

GAO

Report to the Chairman, Subcommittee
on Energy and Resources, Committee on
Government Reform, House of
Representatives

November 2005

ELECTRICITY RESTRUCTURING

Key Challenges Remain



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Highlights

Highlights of [GAO-06-237](#), report to the Chairman, Subcommittee on Energy and Resources, Committee on Government Reform, House of Representatives

Why GAO Did This Study

The electricity industry is in the midst of many changes, collectively referred to as restructuring, evolving from a highly regulated environment to one that places greater reliance on competition. This restructuring is occurring against a backdrop of constraints and challenges, including a shared responsibility for implementing and enforcing local, state, and federal laws affecting the electricity industry and an expected substantial increase in electricity demanded by consumers by 2025, requiring significant investment in new power plants and transmission lines. Furthermore, several recent incidents, including the largest blackout in U.S. history along the East Coast in 2003 and the energy crisis in California and other parts of the West in 2000 and 2001, have drawn attention to the need to examine the operation and direction of the industry.

At the Committee's request, this report summarizes results of previous GAO work on electricity restructuring, which was conducted in accordance with generally accepted government auditing standards. In particular, this report provides information on (1) what the federal government has done to restructure the electricity industry and the wholesale markets that it oversees, (2) how electricity markets have changed since restructuring began, and (3) GAO's views on key challenges that remain in restructuring the electricity industry.

www.gao.gov/cgi-bin/getrpt?GAO-06-237.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Jim Wells, 202-512-3841 or wellsj@gao.gov.

ELECTRICITY RESTRUCTURING

Key Challenges Remain

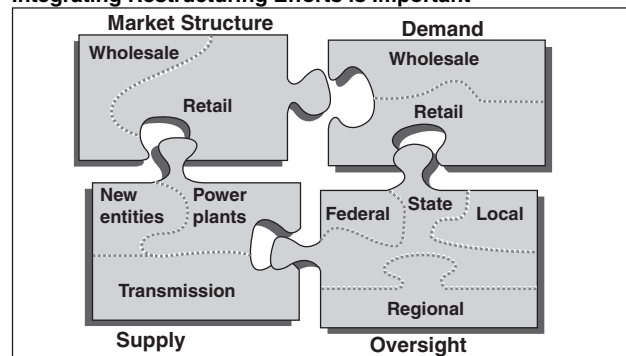
What GAO Found

Over the past 13 years, the federal government has taken a variety of steps to restructure the electricity industry with the goal of increasing competition in wholesale markets and thereby increasing benefits to consumers, including lower electricity prices and access to a wider array of retail services. In particular, the federal government has changed (1) how electricity is priced—shifting from prices set by regulators to prices determined by markets; (2) how electricity is supplied—including the addition of new entities that sell electricity; (3) the role of electricity demand—through programs that allow consumers to participate in markets; and (4) how the electricity industry is overseen—in order to ensure consumer protection.

Federal restructuring efforts, combined with efforts undertaken by states, have created a patchwork of wholesale and retail electricity markets; broadened electricity supplies; disconnected wholesale markets from retail markets, where most demand occurs; and shifted how the electricity industry is overseen. Taken together, these developments have produced some positive outcomes, such as progress in introducing competition in wholesale electricity markets, as well as some negative outcomes, such as periods of higher prices.

We have identified four key challenges to the effective operation of the restructured electricity industry: making wholesale markets work better together so that restructuring can deliver the benefits to consumers that were expected; providing clear and consistent signals to private investors when new plants are needed so that there are adequate supplies to meet regional needs; connecting wholesale markets to retail markets through consumer demand programs to keep prices lower and less volatile; and, resolving divided regulatory authority to ensure that these markets are adequately overseen. The theme cutting across each of these challenges is the need to better integrate the various market structures, factors affecting supply and demand, and various efforts at market oversight. This theme is illustrated below.

Integrating Restructuring Efforts is Important



Source: GAO.

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Abbreviations

FERC	Federal Energy Regulatory Commission
PUHCA	The Public Utility Holding Company Act of 1935
ISOs	Independent System Operators
RTOs	Regional Transmission Organizations

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United States Government Accountability Office
Washington, D.C. 20548

November 15, 2005

The Honorable Darrell E. Issa
Chairman
Subcommittee on Energy and Resources
Committee on Government Reform
House of Representatives

Dear Mr. Chairman:

Since 1992, the electricity industry has been in the midst of many changes, collectively referred to as restructuring. Before restructuring, electric service was provided primarily by federally and state-regulated electric utilities. A utility typically owned the power plants, transmission system, and local distribution lines that supplied electricity to all of the consumers in a geographic area. Under this system, the Federal Energy Regulatory Commission (FERC) regulated, among other things, sales of electricity for resale and the transmission of electricity over high-voltage power lines in interstate commerce.¹ The states regulated retail markets by participating with utilities in forecasting growth in demand, planning and building new power plants, reviewing and approving utility costs, and establishing rates of return. Since restructuring began, there has been a shift from a highly regulated environment to one that places greater reliance on competition.

This restructuring effort is occurring against a backdrop of constraints and challenges. First, it is occurring within a context of numerous federal and state laws and regulations that address clean air and water, fish and wildlife management, and irrigation and flood control. Second, responsibility for implementing and enforcing these laws and regulations is distributed across a wide range of federal, state, and local agencies. Third, electricity demanded by consumers is expected to rise 36 percent by 2025, requiring significant investment in new power plants and transmission lines. Furthermore, several recent events, including the largest blackout in U.S. history along the East Coast in 2003, the energy crisis in California and other parts of the West in 2000 and 2001, and rolling blackouts as recently as August 25, 2005, in southern California, have drawn attention to the need to examine the operation and direction of the industry.

¹FERC does not regulate most of Texas' electricity system because it is an independent transmission region that does not engage in interstate commerce.

In this context, you asked us to provide information on (1) what the federal government has done to restructure the electricity industry and the wholesale markets that it oversees, (2) how electricity markets have changed since restructuring efforts began, and (3) our views on key challenges that remain. As you requested, this report is based on our previous work, including 17 reports issued since 1998,² which was conducted in accordance with generally accepted government auditing standards. As a result, we did not seek additional comments on this report.

Results in Brief

Since at least 1992, the federal government has pursued a policy to restructure the electricity industry with the goal of increasing competition in wholesale markets and thereby increasing benefits to consumers, including lower electricity prices and access to a wider array of retail services. In particular, federal restructuring has changed how electricity is priced—shifting from prices set by regulators to prices determined by markets; how electricity is supplied—including the addition of new entities that sell electricity; the role of electricity demand—through programs that allow consumers to participate in markets; and how the electricity industry is overseen—in order to ensure consumer protection.

Federal restructuring efforts, combined with efforts undertaken by states, have fundamentally changed key aspects of how the electricity sector operates. First, because many of the changes have been made by FERC, which has limited jurisdiction over wholesale markets and no jurisdiction over retail sales, the changes have created a patchwork of wholesale and retail electricity markets. Some of these markets feature a greater role for competition, while others do not. Second, the introduction of a greater role for competition has broadened electricity supplies by allowing new suppliers to participate in markets. Some of these suppliers sell electricity across wide geographic regions and multiple states, which has broadened supplies and made markets more regional. Third, while actions taken at the wholesale level have encouraged prices to be set by the direct interaction of supply and demand, there have not been widespread similar efforts on retail prices, resulting in a disconnection of wholesale markets from retail markets. Fourth, although regulatory authority remains divided between federal, state, and local entities, restructuring has shifted the way electricity markets are overseen. Taken together, these developments have

²See the list of related GAO products at the end of this report.

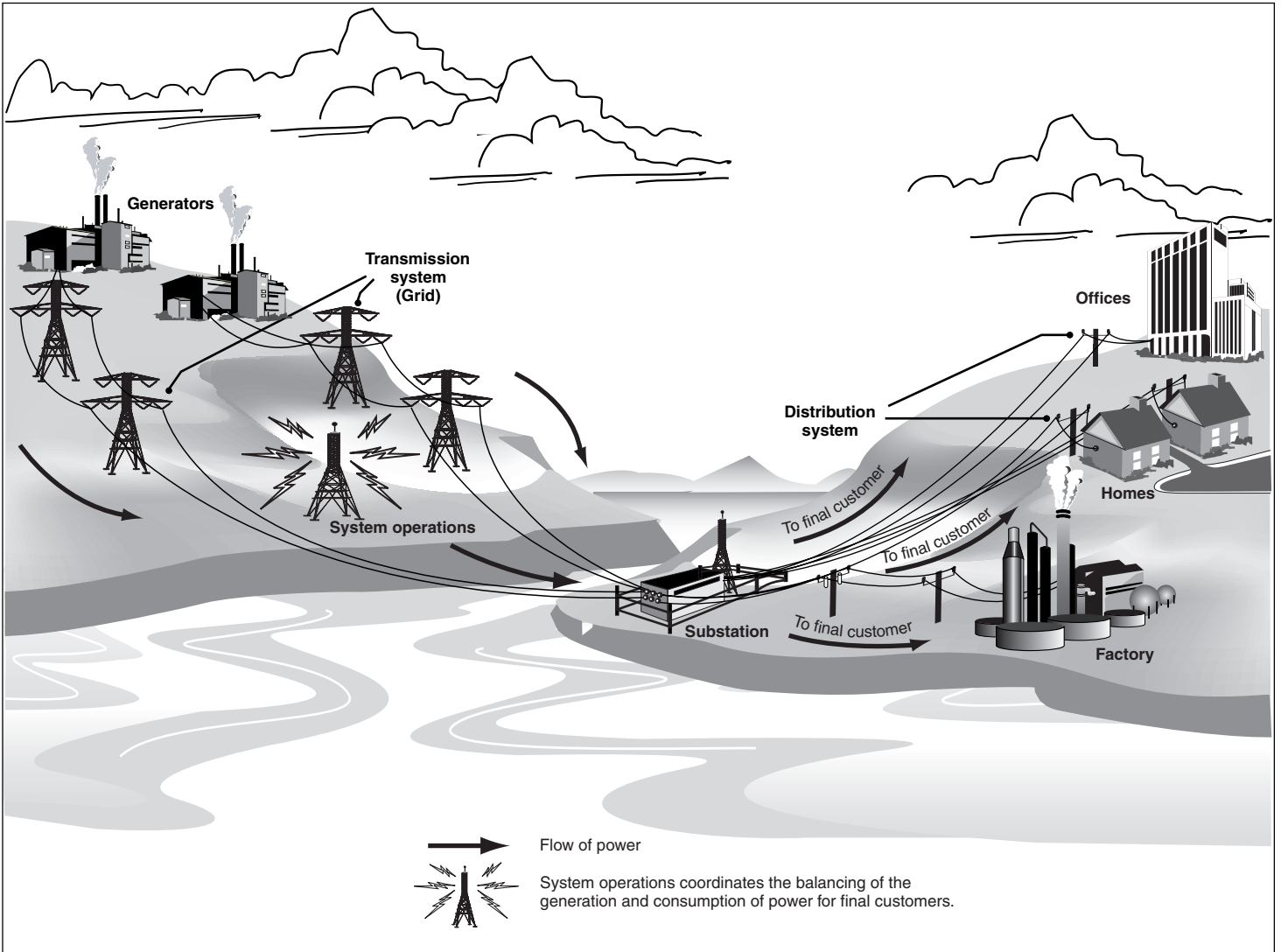
produced some positive outcomes, such as progress in introducing competition in wholesale electricity markets, and some negative outcomes, such as periods of substantially higher prices in some areas of the country.

We have identified four key challenges to achieving the goals of a restructured electricity industry: (1) making wholesale markets work better together so that restructuring can deliver the benefits to consumers that were expected, (2) providing clear and consistent signals so that there are adequate supplies to meet regional needs, (3) connecting wholesale markets to retail markets through consumer demand programs to keep prices lower and less volatile, and (4) resolving divided regulatory authority to ensure that these markets are adequately overseen. Not adequately addressing these issues could result in an electricity industry that does not provide consumers with the sufficient quantities of reliable, reasonably priced electricity that has been a mainstay of our nation's economic and social progress.

Background

The electricity industry is based on four distinct functions: generation, transmission, distribution, and system operations. (See fig. 1.) Once electricity is generated—whether by burning fossil fuels; through nuclear fission; or by harnessing wind, solar, geothermal, or hydro energy—it is sent through high-voltage, high-capacity transmission lines to electricity distributors in local regions. Once there, electricity is transformed into a lower voltage and sent through local distribution wires for end-use by industrial plants, commercial businesses, and residential consumers.

Figure 1: Functions of the Electricity Industry



Source: GAO.

A unique feature of the electricity industry is that electricity is consumed at almost the very instant that it is produced. As electricity is produced, it leaves the generating plant and travels at the speed of light through transmission and distribution wires to the point of use, where it is immediately consumed. In addition, electricity cannot be easily or inexpensively stored and, as a result, must be produced in near-exact

quantities to those being consumed. Because electric energy is generated and consumed almost instantaneously, the operation of an electric power system requires that a system operator balance the generation and consumption of power. The system operator monitors generation and consumption from a centralized location using computerized systems and sends minute-by-minute signals to generators reflecting changes in the demand for electricity. The generators then make the necessary changes in generation in order to maintain the transmission system safely and reliably. Absent such continuous balancing, electrical systems would be highly unreliable, with frequent and severe outages.

Historically, the electric industry developed initially as a loosely connected structure of individual monopoly utility companies, each building power plants and transmission and distribution lines to serve the exclusive needs of all the consumers in their local areas. Such monopoly utility companies were typically owned by shareholders and were referred to as investor-owned utilities. In addition to these investor-owned utilities, several types of publicly owned utilities, including rural cooperatives, municipal authorities, state authorities, public power districts, and irrigation districts, also began to sell electricity. About one-third of these publicly owned utilities are owned collectively by their customers and generally operate as not-for-profit entities. Further, nine federally owned entities, including the Tennessee Valley Authority and the Bonneville Power Administration, also generate and sell electricity—primarily to cooperatives, municipalities, and other companies that resell it to retail consumers.

Because the utilities operated as monopolies, wholesale and retail electricity pricing was regulated by the federal government and the states. The Public Utility Holding Company Act of 1935 (PUHCA) and the Federal Power Act of 1935 established the basic framework for electric utility regulation. PUHCA, which required federal regulation of these companies, was enacted to eliminate unfair practices by large holding companies that owned electricity and natural gas companies in several states. The Federal Power Act created the Federal Power Commission—a predecessor to FERC—and charged it with overseeing the rates, terms, and conditions of wholesale sales and transmission of electric energy in interstate commerce. FERC, established in 1977, approved interstate wholesale rates based on the utilities' costs of production plus a fair rate of return on the utilities' investment. States retained regulatory authority over retail sales of electricity, electricity generation, construction of transmission lines within their boundaries, and intrastate transmission and distribution. Generally,

states set retail rates based on the utility's cost of production plus a rate of return.

The Federal Government Has Taken Steps to Increase Competition in the Electricity Industry and Wholesale Markets

The goal of federal efforts to restructure the electricity industry is to increase competition in order to provide benefits to consumers, such as lower prices and access to a wider range of services, while maintaining reliability. Over the past 13 years, the federal government has taken a series of steps to encourage this restructuring that generally fall into four key categories: (1) market structure, (2) supply, (3) demand, and (4) oversight.

Regarding market structure, federal restructuring efforts have changed how electricity prices are determined, replacing cost-based regulated rates with market-based pricing in many wholesale electricity markets. In this regard, efforts undertaken predominantly by FERC have helped to encourage a shift from a market structure that is based on monopoly utilities providing electricity to all customers at regulated rates to one in which prices are determined largely by the interaction of supply and demand. In prior work, we reported that increasing competition required that at least three key steps be taken: increasing the number of buyers and sellers, providing adequate market information, and allowing potential market participants the freedom to enter and exit the industry.³

In terms of supply, federal restructuring efforts have generally focused on allowing new companies to sell electricity, requiring the owners of the transmission systems to allow these new companies to use their lines, and approving the creation of new entities to fairly administer these markets. The Energy Policy Act of 1992 made it easier for new companies, referred to as nonutilities,⁴ to enter the wholesale electricity market, which expanded the number of companies that can sell electricity. For example, we reported that from 1992 through 2002, FERC had authorized 850 companies to sell electricity at market-based rates. To allow these companies to buy and sell electricity, FERC also required that transmission owners under its jurisdiction, generally large utilities, allow all other entities to use their transmission lines under the same prices, terms, and

³GAO, *Lessons Learned from Electricity Restructuring: Transition to Competitive Markets Underway, but Full Benefits Will Take Time and Effort to Achieve*, [GAO-03-271](#) (Washington, D.C.: December 17, 2002).

⁴Companies that generate, buy, and/or sell electricity but do not transmit electricity.

conditions as those that they apply to themselves. To do this, FERC issued orders that required the regulated monopoly utilities—which had historically owned the power plants, transmission systems, and distribution lines—to separate their generation and transmission businesses.⁵ In addition, in response to concerns that some of these new companies received unfair access to transmission lines, which were mostly still owned and operated by the former utilities, FERC encouraged the utilities that it regulated to form new entities to impartially manage the regional network of transmission lines and provide equal access to all market participants, including nonutilities. These entities, including independent system operators (ISOs) and regional transmission organizations (RTOs), operate transmission systems covering significant parts of the country. One of these, the California ISO, currently oversees the electricity network spanning most of the state of California. Another important effort to facilitate the interaction of buyers and sellers was FERC’s approval of the creation of several wholesale markets for electricity. These markets created centralized venues for market participants to buy and sell electricity. Finally, FERC has undertaken efforts to improve the availability and accuracy of price information used by suppliers, such as daily market prices reported to news services, and has established guidelines for the conduct of sellers of wholesale electricity, requiring these entities to, among other things, accurately report prices and other data to news services.

Federal efforts to affect demand at the wholesale level have focused on encouraging prices in wholesale markets to be established by the direct interaction between buyers and sellers in these markets. We previously reported that there were several centralized markets in which suppliers and buyers submitted bids to buy and sell electricity and that other types of market-based trading were also emerging, such as Internet-based trading systems.⁶ However, there have been few federal efforts to directly affect prices at the retail level, where most electricity that is consumed is purchased, because states, and not the federal government, have regulatory authority for overseeing retail electricity markets. As part of its efforts to have prices set by the direct interaction of supply and demand, FERC has approved proposals to incorporate so-called “demand-response” programs into the markets that it oversees. These programs, among other things,

⁵A process referred to as “unbundling.”

⁶GAO-03-271.

allow electricity buyers to see electricity prices as they change throughout the day and provide the choice to sell back electricity that they otherwise would have used. For example, we reported that FERC had approved one such program in New York State that allows consumers to offer to sell back specific amounts of electricity that they are willing to forgo at prices that they determine.⁷ More recently, the Energy Policy Act of 2005 requires FERC to study issues such as demand-response and report on its findings to the Congress.

Finally, restructuring has fundamentally changed how electricity markets are overseen and regulated. Historically, FERC had ensured that prices in wholesale electricity markets were “just and reasonable” by approving rates that allowed for the recovery of justifiable costs and providing for a regulated rate of return, or profit. To ensure that prices are just and reasonable in today’s restructured electricity markets, FERC has shifted its regulatory role to approving rules and market designs, proactively monitoring electricity market performance to ensure that markets are working rather than waiting for problems to develop before acting, and enforcing market rules.⁸ As part of its decision to approve the creation of market designs that include ISOs and RTOs, FERC approved the creation of market monitoring units within these entities. These market monitors are designed to routinely collect information on the activities in these markets including prices; perform up-to-the-minute market monitoring activities, such as examining whether prices appear to be the result of fair competition or market manipulation; and can impose penalties, such as fines, when they identify that rules have been violated. More recently, the Energy Policy Act of 2005 granted FERC authority to impose greater civil penalties on companies that are found to have manipulated the market.

⁷GAO, *Electricity Markets: Consumers Could Benefit from Demand Programs, but Challenges Remain*, [GAO-04-844](#) (Washington, D.C.: August 13, 2004).

⁸While FERC is the principal federal regulator for the electricity industry, other federal agencies also play important roles in regulating energy markets, including the Commodity Futures Trading Commission.

Electricity Markets Have Changed in Several Important Ways Since Restructuring Began

Federal restructuring efforts, combined with efforts undertaken by states, have created a patchwork of electricity markets, broadened electricity supplies, disconnected wholesale and retail markets, and shifted how the electricity industry is overseen. Taken together, these developments have produced some positive and some negative outcomes for consumers.

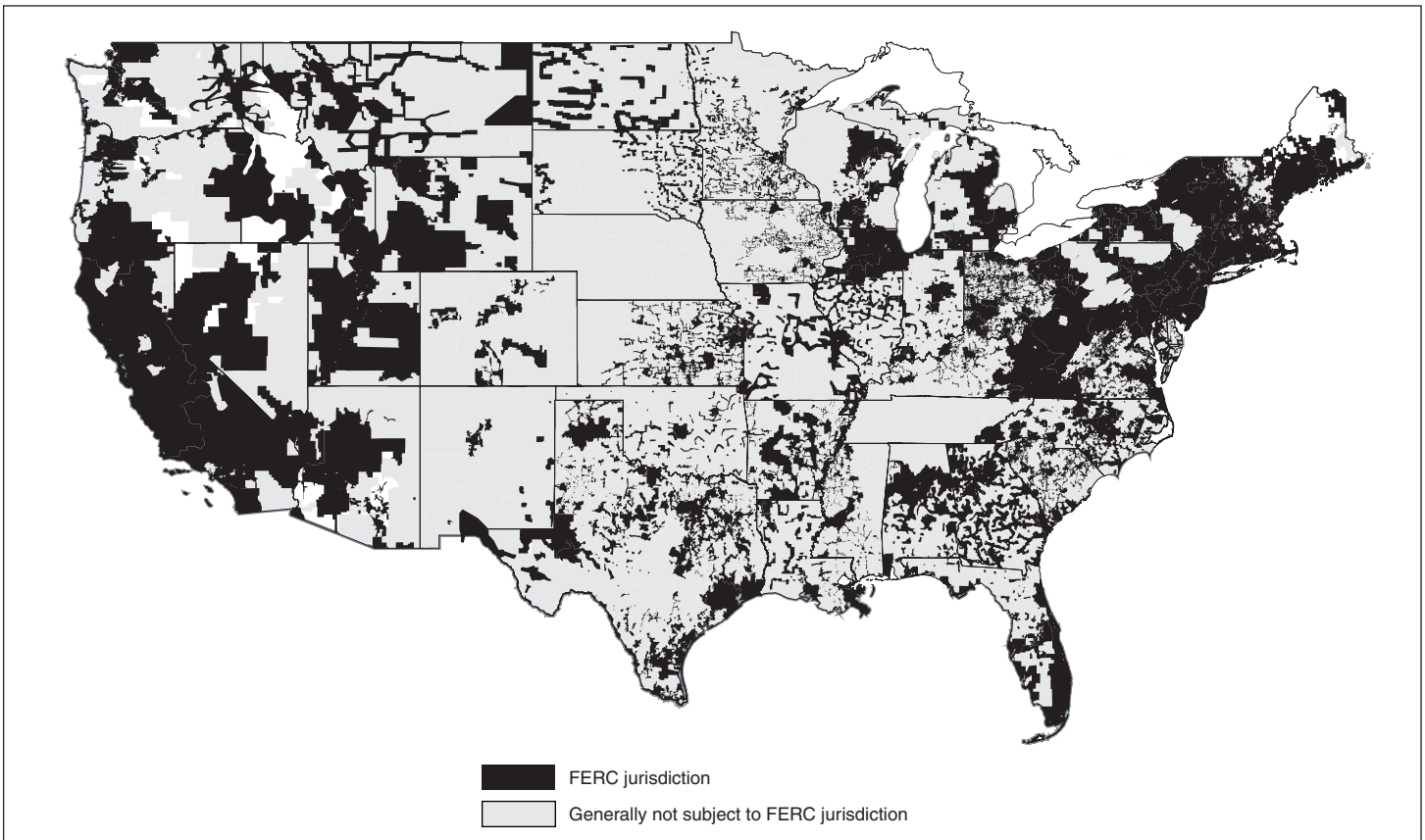
In terms of market structure, we previously reported that the combined effects of the federal efforts and those of some states have created a patchwork of wholesale and retail electricity markets.⁹ In the wholesale markets, there is a combination of restructured and traditional markets because FERC's regulatory authority is limited. As a result, some entities—including municipal utilities and cooperatively owned utilities—have not been required to make the changes FERC has required others to make.¹⁰ As shown in figure 2, collectively the areas not generally subject to FERC jurisdiction span a significant portion of the country. In addition, even where FERC has clear jurisdiction, it has historically approved a variety of different rules that govern how each of the transmission networks is controlled and what types of wholesale markets may exist. In the retail electricity markets, state utility commissions or local entities historically have controlled how prices were set, as well as approved power plants, transmission lines, and other capital investments. Because each state performed these functions slightly differently, these rules vary. In addition, many states also have shifted the retail markets that they oversee toward competition. As we reported in 2002, 24 states and the District of Columbia had enacted legislation or issued regulations that planned to open their retail markets to competition.¹¹ As of 2004, 17 states had actually opened their retail markets to competition, according to the Energy Information Administration. One of these states, California, opened its retail markets to competition but has taken steps to limit the extent of competition.

⁹GAO-03-271.

¹⁰Municipal utilities are city-owned electricity suppliers, such as the Los Angeles Department of Water and Power. Cooperatively owned utilities are customer-owned electricity suppliers, historically more common in rural areas.

¹¹GAO-03-271.

Figure 2: Areas Served by Entities Subject to FERC Jurisdiction, 2002



Source: GAO analysis of PowerMap data provided by Platt's/RDI.

Notes:

Areas served by entities generally not subject to FERC jurisdiction include areas served by publicly owned entities, such as municipal utilities, cooperative utilities, and others.

Data on service territories include some overlaps, indicating that some areas are served by both entities subject to FERC jurisdiction and entities not generally subject to FERC jurisdiction, particularly some areas in Pennsylvania, Michigan, Wisconsin, and Iowa. Data reflected above depict those areas of overlap as not generally subject to FERC jurisdiction.

Unshaded portions of the map indicate either that no electric service is provided or the service area is very small.

In terms of supply, efforts to restructure the electricity industry by the federal government and some states have broadened electricity markets overall—shifting the focus from state and/or local supply to multistate or regional supply. In particular, efforts at wholesale restructuring have led to a significant change in the way electricity is supplied in those markets. The

introduction of ISOs and RTOs in many areas has provided open access to transmission lines, allowing more market participants to compete and sell electricity across wide geographic regions and multiple states. In addition, in some parts of the country, overall supply has grown as a result of the large increase in new generating capacity that has been built by nonutility companies, while other regions have witnessed smaller increases in supply. For example, we reported that, by 2002, Texas had added substantial amounts of generating capacity—more than double the forecasted amount needed through 2004.¹² In contrast, in California only about 25 percent of the forecasted need had been built over the same period, and the region witnessed a historic market disruption costing consumers billions of dollars. Similarly, the opening of retail markets has also widened the scope of electricity markets by allowing new and different entities to sell electricity, which works to further broaden markets because these retail sellers must either build or buy a power plant or rely on wholesale markets. Finally, FERC has improved the transparency of wholesale markets, a key requirement of competitive markets, by increasing the availability and accuracy of price and other market information.

In terms of demand, while federal efforts have encouraged price setting by the interaction of supply and demand, this approach has not been widely adopted in retail markets. Even though FERC and other electricity experts have determined that it is important for demand to be responsive to prices and other factors for competitive markets to operate efficiently, as we reported in 2004, the use of these programs remains limited.¹³ In many retail markets, including some states where retail markets have been opened to competition, prices are still set so that rates are either flat or have been frozen. In either case, prices are not reflective of the hourly costs of providing electricity. In some cases, demand-response programs are in place but are aimed at only certain types of customers, such as some commercial and industrial customers. Overall, these customers account for only a small share of total demand. As a result, in this hybrid system, wholesale and retail markets remain disconnected, with competition setting wholesale prices in many areas, and state regulation setting retail prices in many states.

¹²GAO, *Restructured Electricity Markets: Three States' Experiences in Adding Generating Capacity*, GAO-02-427 (Washington, D.C.: May 24, 2002).

¹³GAO-04-844.

Regulatory oversight of the electricity industry remains divided among federal, regional, and state entities. As we have previously reported, FERC initially did not adequately revise its regulatory and oversight approach to respond to the transition to competitive energy markets.¹⁴ However, it has made progress in recent years in defining its role, developing a framework for overseeing the markets, and beginning to use an array of data and analytical tools to oversee the market. In particular, FERC established the Office of Market Oversight and Investigations in 2002, which oversees the markets by monitoring its enforcement hotline for tips on misconduct; conducting investigations and audits; and reviewing large amounts of data—including wholesale spot and futures prices, plant outage information, fuel storage level data, and supply and demand statistics—for anomalies that could lead to potential market problems. In addition to FERC's own efforts, substantial oversight also now occurs at the regional level, through ISO and RTO market monitoring units. These units monitor their region's market to identify design flaws, market power abuses, and opportunities for efficiency improvements and report back to FERC periodically. Finally, states' oversight roles vary. Those states that have not restructured their markets retain key roles in overseeing and regulating electricity markets directly and indirectly through such activities as setting rates to recover costs and siting of power plants and transmission lines and other capital investments needed to supply electricity. The ability of states that have restructured their retail markets, to oversee their markets is more limited, according to experts.

The effects of restructuring on consumers have been mixed. While most studies evaluating wholesale electricity markets, including our own assessment, have determined that progress has been made in introducing competition in wholesale electricity markets, results at the retail level have been difficult to measure. For example, in 2002, we reported that prices generally fell after restructuring and fell in particular in many areas that had implemented retail restructuring.¹⁵ However, we were unable to attribute these price decreases solely to restructuring, since several other factors, such as lower prices for natural gas and other fuels used in the production of electricity, could have contributed to the price decreases. Furthermore, while some consumers had benefited by paying lower prices,

¹⁴GAO, *Energy Markets: Additional Actions Would Help Ensure that FERC's Oversight and Enforcement Capability Is Comprehensive and Systematic*, [GAO-03-845](#) (Washington, D.C.: Aug. 15, 2003).

¹⁵GAO-03-271.

others have experienced high prices and market manipulation. For example, in 2002, we reported that nationally, consumers benefited from price declines of as much as 15 percent since federal restructuring efforts began.¹⁶ However, as consumers in California and across other parts of the West will attest, there have been many negative effects, including higher prices and market manipulation. More recently, electricity prices have risen, potentially the result of higher prices for fuels such as natural gas and petroleum, and other factors.

Four Key Challenges Remain Unresolved

We have identified four key challenges that, if addressed, could benefit consumers and the restructured electricity markets that serve them.

Making Wholesale Market Structures Work Better Together

With several fundamentally different electricity market structures in place simultaneously in various parts of the country, it is important that these markets work together better in order to meet regional needs. As we previously reported, two aspects of the current electricity markets serve to limit the benefits expected from restructuring.¹⁷ First, FERC's limited authority has meant that significant parts of the market and significant amounts of transmission lines have not been subject to FERC's effort to restructure wholesale markets—creating “holes” in the national restructured wholesale market. These gaps, where efforts to open wholesale markets have not been undertaken, may limit the number of potential participants and the types of transactions that can occur, thereby limiting the benefits expected from competition.¹⁸ Second, where FERC has clear authority, it has historically approved a range of rules for how the different transmission systems and centralized wholesale markets operate—creating “seams” where these different jurisdictions meet and the rules change. We have previously noted that the lack of consistent rules among restructured wholesale markets limits the extent of competition across wholesale markets and, in turn, limits the benefits expected from competition.¹⁹ California experienced this firsthand, as it tried to “cap”

¹⁶GAO-03-271.

¹⁷GAO-03-271.

¹⁸GAO-03-271.

¹⁹GAO-03-271.

wholesale electricity prices in its state market—establishing rules different from those in the markets surrounding California. The lower price cap in California, coupled with an exemption for electricity imports, created incentives to sell electricity to areas outside the state (where prices were higher) and later import it (because imports were exempt from the price cap).

FERC has acknowledged that the lack of consistent rules can lead to discrimination in access, raise costs, and lead to reliability problems. As a result, FERC made an effort to standardize the various wholesale market designs under its jurisdiction. However, these efforts met with sharp criticism from some industry stakeholders. FERC ended its effort to require a single market design in all regions and has, instead, promoted voluntary participation in RTOs and having the RTOs work together to reconcile their differences. In the end, today's patchwork of wholesale market structures, with holes and seams, is at odds with the physics of the interdependent electricity industry, where electrons travel at the speed of light and do not stop neatly at jurisdictional boundaries. Successfully developing markets will require the alignment of market structures and rules in order to reconcile them with these physical certainties.

Providing Timely, Clear, and Consistent Signals to Help Ensure Adequate Regional Supplies

Broadening of restructured electricity markets has made the federal government, the states, and localities more dependent on each other in order to ensure a sufficient supply of electricity. We previously concluded that, as federal and state restructuring efforts broaden electricity markets to span multiple states, states will become more interdependent on each other for a reliable electricity supply.²⁰ Consequently, one state's problems acquiring and maintaining an adequate supply can now affect its neighbors. For example, in the lead up to the western electricity crisis in 2000-2001, few power plants were built to meet the rising demand in California, which became dependent on power plants located outside the state. However, when prices began to rise, this affected consumers, both inside and outside California. We previously reported these higher prices had implications for California consumers such as higher electricity bills, as well as others located outside the state, costing billions of additional dollars. Because of these negative outcomes, some have questioned whether restructuring will eventually benefit consumers.

²⁰GAO-02-427.

More broadly, rising interdependence has significant implications for many industry stakeholders, especially in light of the shift in how plants are financed and built. In the past, monopoly utilities proposed, and regulators approved, the construction of new power plants and other infrastructure. Today, policymakers at all levels of government must recognize that providing consumers with reliable electricity in competitive markets requires private investors to make reasoned investments. We have reported that these private investors make decisions on investing by balancing their perceptions of potential risk and profitability.²¹ Further, we concluded that the reliability of the electricity system and, more generally, the success of restructuring, now hinges on whether these developers choose to enter a market and how quickly they are able to respond to the need for new power plants. The implications of this broadening of electricity markets are important, since it has occurred while most of the primary authorities associated with building new power plants, such as state energy siting or local land use planning, still rest with states and localities. As we have reported, there is sometimes considerable variation across states and localities in how long these processes take and how much they cost, and building new power plants can take a year or more once all the approvals are obtained. Because of the broader electricity markets, one state's or locality's processes and decisions provide signals affecting private investors' perceptions of the risk or profitability of making investments in local areas and can have long-lasting implications for the entire region. In this context of growing interdependence for adequate electricity supplies, our work shows that it is important for federal, state, and local entities to provide timely, clear, and consistent signals that allow private developers to make the kinds of reasonable and long-term investments that are needed.

Connecting Wholesale and Retail Markets

As we have previously reported, for competitive wholesale electricity markets to provide the full benefits expected of them, it is essential that they be connected to the retail markets, where most electricity is sold and consumed.²² Otherwise, hybrid electricity markets—wholesale prices set by competition and retail prices set by regulation—will be difficult to manage because consumers at the retail level can unknowingly drive up wholesale prices during periods when electricity supplies are limited. This

²¹GAO-02-427.

²²GAO-04-844.

occurs when consumers do not see prices at the retail level that accurately reflect the higher wholesale market prices. Seeing only these lower electricity prices, consumers use larger quantities of electricity than they would if they saw higher prices, which raises costs and can risk reliability. We have noted that, in this environment (consumers seeing low retail prices during periods of high wholesale prices) consumers have little incentive to reduce their consumption during periods when prices are high or reliability is at risk. The appeal of seeming to insulate retail consumers from wholesale market fluctuations may be compelling, but most experts agree that the lack of significant demand response can actually lead to higher and more volatile prices. In 2004, we concluded that this system makes it difficult for FERC to ensure that prices in wholesale markets are just and reasonable.²³ We further concluded that connecting wholesale and retail markets through demand-response programs such as real-time pricing or reliability-based programs would help competitive electricity markets function better, enhance the reliability of the electricity system, and provide important signals that consumers should consider investments into energy-efficient equipment.²⁴ Such signals would work to reduce overall demand in a more permanent way.

While FERC has been supportive of increasing the role of demand-response programs in the wholesale markets that it oversees, there have been limited efforts to do so in retail markets—these markets are outside FERC’s jurisdiction and overseen by the states. Some states, such as California, have a long history with demand-response programs and have conducted more recent experiments with using it in more widespread ways. Sharing and building upon these and other examples could help develop efficient ways to bring the consumers who flip the light switches into the markets responsible for ensuring that their lights go on. Since electricity travels at the speed of light, retail markets where electricity is consumed are tightly connected to the wholesale markets that supply these retail markets. As a result, much of the success of federal restructuring of the wholesale markets relies on actions taken at the state level to bring consumers into the market.

²³[GAO-04-844](#).

²⁴Real-time pricing refers to markets where consumers see retail prices that are closely linked the frequently changing wholesale prices. Reliability-based programs refer to any of a variety of programs that allow the operators of the electricity system to enter into voluntary agreements with electricity consumers, who are compensated, that allow the grid operator to reduce overall demand on short notice.

Resolving Divided Regulatory Responsibilities

Significant changes in how oversight is carried out in competitive markets, combined with the divided regulatory authority over the electricity industry, has made effective oversight difficult. We previously reported that FERC, the states, and other market monitors were neither fully monitoring the overall performance of all wholesale and retail markets nor collecting sufficient data to do so, thus limiting the opportunity to meaningfully compare performance.²⁵ At the federal level, FERC protects customers primarily through ensuring that prices in the wholesale markets are just and reasonable. In prior work, we found that FERC did not initially revise its oversight approach adequately in response to restructured markets, resulting in markets that were not adequately overseen.²⁶ However, more recently, we reported that FERC has made significant efforts to revise its oversight strategy to better align with its new role overseeing restructured markets, has taken a more proactive approach to monitoring the performance of markets, and has better aligned its workforce to fit its needs in these new markets.²⁷ Recent actions will require further changes to FERC's role. The Energy Policy Act of 2005 provided FERC additional authority to establish reliability rules for all "users, owners, and operators" of the transmission system. We had previously reported that this change would be desirable, but it is too early to judge its success.²⁸ At the state level, oversight varies widely. States that have retained traditionally regulated retail markets continue to require substantial amounts of information to help them set the regulated prices that consumers see. The states that now feature restructured retail markets face a sharply different oversight role of policing their state-level retail markets for misbehavior and signs of market malfunction. The introduction of the market monitoring units within ISOs and RTOs adds a new layer of regional oversight to the existing federal and state roles. While authority over the electricity industry is divided, restructuring has served to make the success of each of the oversight efforts more interdependent, and FERC and the states will have to rely on each other, as well as on new entities, to a greater degree than before to be successful.

²⁵GAO-03-271.

²⁶GAO, *Energy Markets: Concerted Actions Needed by FERC to Confront Challenges That Impede Effective Oversight*, GAO-02-656 (Washington, D.C.: June 14, 2002).

²⁷GAO-03-845.

²⁸GAO-03-271.

Concluding Observations

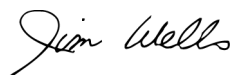
It is becoming increasingly clear that many of the challenges facing the electricity industry are rooted in the interdependence of actions taken by federal, state, local, and private entities, as well as consumers. Accordingly, the individual challenges we have discussed follow a central theme—the need to integrate the various ongoing activities and efforts and harmonize them in a way that improves the functioning of the marketplace while providing adequate oversight to protect electricity consumers. This will not be easy because it requires what is, at times, most difficult: collaboration and cooperation among entities with a history of independence.

Successfully restructuring the electricity industry is an ongoing process that will require rethinking old issues, such as jurisdictional responsibilities, and applying new and creative ideas to help bridge the current gap between wholesale and retail markets. Only if interdependent parties work together will electricity restructuring succeed in delivering benefits to U.S. consumers by way of healthy, viable, and competitive markets. Not adequately addressing these issues could result in an electricity industry that does not provide consumers with sufficient quantities of the reliable, reasonably priced electricity that has been a mainstay of our nation's economic and social progress.

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Sincerely yours,

A handwritten signature in cursive script that reads "Jim Wells".

Jim Wells
Director, Natural Resources
and Environment

GAO Contact and Staff Acknowledgments

GAO Contact

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Meeting Energy Demand in the 21st Century: Many Challenges and Key Questions. [GAO-05-414T](#). Washington, D.C.: March 16, 2005.

Electricity Markets: Consumers Could Benefit from Demand Programs, but Challenges Remain. [GAO-04-844](#). Washington, D.C.: August 13, 2004.

Energy Markets: Additional Actions Would Help Ensure That FERC's Oversight and Enforcement Capability Is Comprehensive and Systematic. [GAO-03-845](#). Washington, D.C.: August 15, 2003.

Electricity Markets: FERC's Role in Protecting Consumers. [GAO-03-726R](#). Washington, D.C.: June 6, 2003.

Energy Markets: Concerted Actions Needed by FERC to Confront Challenges That Impede Effective Oversight. [GAO-02-656](#). Washington, D.C.: June 14, 2002.

Electricity Restructuring

Electricity Restructuring: 2003 Blackout Identifies Crisis and Opportunity for the Electricity Sector. [GAO-04-204](#). Washington, D.C.: November 18, 2003.

Electricity Restructuring: Action Needed to Address Emerging Gaps in Federal Information Collection. [GAO-03-586](#). Washington, D.C.: June 30, 2003.

Lessons Learned from Electricity Restructuring: Transition to Competitive Markets Underway, but Full Benefits Will Take Time and Effort to Achieve. [GAO-03-271](#). Washington, D.C.: December 17, 2002.

Restructured Electricity Markets: California Market Design Enabled Exercise of Market Power. [GAO-02-828](#). Washington, D.C.: June 21, 2002.

Restructured Electricity Markets: Three States' Experiences in Adding Generating Capacity. [GAO-02-427](#). Washington, D.C.: May 24, 2002.

Electric Utility Restructuring: Implications for Electricity R&D. [T-RCED-98-144](#). Washington, D.C.: March 31, 1998.

Western Electricity Crisis

Restructured Electricity Markets: California Market Design Enabled Exercise of Market Power. [GAO-02-828](#). Washington, D.C.: June 21, 2002.

California Electricity Market: Outlook for Summer 2001. [GAO-01-870R](#). Washington, D.C.: June 29, 2001.

California Electricity Market Options for 2001: Military Generation and Private Backup Possibilities. [GAO-01-865R](#). Washington, D.C.: June 29, 2001.

Energy Markets: Results of Studies Assessing High Electricity Prices in California. [GAO-01-857](#). Washington, D.C.: June 29, 2001.

Federal Power

Bonneville Power Administration: Better Management of BPA's Obligation to Provide Power Is Needed to Control Future Costs. [GAO-04-694](#). Washington, D.C.: July 9, 2004.

Bonneville Power Administration: Long-Term Fiscal Challenges. [GAO-03-918R](#). Washington, D.C.: June 27, 2003.

Federal Power: The Evolution of Preference in Marketing Federal Power. [GAO-01-373](#). Washington, D.C.: February 8, 2001.

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