



U.S. Electric Power Industry - Context and Structure

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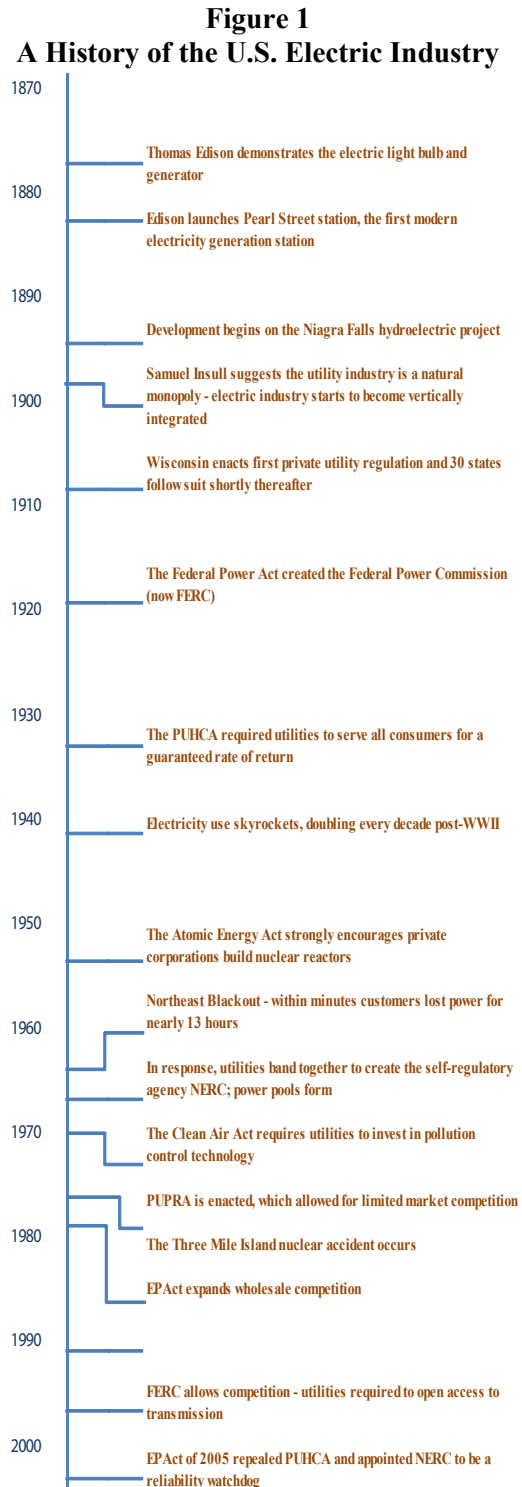
Industry Organization

The electric industry across the United States contains significant variations from the perspectives of structure, organization, physical infrastructure characteristics, cost/price drivers, and regulatory oversight. The variation stems from a mix of geographical influences, population and industry make up, and the evolution of federal and state energy law and policy.

In the early part of the 20th century, the electric industry evolved quickly through the creation, growth and consolidation of vertically-integrated utilities – that is, companies that own and operate all of the power plants, transmission lines, and distribution systems that generate and deliver power to ultimate customers. At the same time, efficiency of electricity generation dramatically improved, encouraging growth, consolidation of the industry, and expansion into more and more cities, and across a wider geographic area. Over time, consolidated utilities were granted monopoly franchises with exclusive service territories by states, in exchange for an obligation to serve customers within that territory at rates for service based on state-regulated, cost-of-service ratemaking.¹

Over time, utilities grew both geographically and vertically, with the predominant model becoming public or private utilities responsible for the generation, transmission, and distribution of power. Private, or “investor-owned utility” (or IOU) rates are highly regulated by state (public utility commissions or PUC) or federal (Federal Energy Regulatory Commission, or FERC) authorities, whereas public utility (municipal electric companies, and electric cooperatives) rates are generally set by a locally elected electric board without much oversight by utility regulators. Currently, investor-owned utility companies serve approximately three quarters of all electric consumers with most of the rest served by coops, municipals, and federal authorities.

The 20th century also saw the industry change structurally in several ways pursuant to laws affecting holding company structures. Rural electric cooperatives were created to serve sparsely populated regions and federal power authorities (such as the Tennessee Valley Authority



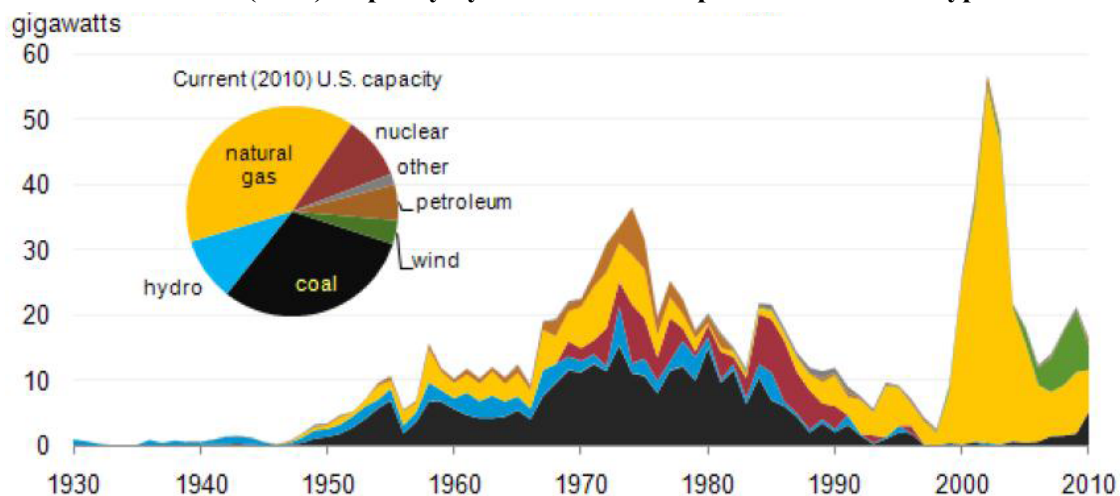
¹ The background discussion is drawn from Energy Information Administration, *History of the U.S. Electric Power Industry, 1882-1991*, http://38.96.246.204/cneaf/electricity/page/electric_kid/append_a.html (hereafter “EIA History”); and Susan F. Tierney and Paul J. Hibbard, *Energy and Environmental Policy in the United States: Synergies and Challenges in the Electric Industry*, prepared for The French Center on the United States, June, 2003 (hereafter “Tierney-Hibbard.”)

and the Bonneville Power Administration) were established. Later in the century, as population grew and electric utilities expanded, interconnected, and increasingly impacted the electric systems of neighboring utilities, the industry was forced to evolve further. The Northeast blackout of November, 1965 in particular brought home the interconnectedness of the system in a major way, and spurred the formation in many regions of voluntary organizations to coordinate operations and identify and follow protocols and standards to improve the reliability of the grid. Many of these councils or power pools also began development of inter-utility exchanges of power in real-time to save money associated with generation. These organizations ultimately evolved into the independent system operators (ISOs) and regional transmission organizations (RTOs) that are in place today.

The most recent major changes to industry organization are related to federal and state efforts to restructure the industry. These efforts have, in some places, separated the generation and delivery functions; opened up power generation to competition at the wholesale level; provided equal access to the interstate transmission network for all potential users (suppliers and consumers); and allowed retail competition for energy (i.e., allowed consumers to choose a power supplier besides their local utility).

As the organizational structure of the system developed, so too did its infrastructure. The industry experienced rapid growth in capacity along with increasing efficiency and decreasing costs essentially through the 1960s. Simultaneously, electricity prices continued to decline, with residential electricity prices falling from over 15 cents near the beginning of the century to just a few cents. Not surprisingly, the use of electricity expanded to include all cities and rural areas, with ever-greater levels of interconnection between neighboring utility systems. The favored technology in meeting that growing demand has varied over time as a function of fuel availability, federal legislation, and economics. Most coal-fired capacity was built in the middle part of the last century, while most nuclear capacity was added in the 1970s and 1980s, and natural gas and wind capacity have been the most recent technologies of choice. See Figure 2.²

Figure 2
Current (2010) Capacity by Initial Year of Operation and Fuel Type



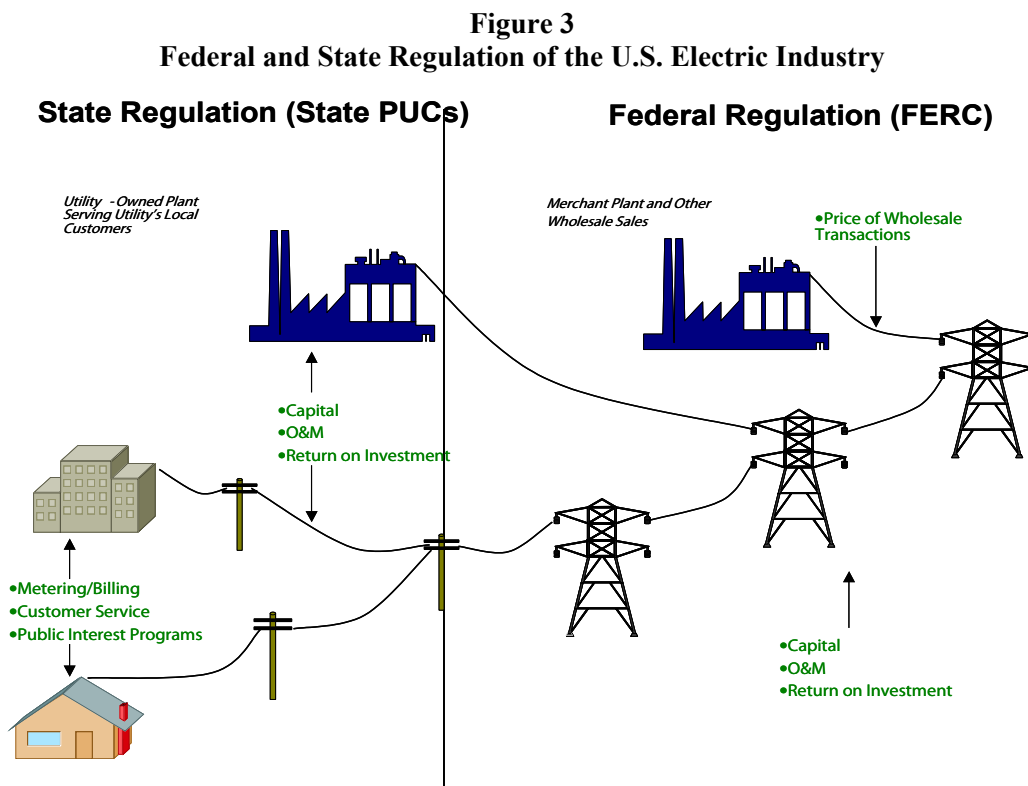
² Energy Information Administration, *Energy In Brief – How Old Are U.S. Power Plants*, August 2011.

Federal vs. State Regulatory Landscape

Electric industry policy is the result of a combination or sequence of laws passed since the beginning of the 20th century, and a long history of regulations, orders, and court decisions. Historically, a major piece of energy or environmental policy legislation affecting the electric industry has emerged roughly every ten years or so on average, with each piece of legislation reorganizing to some extent the jurisdictional responsibilities and policymaking opportunities of state and federal energy regulatory agencies.³

Under the long-standing framework for industry organization, utilities with franchised service territories and an obligation to serve are allowed to recover revenues adequate to cover capital, operational and customer service expenses, including a reasonable rate of return on the utility's invested capital. This reciprocal arrangement, often referred to as the "regulatory compact," represents the conceptual structure for electricity price regulation at the state and federal level.

Allocation of regulatory authority between the states' and federal government's economic regulation of the electric industry derives from the distinction between what constitutes *interstate* commerce, and what constitutes *intrastate* commerce. In practice, this distinction separates (1) the industry participants subject to federal vs. state regulation, and (2) the physical and functional components of the electric system (i.e., generation, transmission, distribution, and customer service) subject to federal vs. state regulation. The major differences are portrayed in Figure 3 and the subsequent discussion.⁴



³ For example, major laws regarding energy passed Congress in 1934 (the Public Utilities Holding Company Act), 1954 (the Atomic Energy Act), 1974 (the Energy Reorganization Act), 1978 (the Public Utilities Regulatory Act), 1992 and 2005 (both called the Energy Policy Act).

⁴ Figure 3 and the description of federal and state regulation are from Tierney-Hibbard.

Federally-regulated aspects:

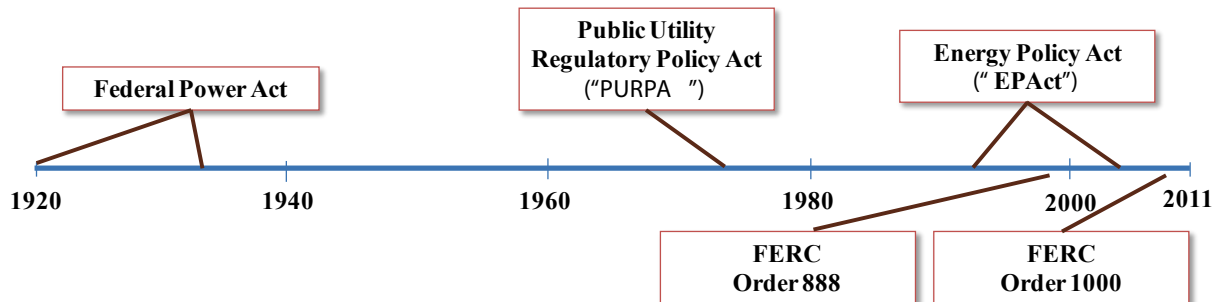
- Interstate commerce primarily involves the movement of electricity across high-voltage transmission lines.
- These lines are considered a component of interstate commerce because they are typically part of large, regional (interstate) electricity grids that connect utilities within and across states, and that connect regulated utility systems with those of federal, municipal, and cooperative electric systems.
- The transmission system also connects privately owned generating facilities with the electric grid, thereby providing an avenue for the sale of this “merchant” generation to electric utilities within and outside the state in which the facility is located.
- Consequently, FERC has jurisdiction over service and rates related to the construction, maintenance, and operation of the transmission facilities owned or operated by utilities or private entities in the United States.
- In setting rates for transmission, FERC reviews filings made by the owners or operators of transmission facilities that must provide detail regarding all capital, maintenance, and operational costs associated with the construction and operation of those facilities.
- FERC has jurisdiction over rates for all electricity sales not made by state-regulated utilities to the ultimate consumers (residential customers, businesses). These federally regulated transactions, referred to as “wholesale” sales, include, sales of electricity among or between utilities, power marketers, power exchanges or grid operators. Generally, FERC sets the rates for such sales based on the costs of generation in areas or circumstances where no market competition exists, and approves market-based rates for sales where competitive conditions exist.

State-regulated aspects:

- State PUCs have jurisdiction over rates charged for the generation (or purchase) and *local* distribution of electricity, as well as metering/billing and customer services, provided these activities and services benefit the ultimate – or end-use – customers within the state.
- *Local* distribution primarily involves the movement of electricity across low-voltage distribution lines to the electricity meters of the state’s end-use customers (homes and businesses).
- In setting the electricity rates for end-use customers, state PUCs typically review state-regulated utility filings. The filings provide detail regarding all capital, maintenance, and operational costs associated with the construction and operation of generation and distribution facilities, as well as expenses associated with metering, billing, and customer service activities.
- State PUCs exercise general supervisory authority over regulated utilities. This authority has been applied in many states with the objective of requiring utilities to plan for and operate their systems in the “public interest. Public interest-related requirements include PUC-mandated installation of end-use efficiency measures, investment in renewable generation resources, and provision of discounted rates to low-income customers and prohibitions from shutting off service to the elderly.
- State PUCs tend to set utility rates in a manner that enables recovery of all prudently incurred costs, including additional costs incurred to execute public-interest related activities, as well as a reasonable rate of return on the utility’s in vested capital.
- Ultimately, the state PUCs set the rate of return on invested capital in part to reflect the utility’s performance with respect to cost, reliability and/or public-interest factors. That is, the rate of return may be increased or decreased (resulting in more or less shareholder profit) to reward or penalize the utility based on its ability
- to provide reliable service at the lowest possible cost.
- While FERC has jurisdiction over a portion of the electricity rate-setting process, the state PUC treats such FERC-approved rates (such as power purchase contracts) as a pass-through in state proceedings. As a result, electricity customers see a single bill that includes all federal- and state-approved charges.
- FERC has delegated to the state PUCs the responsibility to administer PURPA, the statute which requires electric utilities to purchase power from Qualifying Facilities at a price less than or equal to the costs the utility would incur if it produced the power itself.

Key Federal Regulatory Provisions

Figure 4
Key Federal Energy Milestones



There are currently five major federal laws affecting the electric industry, which are summarized in some detail below.

PURPA - Passed in 1978 as part of the National Energy Conservation Policy Act, the Public Utility Regulatory Policy Act (PURPA) encourages energy-efficient and environmentally conscious commercial energy production. This Act was designed to serve three purposes: to encourage conservation of energy supplied by electric utilities; to encourage optimal efficiency of electric utility facilities and resources; and to encourage equitable rates for electric consumers. PURPA defined a new class of energy producers called qualifying facilities. These producers are either small-scale producers of commercial energy who normally self-generate energy for their own needs but may have surplus energy, or incidental producers who happen to generate usable electric energy as a byproduct of other activities. When a facility of this type meets the requirements for ownership, size and efficiency, utility companies are obliged to purchase their energy based on a pricing structure referred to as avoided cost rates. These rates tend to be highly favorable to the producer, and are intended to encourage more production of this type of energy as a means of reducing emissions and dependence on other sources of energy.

Federal Power Act - The Federal Water Power Act in 1920 coordinated the development of hydroelectric projects in the United States. The act created the Federal Power Commission (FPC) (now FERC) as the licensing authority for these plants. The FPC regulated the interstate activities of the electric power and natural gas industries. The FPC's mandate called for it to maintain reasonable, nondiscriminatory and just rates to the consumer. In 1935 the law was renamed the Federal Power Act, and the FPC's regulatory jurisdiction was expanded to include all interstate electricity transmission. Additionally, the FPC could now regulate non-federal hydropower projects in order to support comprehensive development of rivers for energy generation and other beneficial uses. The Federal Power Act is the basis for federal jurisdiction over the electric and natural gas industries, and the responsibilities of the FERC.

EPAAct - There are two versions of the Energy Policy Act (EPAAct): one established in 1992, the other established in 2005. The EPAAct of 1992 amended parts of the Federal Power Act of 1935, and addressed many aspects of energy policy, such as the creation of exempt wholesale generators (increasing competition from independent non-utility power suppliers); energy efficiency, conservation and management; and natural gas imports and exports. Alternative fuel vehicles (including both vehicles capable of operating on nonpetroleum fuels and electric motor vehicles) were a significant part of the Act, which provided financial incentives to developers and users of clean-electric motor vehicles. The Act also established regulations requiring certain federal, state, and alternative fuel provider fleets to build an inventory of alternative fuel vehicles. The EPAAct of 2005 calls for the development of grant programs,

demonstration and testing initiatives, and tax incentives that promoted alternative fuels and advanced vehicles production and use. One such incentive is the Energy Efficient Commercial Buildings Deduction, which allows building owners to deduct the entire cost of lighting or building upgrades in the year the equipment is placed in service, subject to a cap.

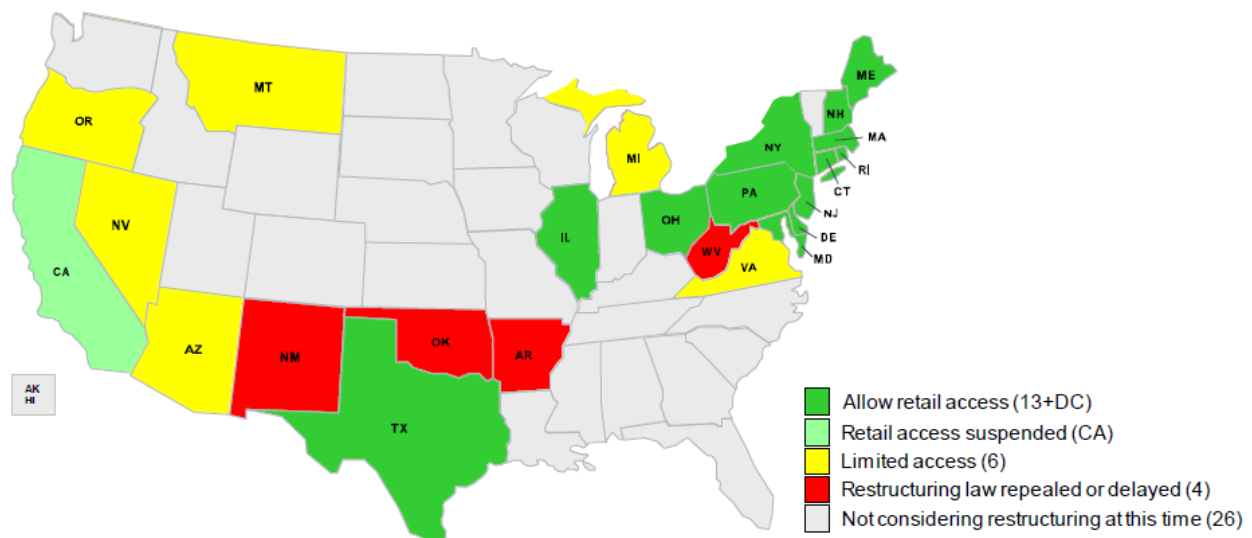
FERC Order 888 - In 1996, the Federal Energy Regulatory Commission (FERC) issued Order 888, which played a key role in opening the U.S. energy market to competition. This order required transmission providers to offer open-access transmission service on a nondiscriminatory basis to wholesale transmission customers. Order 888 also gave existing utilities, many of which made substantial investments based on older regulations, the right to recover their stranded costs from energy customers.

FERC Order 1000 - Order No. 1000 is a proposal by FERC to reform the electric transmission planning and cost allocation requirements for public utility transmission providers (POTPs) with the hope of removing barriers to the development of transmission facilities. This Order requires POTPs to improve transmission planning processes and allocate costs for new transmission facilities to beneficiaries of those facilities. The transmission planning requirements established in the rule include development of regional transmission plans, consideration of transmission needs driven by public policy requirements, and coordination between pairs of neighboring transmission planning regions. Each public utility transmission provider must participate in the regional transmission planning process.

Competition in the Industry

As noted above, towards the end of the 20th century, a combination of factors significantly increased the level of competition in the U.S. electric industry. The passage of PURPA and EPCRA 1992 opened up the generation of electricity to independent players. FERC decisions on transmission access complemented this movement, and some states took steps to break up the vertical integration of utilities within those states, and introduce retail competition. See Figure 5⁵ for a status of such industry restructuring across the states.

Figure 5
Status of Electricity Restructuring by State



⁵ Source: Compete Coalition

Initially over 20 states and the District of Columbia gave either all or some classes of retail electricity customers the right to choose their supplier of power, while still requiring that the local utility deliver that power to the customer's premises. Since that time, several states have suspended or reversed the introduction of retail competition. In most restructured states, utilities no longer are required to build or contract for generation to meet the needs of all customers within their (distribution service) franchise territory, though the local distribution utility tends to be responsible for providing "back up service and supply" in the event that the retail customer cannot or does not obtain power from a non-utility supplier. In theory, in these states the generation portion of electricity rates is determined by the prices customers are able to obtain from competitive suppliers, and is passed through on utility bills. To date, in states with retail competition, competitive supply has been strong among large commercial and industrial customers, but slow to materialize for smaller commercial and residential customers.

Industry and Regulatory Responsibilities

Industry and regulatory participants and their responsibilities in the electric industry can be broken down by key industry functions. Figure 6 presents these participants and responsibilities across three key functions: Reliability and Infrastructure, Wholesale Markets and Transmission, and Retail Supply and Rates.

Figure 6
U.S. Electric Industry Participants and Responsibilities

Function/ Description	Industry Participants	Oversight/Regulation		Current Issues
		Federal	State	
Reliability and Infrastructure				
<i>Resource Adequacy</i> – A company or region must have sufficient generation or demand response resources to meet expected peak loads plus reserves	Vertically-integrated utilities, RTOs/ISOs; reliability councils; wholesale generators and demand resource providers	FERC regulates wholesale markets in competitive regions where markets lead to new resources to meet RA needs. FERC oversees NERC as the “electric reliability organization” under the FPA; NERC delegates RA and TS implementation to- and oversees- regional councils (NPCC), with compliance standards that cascade down through regional organizations (ISO-NE, transmission owners, etc.)	In states with vertically-integrated companies, states oversee utility’s resource planning and procurement, and the siting of jurisdictional power plants	Competitive market regions – and FERC – are struggling with the challenge of aligning <i>transmission</i> planning with procurement of market-driven solutions (generation, demand response), to induce the most efficient outcome
<i>Transmission Security</i> – A company or region must plan for and ensure system operations can reliably continue in the face of contingencies (loss of generation or transmission); such planning includes identification of backstop transmission solutions to identified reliability needs	Vertically-integrated utilities, RTOs/ISOs; reliability councils; transmission owners		States generally must approve the siting of jurisdictional transmission lines and equipment	
Wholesale Markets/Transmission				
<i>Competitive Wholesale Markets</i> – Regions implement competitive wholesale markets for energy, capacity, ancillary services; there are also real-time “balancing” markets only in some regions	RTOs/ISOs, Wholesale generators, demand response providers, power purchasers (utilities, other suppliers)	FERC is responsible for the setting of wholesale rates in interstate commerce, and oversees the design, administration, and monitoring of wholesale markets	State do not have any direct authority over wholesale markets	FERC is promoting the expansion of transmission planning to include consideration of transmission to interconnect remote renewable generation and other “policy projects” which could change transmission planning, wholesale market design and transmission cost allocation
<i>Open Transmission Access</i> – Transmission owners must provide equal, non-discriminatory access to transmission facilities for all market participants	Transmission owners, RTOs/ISOs	FERC is responsible for the regulation of transmission in interstate commerce, and oversees transmission planning, access, and tariffs	States must pass tariffs for transmission that are approved by FERC through in the rates of their utilities	
Retail Supply and Rates				
<i>Regulated Cost of Service</i> at retail – rates paid by retail customers involve a mix of state and federal ratemaking authorities	Utilities, retail suppliers	FERC is responsible for setting rates for transmission in interstate commerce, which must be passed through to retail customers in state ratemaking processes; FERC oversees wholesale markets in restructured regions	State PUCs set rates for retail service for vertically integrated or distribution-only utilities on a cost-of-service basis; PUCs also regulate the procurement of supplies for default service customers by distribution utilities, and license competitive suppliers	Many states are turning to “decoupling” in rate setting in order to eliminate incentives for utilities to increase sales, removing a barrier to distributed generation and energy efficiency