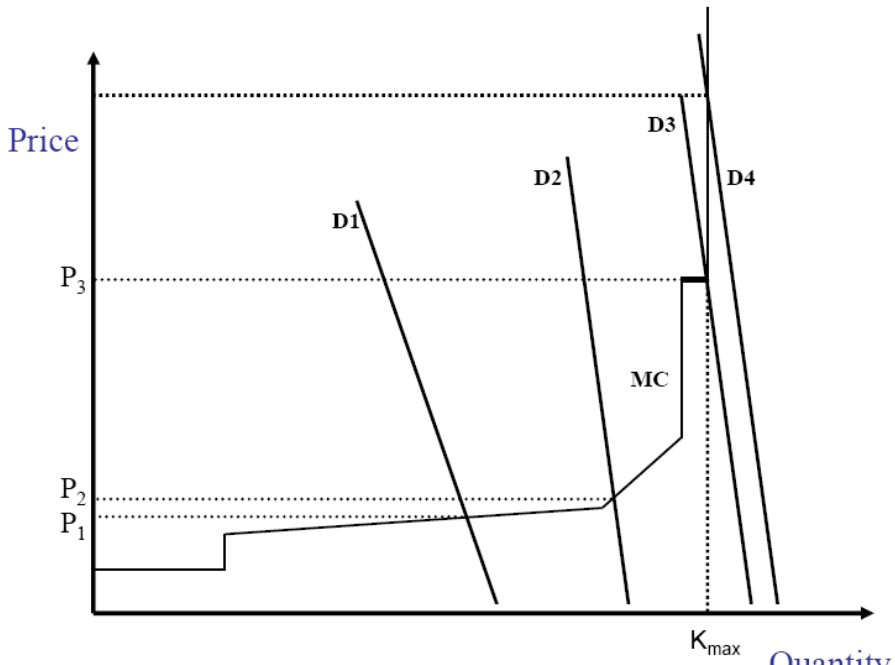
The Boulder City Council voted early Wednesday morning to delay a hearing scheduled for later this month on raising the tax while they take a fresh look at the three-year-old plan aimed at cutting carbon emissions.

Among the options they're considering: Trying to drive a harder bargain with Xcel Energy to bring power to Boulder that doesn't come from coal plants.

The utility's franchise agreement with the city expires this year, and officials from the city and Xcel have been negotiating a new contract, which voters would need to approve this fall. For several years, Boulder's elected leaders said they were willing to consider "municipalizing," or taking over, the grid from Xcel in order to provide the city with cleaner sources of energy.

New Rates and Demand Response

- Modify rates so that retail customers no longer pay same rate regardless of when electricity used and how it was generated
- CA experience: 13% reduction in usage when prices quintuple at peak
- But just low-tech "feedback" could likely reduce usage by 5%
  - Feedback enhanced with inclining block rates
- Carbon implications of peak load shifting



Source: Joskow

Resources

Online

- Selected online resources
  - MIT Center for Energy and Environmental Policy Research
    web.mit.edu/ceepr/
  - Harvard Electricity Policy Group
    www.hks.harvard.edu/hepg/
  - Stanford University Energy Modeling Forum
    http://www.stanford.edu/group/EMF/
  - Edison Electric Institute
    www.eei.org
  - NARUC
    www.narug.org
  - University of California Energy Institute
    http://www.ucei.berkeley.edu/
  - Electric Power Research Institute
    http://my.epri.com/portal/server.pt?
  - Rocky Mountain Institute
    http://www.rmi.org/
  - Regulatory Assistance Project
    http://www.raponline.org/
  - Colorado Governor's Energy Office
    www.colorado.gov/energy/

Working Bibliography

- Baldwin, Robert and Martin Cave. *Understanding Regulation: Theory, Strategy, and Practice*. Oxford University Press, 1999.
- Bezdeck, Roger H. "Green Collar Jobs in the U.S. and Colorado: Economic Drivers for the 21st Century." For the American Solar Energy Society. January 2009.
- Brown, Ashley C. "The Structure and Processes for Regulation in the United States." Prepared for the Planning Commission of India and the World Bank.
- The Brattle Group. "Transforming America's Power Industry: The Investment Challenge 2010-2030. For the Edison Foundation. November 2008.
- Crew, Michael A. and David Parker. *International Handbook on Economic Regulation*. Edward Elgar Publishing, 2006.
- Crew, Michael A., and Paul R. Kleindorfer. *The Economics of Public Utility Regulation*. MIT Press. MIT Press, 1986.
- Cubbin, John and Jon Stern. "The Impact of Regulatory Governance and Privatization on Electricity Industry Generation Capacity in Developing Economies." *The World Bank Economic Review*. Vol. 20, No. 1 (2006).
- Gordon, R.L. "Electricity Restructuring in Practice." *Electricity Pricing in Transition*. Ahmad Faruqui and Kelly Eakin. Springer, 2002.
- Grossman, Peter Z. and Daniel H. Cole. *The End of a Natural Monopoly: Deregulation and Competition in the Electric Power Industry.* Routledge, 2003
- Holt, Lynne. "Utility service quality—Telecommunications, electricity, water." *Utilities Policy.* Vol. 13, No. 3 (September 2005), pp. 189-200.

Working Bibliography

- Huntington, Hilard G. "Creating Jobs with 'Green' Power Sources." *Dialogue of the United States Association of Energy Economists* (March 2009).
- Jamison, Mark A., Robert Rowe, and Brett A. Perlman. "Getting on the Balcony: Leadership Challenges in Regulation." *The Electricity Journal*, Vol. 18, No. 10 (December 2005), pp. 43-52.
- Jones, Douglas N. and Patrick C. Mann, "The Fairness Criterion in Public Utility Regulation: Does Fairness Still Matter?" *Journal of Economic Issues*, Vol. 35, No. 1 (March 2001), pp. 153-172
- Joskow, Paul L. "Electricity Restructuring: What's Gone Right? What's Gone Wrong? Why do We Care?" October 1, 2008.
- Joskow, Paul L. "Regulation of Natural Monopolies." *Handbook of Law and Economics*. A.M. Polinsky and S. Shavell, eds. Elsevier, B.V., 2005.
- Kelly, John M. "The Missing Manifesto: What Economists Should Be Saying about Electric Utility Restructuring in the United States." *The Electricity Journal*. (January/February 2003), pp. 13-23.
- Kleit Andrew N. and Pat Wood, III. *Electric Choices: Deregulation and the Future of Electric Power*. Rowman & Littlefield, 2006
- McGrew, James H., *FERC: Federal Energy Regulatory Commission*. American Bar Association, 2003.
- Ogus, Anthony. "W(h)ither the Economic Theory of Regulation? What Economic Theory of Regulation?" *The Politics of Regulation: Examining Regulatory Institutions and Instruments in the Age of Governance*. Northampton, MA: Jacint Jordana and David Levi-Faur. Edward Elgar Publishing, 2004.

Working Bibliography

- Public Utility Research Center and the Australian Competition and Consumer Commission. *Principles and Practice of Infrastructure Regulation*. 1997
- Rossi, Jim. *Regulatory Bargaining and Public Law*. Cambridge University Press, 2005
- Sherman, Roger. "The Future of Market Regulation." Working Paper.
- Sherman, Roger. *The Regulation of Monopoly*. Cambridge University Press, 1989
- Teske, Paul Eric. *Regulation in the States*. Brookings Institution Press, 2004.
- Tierney, Susan F. and Todd Schatizki. "Competitive Procurement of Retail Electricity Supply: Recent Trends in State Policies and Utility Practices." For NARUC. July 2008.
- Trebing, Harry M. "Market Failure in Public Utility Industries: An Institutionalist Critique of Deregulation." *Institutional Analysis and Economic Policy*. Marc R. Tool and Paul Dale Bush. Springer, 2003.
- Trebing, Harry M. "On the Changing Nature of the Public Utility Concept." *Economics Broadly Considered: Essays in Honor of Warren J. Samuels.* By Warren J. Samuels, Jeff Biddle, John Bryan Davis, Steven G. Medema. Routledge, 2001.
- Troesken, Werner. "Regime Change and Corruption: A History of Public Utility Regulation." *Corruption and Reform: Lessons from America's Economic History*. Edward Ludwig Glaeser and Claudia Dale Goldin. University of Chicago Press, 2006.
- Weil, Gordon L. *Blackout: How the Electric Industry Exploits America*. Nation Books, 2006.