



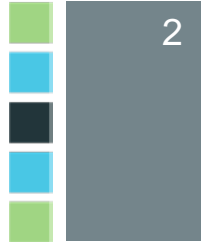
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Overview of the Electricity and Natural Gas Utility Industry

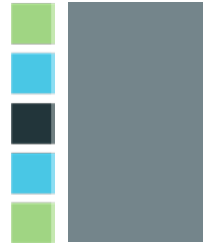
Presented to
University of Colorado Denver
Business School
Global Energy Management Program

Outline



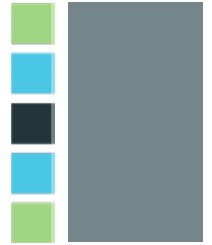
- **Utility industry entities, authorities**
- **History**
- **Structure**
- **Regulation and deregulation**
- **Cost structure and behavior**
- **Deregulation outside the United States**
- **Suggested case studies**

Utility entities



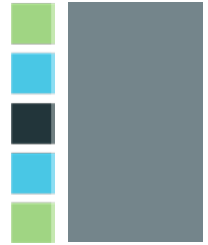
- **Investor owned utilities (IOUs)**
 - Holding companies
 - Distribution companies
 - Regulated
 - Supplier, marketer, generator subsidiaries
- **Independent System Operator and Transmission companies**
- **Suppliers, merchants, independent power providers**
- **Gas exploration and production companies**
- **Gas Transportation Pipelines**
- **Public power organizations**
 - Tennessee Valley Authority & Bonneville Power Authority
 - Public power districts (e.g., NPPD, Washington PUDs, etc.)
 - Power authorities (e.g., NYPA)
- **Municipals**
- **Cooperatives, rural electric associations, etc.**

Governing Authorities



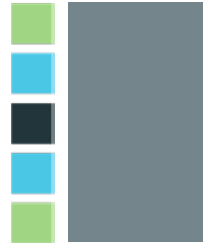
- **Federal**
 - Congress
 - Federal Energy Regulatory Commission
 - Securities and Exchange Commission
 - Environmental Protection Agency
 - Department of Energy
- **State**
 - State Legislatures
 - Public Utility Commissions
- **Independent System Operators (wholesale markets)**
- **Municipalities**
 - City Councils
- **Cooperatives, Rural Electric Authorities, Public Utility Districts**

Federal Energy Regulatory Commission (FERC) purview



- Regulates the transmission and sale of natural gas interstate;
- Regulates the transmission of oil by pipeline interstate;
- Regulates transmission and wholesale sales of electricity interstate;
- Licenses and inspects private, municipal, and state hydro projects;
- Approves siting and abandonment of interstate natural gas pipelines and storage facilities
- Ensures safe operation/reliability of proposed/operating LNG terminals;
- Ensures the reliability of high voltage interstate transmission system;
- Monitors and investigates energy markets;
- Uses civil penalties and other means against energy organizations and individuals who violate FERC rules in the energy markets;
- Oversees environmental matters related to natural gas and hydroelectricity projects and major electricity policy initiatives; and
- Administers regulated company accounting/financial report regulations/conduct

States' purview

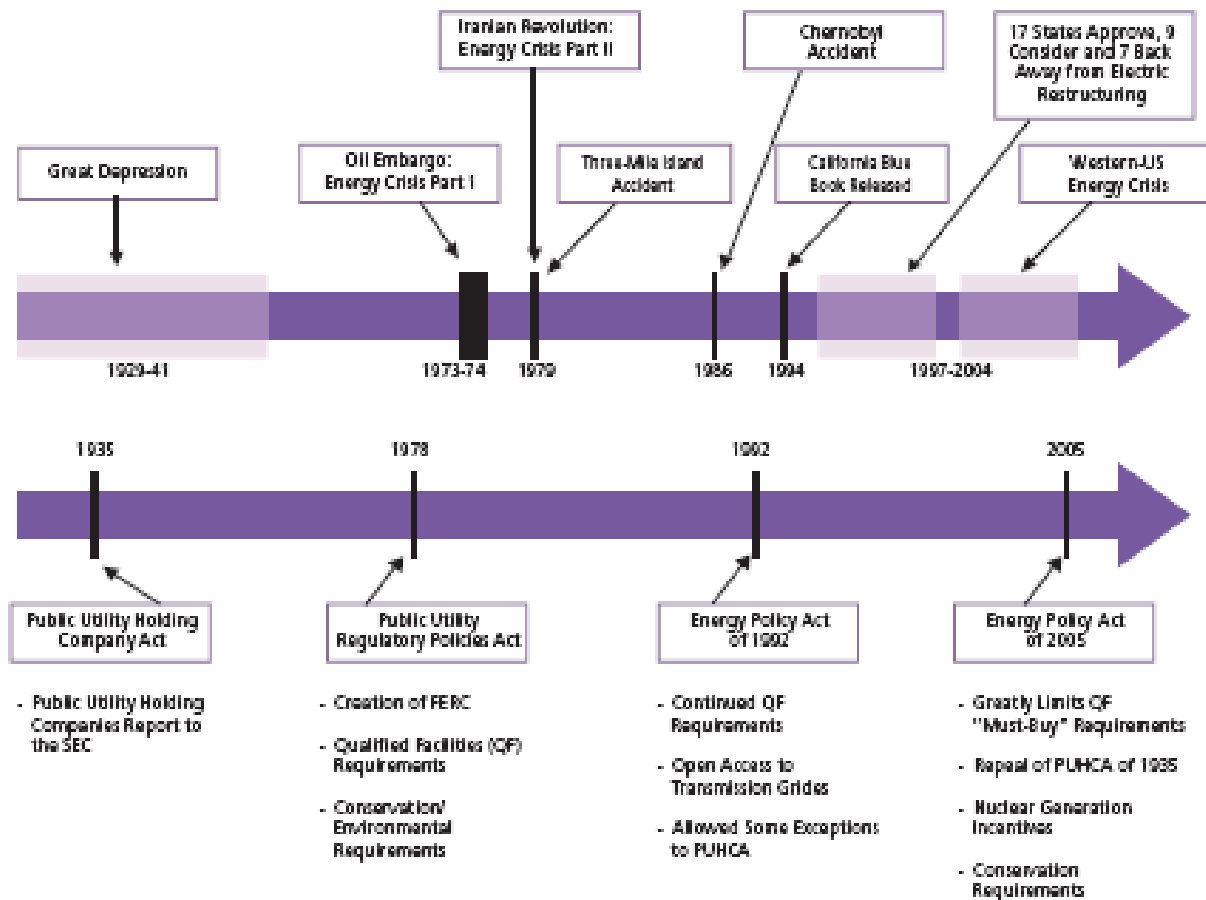


- Decisions regarding regulation and deregulation
- Regulation of retail electricity and natural gas sales to consumers;
- Approval for the physical construction of electric generation, transmission, or distribution facilities;
- Regulation of local utility companies
 - Investor owned
 - Municipalities
 - Cooperatives
 - Rural Electric Authorities
 - Not federal entities like
 - Tennessee Valley Authority or
 - Bonneville Power Authority
- Regulation of local distribution pipelines of natural gas
- Regulation of local utility electric distribution systems
- Tariffs, rates, default rates and rate setting processes

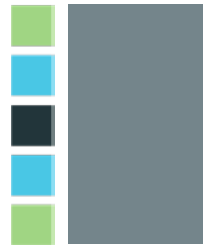
Not always

History of Electricity Legislation

Key Regulatory Developments in the Electricity Industry

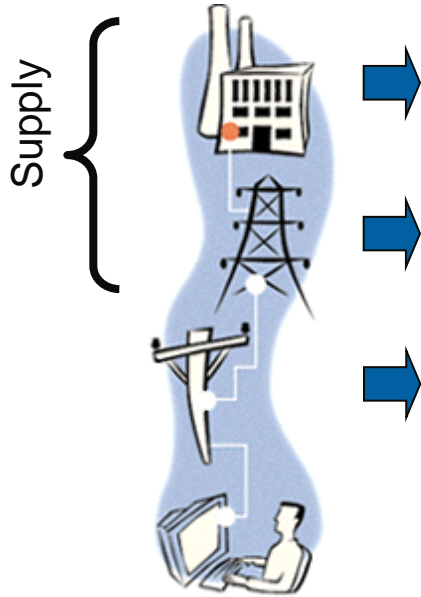


Natural Gas Regulation



- First public utility commissions – 1907
- 'Supreme Court Commerce Clause' cases – 1911-1928
- PUHCA – 1935
 - Did not address interstate gas sales
- Natural Gas Act – 1938
- Phillips Petroleum Co. v. Wisconsin – 1954
- FPC price ceilings – 1954 – 1978
- Natural Gas Policy Act - 1978.
- FERC Order No. 436 – 19
- Natural Gas Wellhead Decontrol Act -1989
- FERC Order 636 - 1992

Energy Market Structure



Electricity	Natural Gas	Deregulated?	Fraction of Total Cost
Generation	Production	Some States	65-85%
Transmission	Transportation	Maybe	~ 10%
Distribution Delivery	Distribution Delivery	Never	15-35%

Regulated markets:

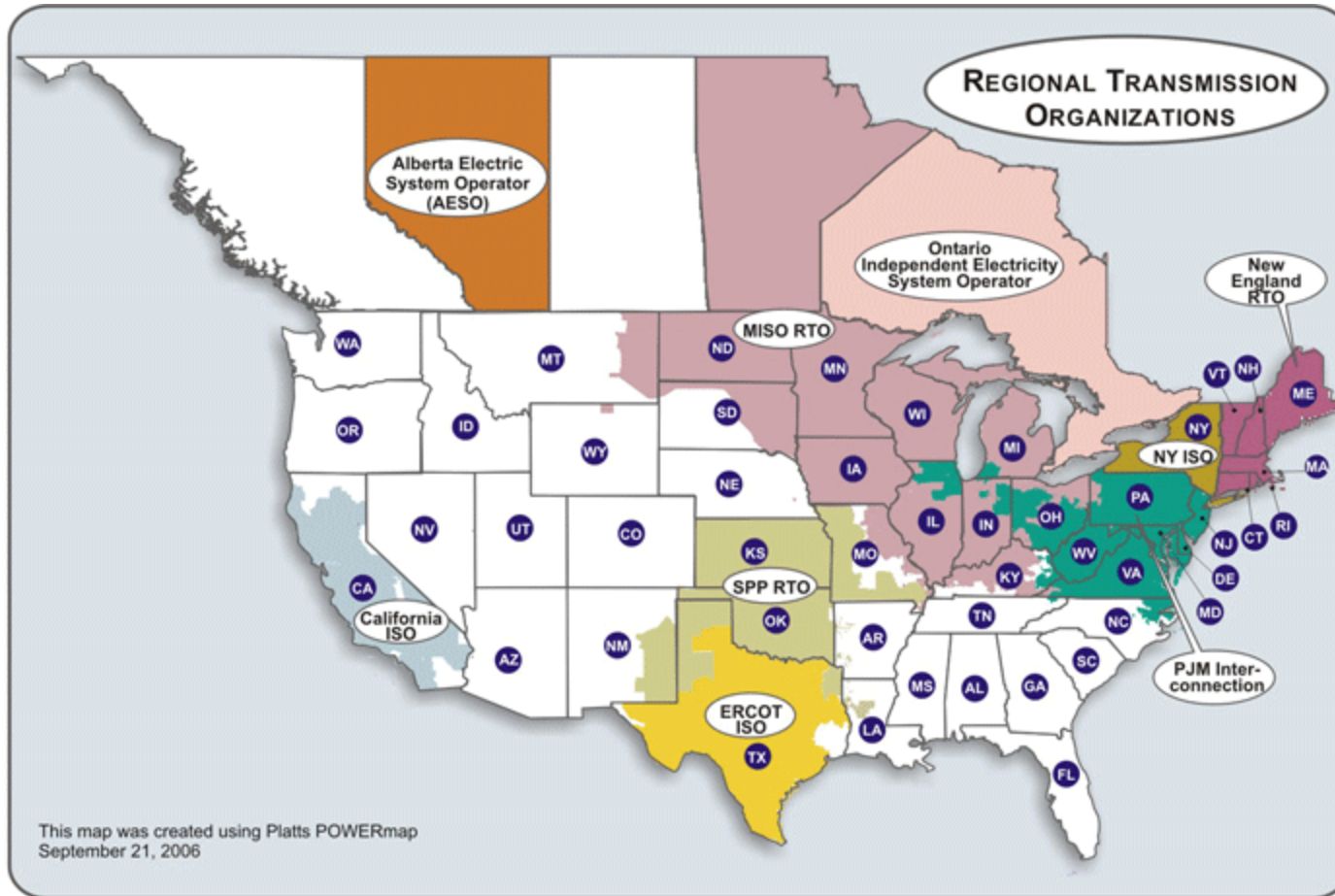
- ▶ *All are “bundled” together and provided by local utility*
- ▶ *Rates are set in tariffs by negotiation with the public utilities commission (PUC)*

Deregulated Markets:

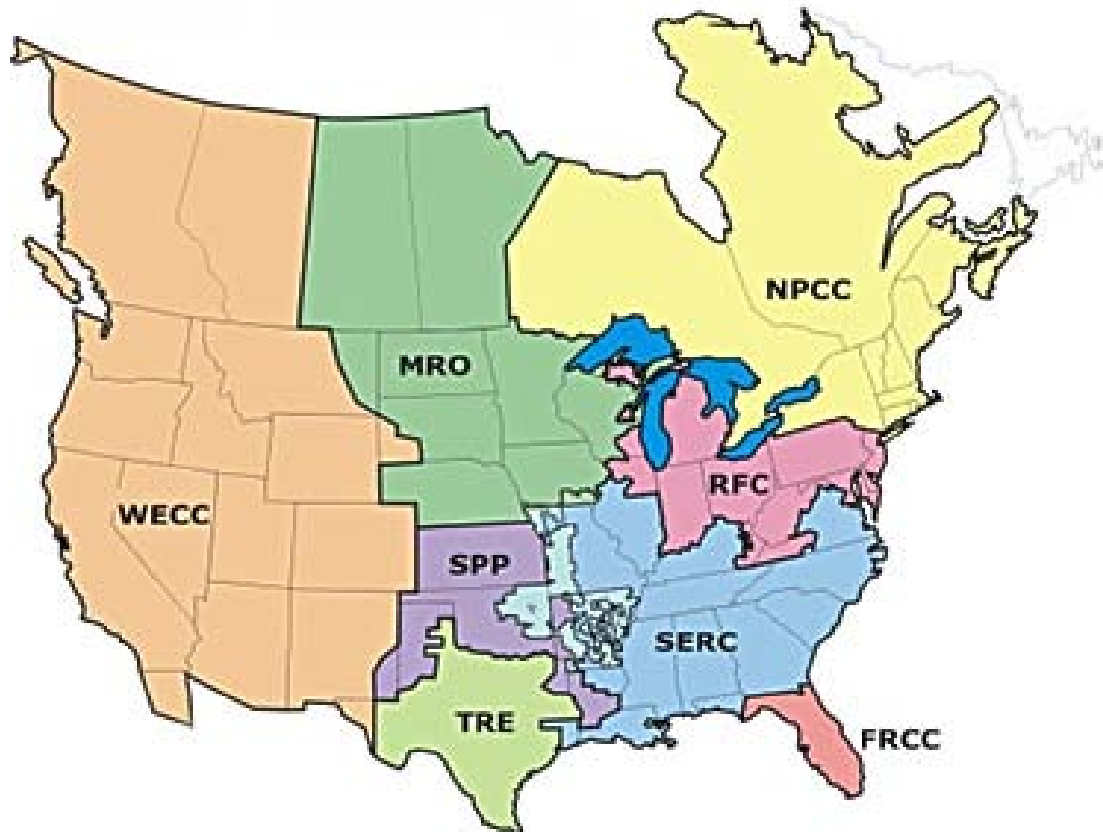
- ▶ *Local utility provides delivery and “Default” supply*
- ▶ *Competitive suppliers provide competitive supply*

www.energywibndow.com

Independent System Operators



North American Electric Reliability Corporation (NERC) Regions



www.nerc.org

FRCC - Florida Reliability Coordinating Council

MRO - Midwest Reliability Organization

NPCC - Northeast Power Coordinating Council

RFC - ReliabilityFirst Corporation

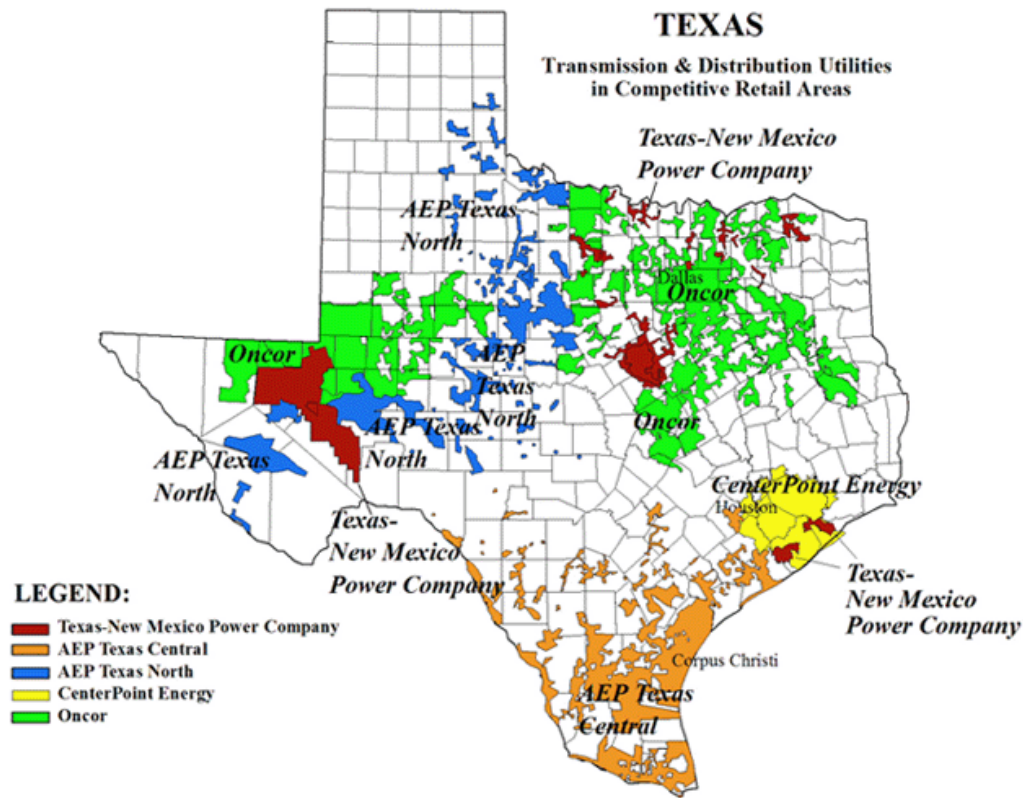
SERC - SERC Reliability Corporation

SPP - Southwest Power Pool, RE

TRE - Texas Regional Entity

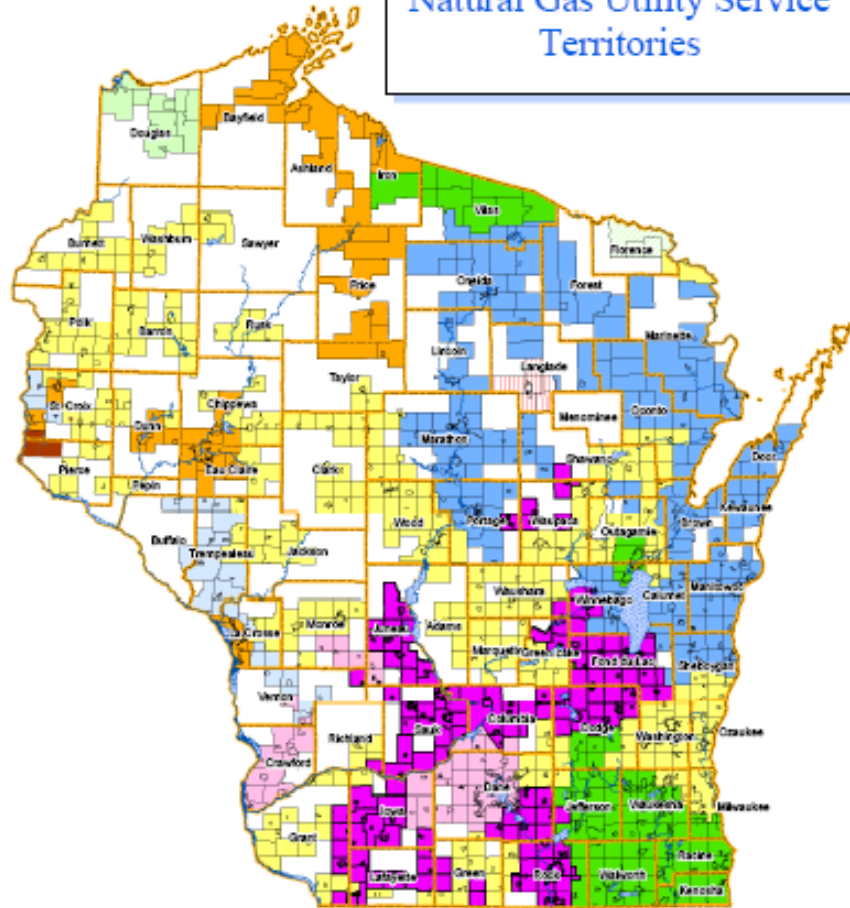
WECC - Western Electricity Coordinating Council

Example: Texas Major Electric Utilities



Example: Wisconsin Major Gas Utilities

Natural Gas Utility Service Territories

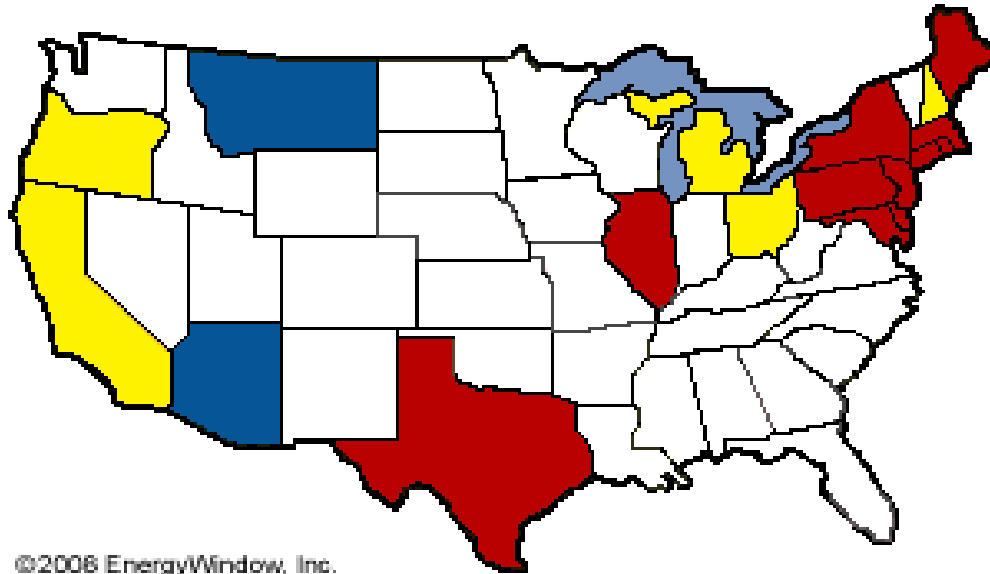


GEOGRAPHICS



August 2008

Active Regulated States: Electricity



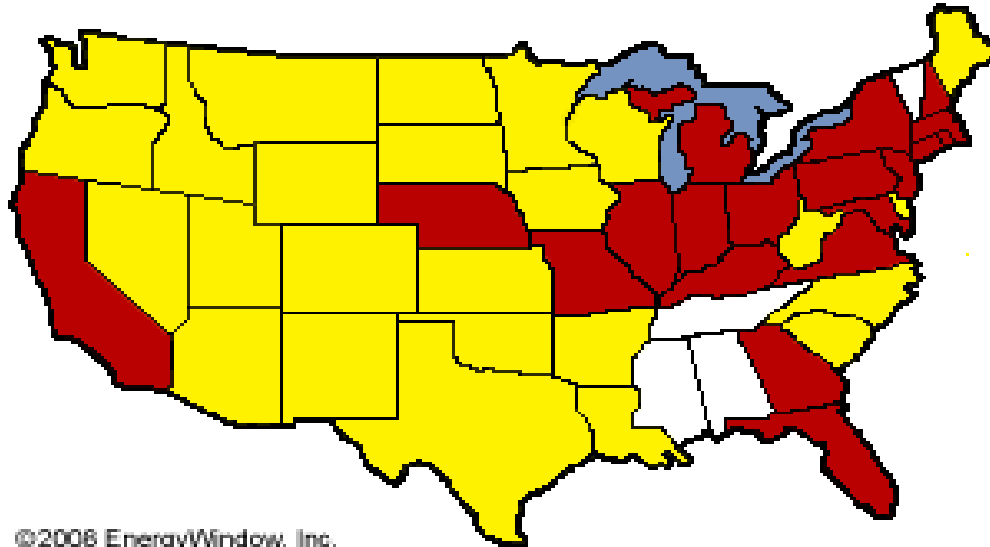
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Select a commodity: Electricity

Legend

Active
Potentially Active
Deregulated But Inactive
Regulated

Active Regulated States: Natural Gas



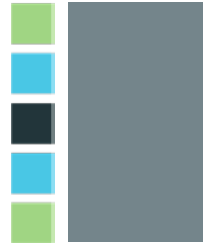
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Select a commodity:

Legend

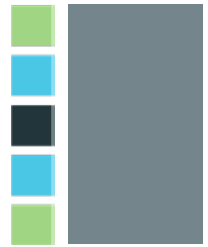
Active
Potentially Active
Deregulated But Inactive
Regulated

Utility industry service and cost structure



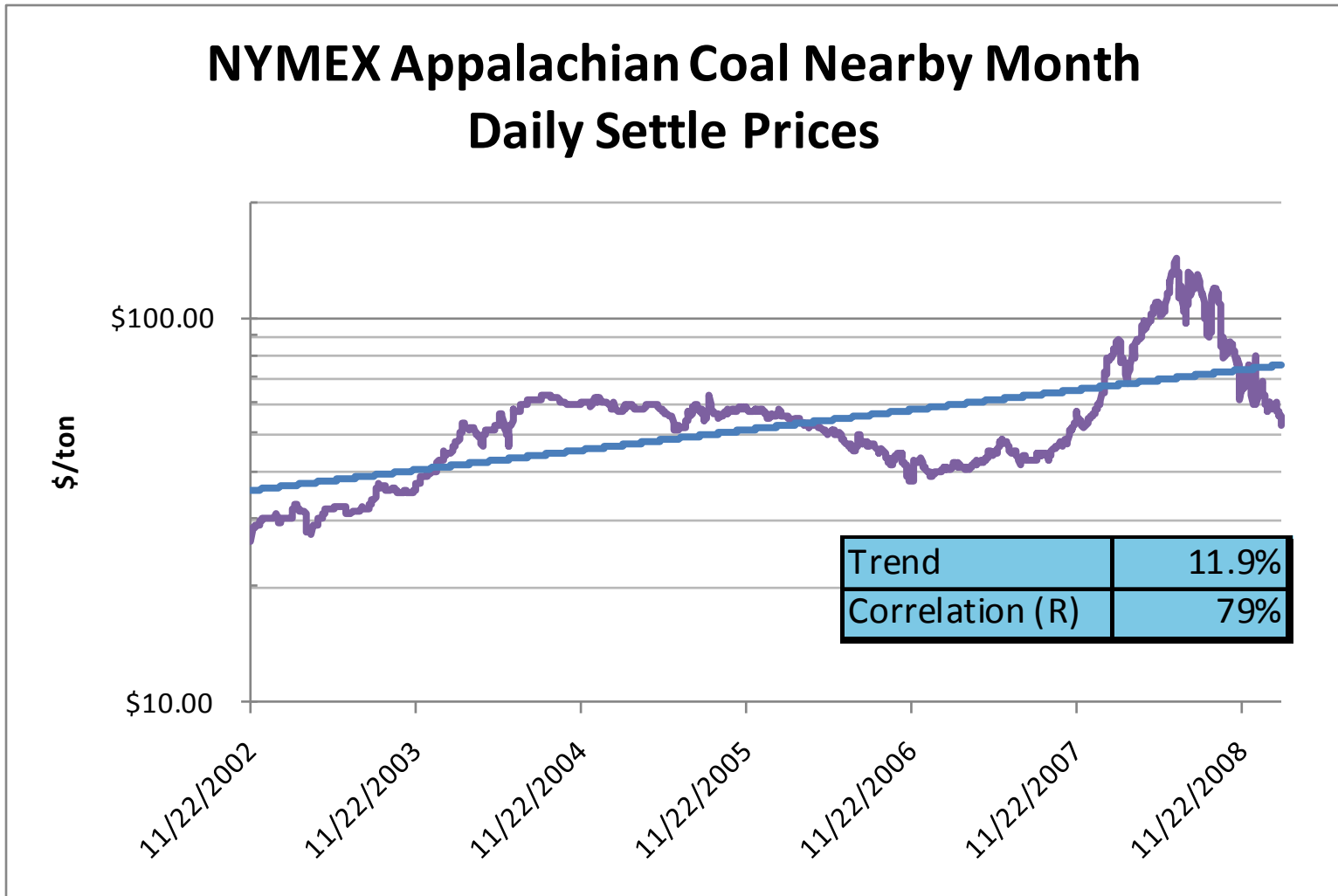
- **Service and cost components**
 - **Generation/Production**
 - **Transmission/Transportation**
 - **Distribution /Delivery**
- **Bundled and unbundled service**
- **Supply versus delivery**
 - **Supply**
 - **Commodity**
 - **Some transportation costs**
 - **Capacity charges**
 - **Losses**
 - **Administrative and scheduling**
 - **Delivery**
- **Fuel versus non-fuel related costs**

Regulated states (Electric/Gas)

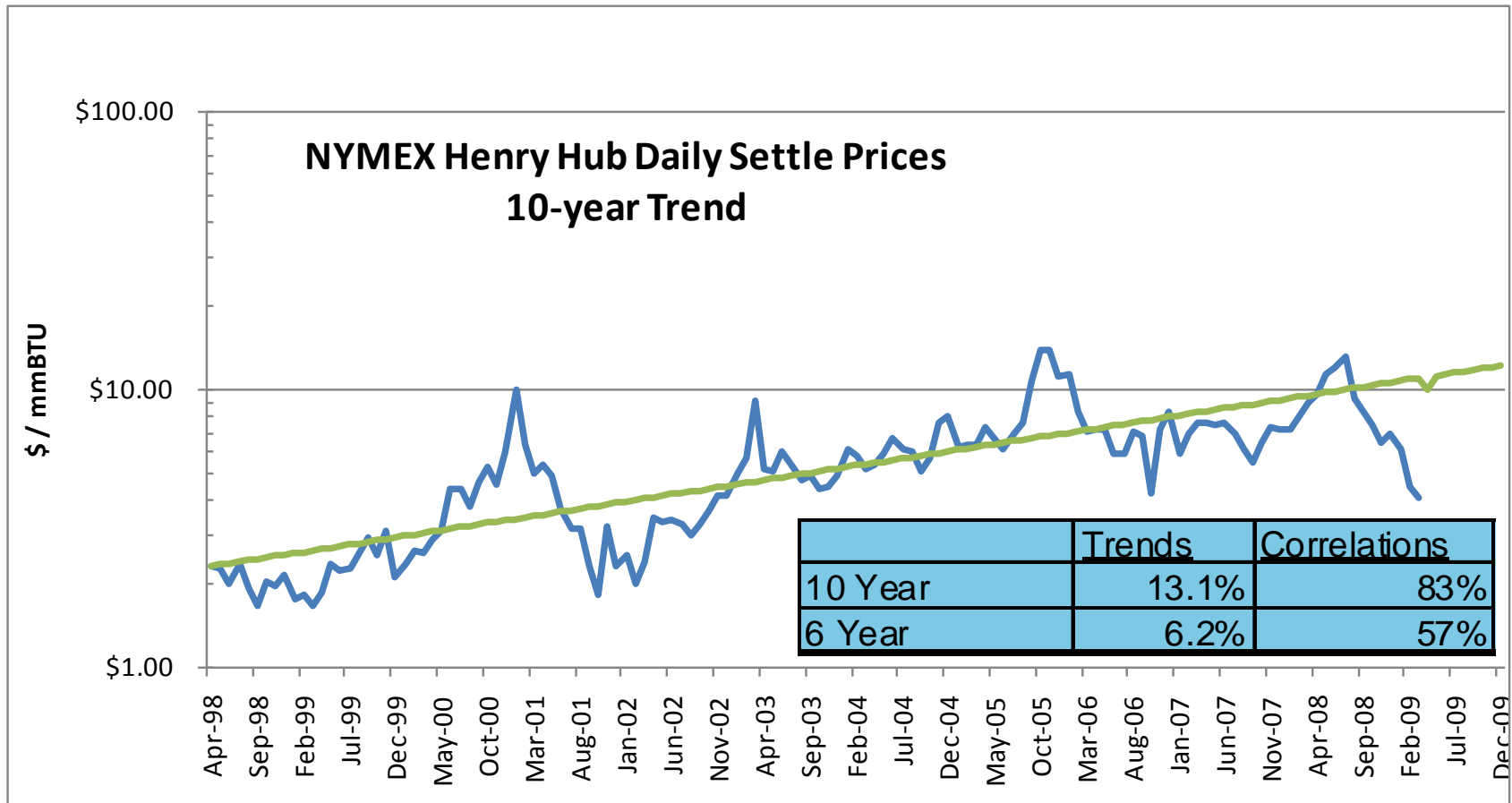


- **Rate-making processes**
 - Annual
 - Interim
- **Types of increases**
 - General or base rate increases
 - Fuel or commodity related
- **Approaches**
 - Rate base +
 - Return on Assets/Investment
 - Rate case submittal/review
- **Trend is to more frequent adjustments more closely tied to market**

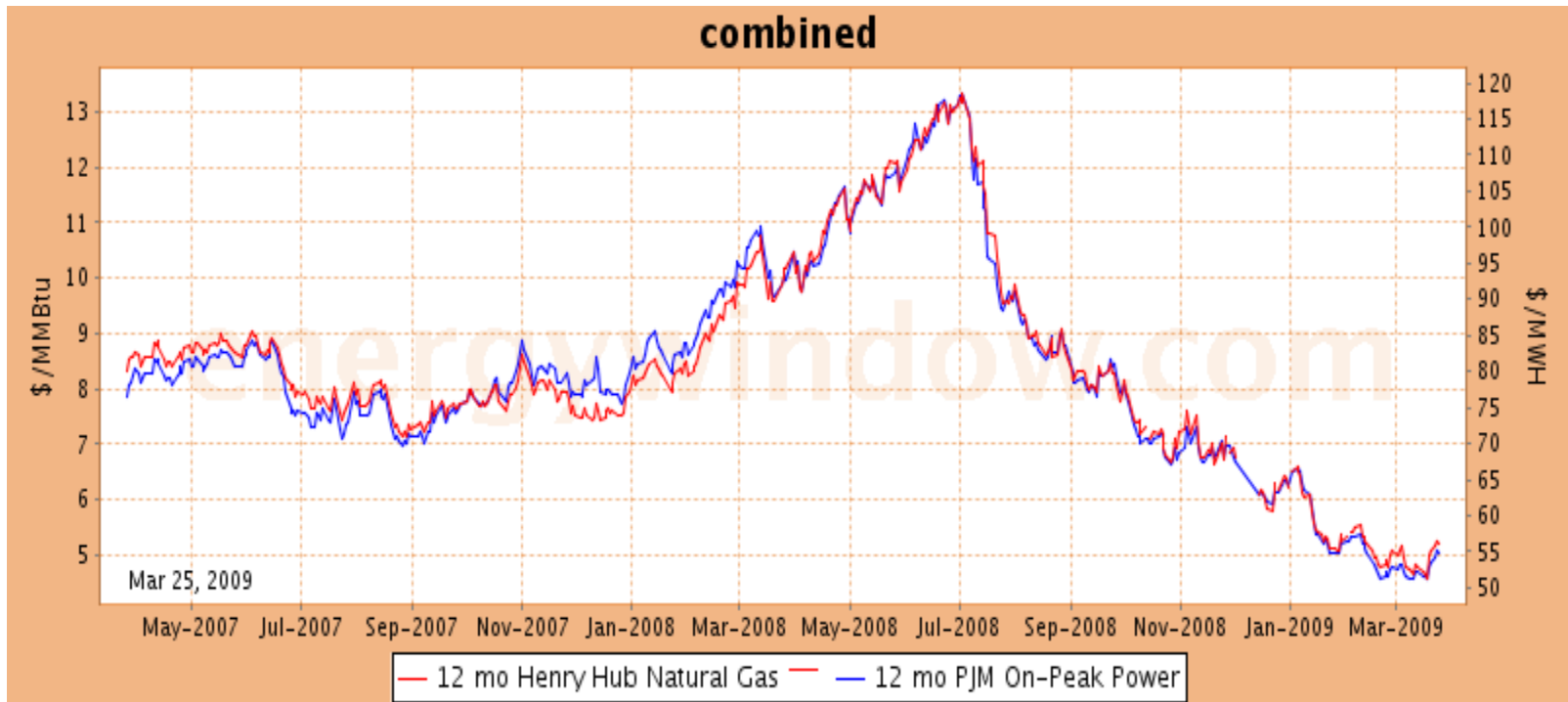
Commodity Prices: Coal



Commodity Prices: Natural Gas



Commodity Prices: Electricity/Gas Highly Correlated



Regulated States Rate Structures



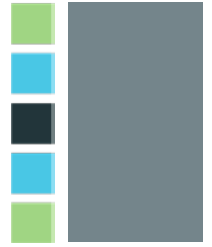
■ Electricity

- Fuel / Commodity costs (65-85%)
 - Highly volatile
 - Fuel/Energy adjustment factor
 - Tariffs
 - Monthly, quarterly, annually
- Non-fuel components (15-35%)
 - Delivery
 - Public purpose
 - Credit for Work in Progress
 - Tariff

■ Natural Gas

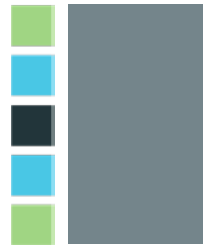
- Commodity costs (75-85%)
 - Highly volatile
 - Gas cost recovery rates
 - Monthly, quarterly, annually
 - Negotiated formula/process
 - True-up
- Delivery costs (15-25%)
 - Tariff

Deregulation



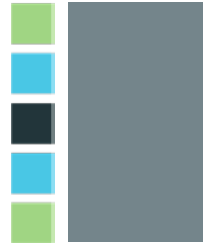
- **Separation or restructuring of utilities**
 - Separating delivery and supply
- **Transition periods**
 - Move from regulated to deregulated over several years
- **Default or “provider of last resort” (POLR) service**
- **Unbundling of rates**
- **Dealing with “stranded” assets**
- **Challenges and conflicts**

Deregulation Examples



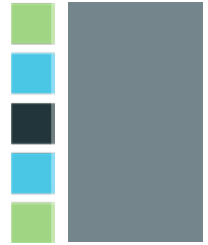
- **California**
 - Deregulation
 - Capping default rates but determining costs via the market
 - Requiring utilities to spin off generation assets
 - Regulation (but with “grandfathered” competitive market direct access)
- **Texas**
 - Transition period with “Price to Beat” default
 - Set up of competitive wholesale market (ERCOT)
 - Now fully competitive with no default price
- **Illinois**
 - Deregulated but with poorly designed unbundling and default price
 - Competitors could not enter market; buyers could not count on market
 - 10-year rate cap → rate shock
 - Established Illinois Power Authority to buy default price

Deregulation Examples



- **New Jersey**
 - Fixed and hourly rates based on account size
 - Default determined by annual auction for 1/3 of load requirements
- **Maryland**
 - Initial default tariffs and overall rate cap
 - Then move to annual auctions for default price
 - Result was rate shock
 - Now major pressure by legislature and governor to re-regulate

Perspectives and implications



■ Utilities

- Challenges of dealing with volatile commodity costs
- Need for long-range planning and commitments
- Satisfying diverse stakeholders: PUC, customers, stockholders

■ Suppliers

- Market entry challenges and expenses
- Barriers posed by imbalanced unbundling
- Substantial early competition and new entrants
- Current challenges with credit and limited markets

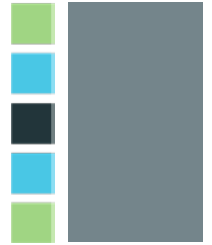
■ End-user Customers

- Predicting prices
- Managing volatile costs and budgeting

■ The Nation and the Environment

- Lack of market signals to inhibit consumption
- Unnatural lower prices for non-renewable energy sources
- Alternative energy sources not competitive

Canada & Mexico



■ Canada

- Very Similar Structure to United States
 - Provincial structure similar to states
 - Somewhat more limited federal role
- Electricity deregulation and competition
 - Alberta
 - Ontario (with current uncertainties)
- Natural Gas Deregulation
 - Effectively in all provinces
 - Limitations in Maritime Provinces

■ Mexico

- No deregulation

Europe & Asia



■ Deregulated Markets

- Great Britain – very well developed
- Denmark
- Finland
- Austria
- Spain
- Italy

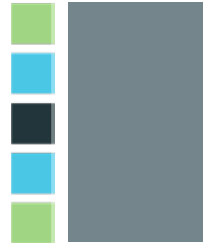
■ European Union Mandate for Deregulation

- July 2007
- Reality less so
- But still choices in most markets for larger commercial/industrial customers

■ Asia

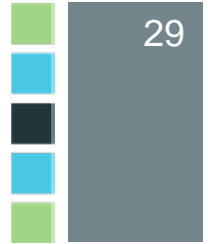
- No significant deregulation

Case studies (individual or teams)



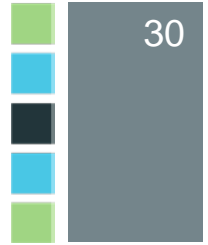
- Pick a state and answer the following questions (for both electricity and natural gas)
 - Regulated or deregulated?
 - *Time frame*
 - *Prospects*
 - *Why one or the other (drivers)?*
 - *History*
 - *Complete the outline(s) on the following slides for*
 - *Regulated states or*
 - *Deregulated states*

Regulated states



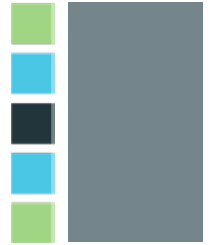
- *History*
- *Generation mix*
- *What types of utilities exist (e.g., IOUs, municipals...)*
- *Regulatory, legislative, and political environment*
- *PUC structure, appointments, responsibilities*
 - Which entities are regulated
 - How are others handled
- *Rate setting mechanism and process?*
- *How are rate components handled*
 - Bundled
 - General rate increases
 - Fuel cost adjustments
 - Frequency
- *Pros and cons of approach*
- *How would you do it better*

Deregulated states



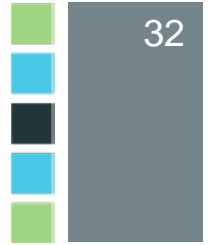
- **History**
- **Generation mix**
- **Entities (IOU, delivery companies, suppliers, etc.)**
- **What is role of public utility commission**
- **Transition period?**
 - When
 - Transition period constructs
- **Unbundling**
 - Stranded assets
- **Default price**
 - Exists?
 - How established and determined
 - Frequency

For both regulated and deregulated states



- ***Successful / Unsuccessful?***
 - Why?
 - Consequences?
- ***Lessons learned***
- ***How would you have done it better?***

Summary



- **Very complex industry**
- **Heterogeneous multiple-level structure**
- **Many different organizations involved**
- **Very inconsistent approaches to regulation, and deregulation**
- **Challenging for all participants**
 - **Energy end-user / customers**
 - **Utilities**
 - **Suppliers**
- **Establishment and achievement of national strategy and goals inhibited**