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Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives

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ELECTRICITY SUPPLY

The Effects of Competitive Power Purchases Are Not Yet Certain

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GAO

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Resources, Community, and
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The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In response to a request made during an April 1989 discussion with your office, we agreed to review plans for meeting part of the nation's future electric power needs through utilities' use of competitive power purchases. This report examines electric utilities' use of competitive bidding to purchase electricity from nonutility generating sources and identifies how such purchases might affect the reliability and cost of electric power.

Competitive bidding is a relatively recent development in the utility industry; the first competitive bid solicitation for purchases of electricity occurred in 1984. To respond to your request, we reviewed, as case studies, the experiences of three utilities—Boston Edison, Central Maine Power, and Virginia Power—that are among the first U.S. utilities to use competitive bidding for purchases of electricity.

Results in Brief

Because several years are often required to construct generating sources, utilities have little operating experience with competitively purchased electricity. Thus, the effects of competitive power purchases on the long-term reliability of electric service—which is affected by the reliablity of all sources and transmission and distribution facilities—are not yet certain and difficult to assess. Among the three utilities reviewed, only at Central Maine Power have sources of competitively purchased power entered service, and they have operated reliably. However, each utility reviewed has accepted bids that were subsequently withdrawn, for financial or other reasons, prior to scheduled service dates. When selecting nonutility generators, these utilities act to ensure the reliability of service through establishing project selection criteria and contract terms, which consider, for example, a source's ability to dispatch power on demand and to demonstrate sound financing. These utilities also have contingency plans if competitively purchased power is not delivered as planned.

Determining competitive bidding's long-term effects on the cost of electricity requires estimating the future costs and demand for electricity. These estimates are uncertain because they rely on assumptions about unknown factors like future fuel prices. All three utilities estimated the cost of competitively purchased power to be less than the cost of generating it themselves or purchasing it from another source, such as a neighboring utility. Potential impacts on cost depend in part on how utilities design their bidding systems, for example, on whether utilities announce a ceiling price they are willing to pay. Also, potential impacts on cost could be affected by constraints that limit the number of eligible participants in wholesale markets, such as a lack of access to transmission facilities.

Background

Most electricity in the United States is produced by utilities that own and operate facilities for the generation, transmission, and distribution of power. Utilities traditionally have operated as regulated monopolists, each within an established geographic area. In return, utilities have an obligation to provide reliable electricity to all consumers in their territory at a reasonable price. Many utility companies also participate in power pools, under which they may purchase electricity from one another to meet requirements. Utilities are allowed to earn a return on plants they own and operate, while the costs of purchased electricity are passed directly to consumers.

To encourage the development of alternative energy resources, the Public Utility Regulatory Policies Act of 1978, as amended, (PURPA) required utilities to purchase power offered by qualifying facilities[1] at a price not exceeding the utilities' "avoided cost"[2] of generating it or purchasing it from another source. In part to help state regulators and utilities determine utilities' avoided costs and to help sort through a flood of bids, competitive bidding, which allows market forces to help determine prices, has emerged as a means of purchasing power from nonutility generators (see app. I).

[1]Qualifying facilities are (1) those that use renewable resources to produce a relatively small amount of electricity and (2) cogenerators, which use a single fuel to produce steam for industrial or commercial purposes (such as paper production) and for electricity production (through a steam turbine).

[2]PURPA states that rates for such purchases shall not exceed the incremental cost of alternative electric energy. In implementing PURPA, the Federal Energy Regulatory Commission defined avoided cost as the cost an electric utility would otherwise incur to generate or purchase power if it would not purchase electricity from the qualifying facility.

Nonutility generators could account for 25 percent of all increases in U.S. electric generating capacity between 1989 and 1998, according to the North American Electric Reliability Council (NERC),[3] and competitive bidding is expected to play a larger role in procuring this power than it has played in the past. According to the National Independent Energy Producers,[4] since 1984 utilities or public utility commissions in 27 states have adopted or developed competitive bidding systems, and as of December 1989, 41 competitive bid solicitations have been issued in 19 states.

Because obtaining approval for and constructing a plant take time, a substantial time period—up to 5 years or more—may elapse between a bid solicitation and the date that a selected project is scheduled to enter service. As of March 1990, the three case study utilities had completed a total of eight solicitations and had awarded contracts to purchase 3,053 megawatts (MW) of electricity,[5] but sources capable of producing only 225 MW had entered service. Central Maine Power is the only case study utility with projects generating competitively purchased power.

Impacts on Reliability

Because the purchase of electricity from nonutility generators is a relatively recent development and competitive bidding even more recent, assessing the long-term effects on reliability is difficult. In 1987 NERC cautioned that competitively purchasing electricity from nonutility generating sources could affect the reliability of electric power in the future because (1) utilities may have less operating control over the sources and (2) nonutility generators, unlike utilities, are not required by regulation to serve the public. On the other hand, reliability could be enhanced because nonutility sources have tended to be relatively small plants, whose unexpected outage (temporary loss) generally would have less impact than that of a large plant. Further, as profit-making enterprises, nonutility generators have an incentive to operate reliably.

The competitively purchased power from projects that have entered service at Central Maine Power has been reliable. However, each utility has accepted bids that were subsequently canceled or withdrawn prior to scheduled service dates, generally because the developers of the projects

[3]NERC, an organization of nearly all of the electric utility systems in North America, was formed in 1968 to promote the adequacy of the power supply and the reliability of the electric system.

[4]The National Independent Energy Producers is an organization representing nonutility generators.

[5]A watt is the basic unit of measuring electrical power. A megawatt is 1 million watts.

were financially or otherwise unable to continue development. Canceled projects account for only 1.4 percent of the generating capacity of all of the projects awarded contracts through competitive bidding at Central Maine Power, but 19.8 percent at Virginia Power and 21.0 percent at Boston Edison. However, the remaining projects for all three utilities are expected to provide about the same or more power than the utilities originally solicited.

The three utilities we reviewed have taken steps to help ensure the reliability of competitively purchased power, employing bid selection criteria and designing contracts to favor projects that appear most likely to enter and remain in service in accordance with the utilities' operating needs. For example, in choosing among the projects from which the utilities have received bids, ranging from projects that are still in the planning stage to fully operational ones, utilities consider as part of their selection criteria the bidders' progress in obtaining permits, a site, financing, and an adequate fuel supply.

Contracts typically require nonutility generators to make security deposits, which are forfeited if the project fails to enter or remain in service. Other contract terms foster utilities' control over the power; for example, bidders offering to supply electricity to Central Maine Power and Boston Edison must agree to make their facility available, under certain conditions, for use by the regional power pools. Additionally, projects are subject to periodic audits to ensure that they are operating at their claimed capability. Central Maine Power's contracts also impose a charge on generating sources if they fail to provide the prescribed quantity of electricity.

The utilities have also developed contingency plans should they lose any significant amount of power produced by nonutility generators. For example, in such a circumstance Central Maine Power would use the security deposits posted by owners of nonutility projects to purchase replacement power. At Virginia Power, some contracts give the utility the right to purchase a failing project from the owner at fair market value so that the utility could operate the generating source if the nonutility operator fails. Boston Edison is reducing the potential amount of time it would need to replace lost power by prelicensing a former plant site on which it could build its own generating plant. (See app. II for more details on the impacts of competitive power purchases on reliability.)

Impacts on Cost

Determining the effects of competitive bidding on the cost of power requires comparing estimates of what the future costs and demand for electricity will be. First, an estimate must be made of the utility's total costs if it would generate the power itself or would purchase it through noncompetitive means (the avoided cost). Next, this estimate must be compared to an estimate of the utility's total costs if it would purchase the power competitively. Estimating these future costs is difficult since many factors affecting both estimates, such as fuel prices, can fluctuate.

Each of the utilities we reviewed estimated the cost of power purchased through competitive bidding to be less than its avoided cost. For example, Boston Edison estimated an 18 percent savings for the power purchased in one bid solicitation. According to Virginia Power officials, the cost of the power purchased from the projects selected in the utility's first solicitation will be between 5 and 10 percent less than the utility's estimated cost to provide the power itself. At Central Maine Power, savings from early solicitations may not be as great as originally estimated, in part because the estimated avoided cost included fuel prices higher than those subsequently encountered; however, the company estimates that the cost of electricity from projects selected in its third solicitation will be 5 to 12 percent lower than its avoided cost.

Bidding Systems

In fulfilling their requirement to be reliable suppliers of electricity, utilities may incur extra costs to replace a lost generating source. Thus, there is an inherent relationship between the cost and reliability of electric service, and the bid evaluation criteria utilities use to ensure the reliability of a proposed generating source potentially can affect the ultimate cost of purchased power. For example, a proposed source with an experienced management team, sound financing, and/or a secure fuel contract may be more likely to enter and remain in service when specified—and thus ultimately be less costly—than a proposed source without these characteristics that is offering the power at a lower price. Therefore, potential impacts on cost depend, to some extent, on how utilities design and implement their bidding systems.

The three utilities have designed their bidding systems to enhance the reliability, and thus minimize the cost, of the projects selected. Each has developed evaluation systems to account for both price and non-price factors. For example, Central Maine Power requires bidders to demonstrate the feasibility of a project; the adequacy of the fuel supply; and the capability to finance, construct, and operate the project. Factors incorporated in bid evaluations at Central Maine Power include the bid

price, the ability of the project to meet the regional power pool's standards, the amount of security deposits, and the ability of the proposed source to dispatch power when requested.

The cost of purchased power can also be affected by the information made available to bidders and the bid selection procedures used by utilities. For example, announcing a ceiling price that the utility will pay for electricity may affect the prices submitted by bidders: Some bidders may submit bids somewhat higher than they otherwise would have in order to increase potential profits, while others may be induced to lower their bids to increase their chances of selection. The amount and type of information available to potential bidders varied among the three utilities; for example, Boston Edison and Central Maine Power published ceiling prices in their solicitations, while Virginia Power did not.

Constraints on Competition

The degree of competition can also affect the cost of competitively purchased power. The degree of competition, and thus the effect on cost, in part depends on the number of buyers and sellers involved in a market. Several factors, including a lack of access to transmission facilities, eligibility criteria specified by utilities, and certain regulatory restrictions, limit the number of participants in wholesale electric generating markets and thus limit the potential for competition to affect cost.

In order to purchase or sell electricity, both the generating source (seller) and the utility (purchaser) must be connected via electrical transmission and/or distribution systems. Access to these systems can be limited by utility or state regulatory policies, economic considerations, and physical constraints. Inability to access transmission facilities may limit the number of participants in bidding programs. For the three utilities reviewed, state regulatory commission and utility officials stated that access to transmission has not been a problem in obtaining bids for the amount of power solicited; in each case, more electricity was offered than the utilities solicited. However, many transmission facilities in the utilities' areas are near full capacity.

Utilities may specify for potential bidders certain eligibility characteristics, which may limit their numbers. For example, Central Maine Power and Boston Edison limited their initial solicitations to nonutility generators that were cogenerators or small power producers qualifying under PURPA. Central Maine Power now employs "all source" bidding; that is, it also solicits bids from nonqualifying nonutility generators (those nonutility generators that do not qualify under PURPA); U.S. and Canadian

utilities; and energy conservation projects, which reduce electricity demand rather than increase supply. All source bidding has also been proposed for Boston Edison.

In addition, potential power producers may be excluded from bidding competitions by regulatory restrictions on the activities of utilities and power producers. The Public Utility Holding Company Act of 1935, as amended, gave the Securities and Exchange Commission authority over the structure, finances, and operations of holding companies that own more than 10 percent of an electric utility. Firms may decide not to propose generating projects if doing so would subject them to this oversight. However, because it is difficult to know how many potential bidders are dissuaded because of regulatory requirements, it is impossible to determine their impact precisely. (See app. III for more details about the effects of competitive power purchases on the cost of electricity.)

Observations

While the lack of operating experience with competitively purchased electricity makes drawing conclusions about the impact on reliability and cost difficult, observations can be made.

- The three utilities we reviewed have learned from their initial bidding solicitations and have refined bid evaluation criteria to favor projects with the greatest likelihood of entering and remaining in service. To the extent that other utilities adopt the successful practices of their predecessors in designing competitive bidding programs, the reliability of competitively purchased power will be enhanced.
- While regulators allow utilities to earn a return on their investments in plants they own, utilities are not allowed to earn a return on power purchased from nonutility generators; rather, the costs are generally passed directly to consumers. This circumstance may limit utilities' incentives to rely on purchased power, and thus limit the use of such power purchases.
- The calculation of avoided costs plays a major role in competitive bidding programs. Estimated avoided costs are used as a basis for prices for—and projected savings from—competitively purchased power. Thus, the impact of competitive power purchases on cost depends in large measure on the extent to which these estimates reflect true avoided costs.

To respond to your concerns, we interviewed Department of Energy and Federal Energy Regulatory Commission officials. We also interviewed

officials at each of the three utilities selected as case studies and reviewed the utilities' requests-for-proposals, selection criteria and processes, and model contracts. We did not review actual signed contracts. We also interviewed public utility commission officials in Maine, Massachusetts, and Virginia (the states in which our three selected utilities operate) and reviewed pertinent state legislation, regulations, and policies. In addition, we discussed competitive bidding issues with officials of the Cogeneration and Independent Power Coalition of America and the National Independent Energy Producers, organizations representing nonutility generators, and NERC. We also reviewed studies and reports by other organizations regarding competitive bidding issues. (App. V contains more details on our objectives, scope, and methodology.)

Utility officials reviewed the technical information in the report. However, as you requested, we did not obtain formal agency comments on this report. We performed our work in accordance with generally accepted government auditing standards. Our review was conducted between May 1989 and April 1990.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will provide copies to appropriate House and Senate committees; the Secretary of Energy; and the Director, Office of Management and Budget. Copies will also be made available to other interested parties who request them.

Should you have questions or need additional information, please contact me on (202) 275-1441. Major contributors to this report are listed in appendix VI.

Sincerely yours,

Victor S. Rezendes
Director, Energy Issues

Contents

Letter		1
Appendix I Background	Purchasing Power Through Competitive Bidding	12
	Competitive Bidding at Three Selected Utilities	12
		14
Appendix II Impacts of Competitive Power Purchases on Long-term Reliability Are Uncertain	Reliability of Electrical Systems	17
	Competitive Power Purchases Could Affect Reliability	17
	Utilities Have Limited Experience With Competitively Purchased Power	18
	Utilities Have Taken Steps to Ensure Reliability	19
		21
Appendix III Effects of Competitive Power Purchases on Cost Are Difficult to Determine	Savings Estimates Rely on Assumptions About Future Costs	24
	Utilities Estimate Cost Savings From Competitively Purchased Power	24
	Design and Implementation of Bidding Systems Can Affect Potential Cost	25
	Constraints on Participation in Bidding Programs Limit Potential Effects on Cost	26
		29
Appendix IV Differences Between Utilities' and Nonutility Generators' Cost of Production	The Efficiency of Cogeneration	32
	Capital Costs	32
	Other Theories	32
		33
Appendix V Objectives, Scope, and Methodology		34

Appendix VI
Major Contributors to This Report 36

Tables

Table I.1: Utilities' Solicitations, Bid Offers, and Awards 15
Table II.1: Status of Power Projects Selected Under Competitive Bidding 19
Table II.2: Power Projects Awarded, Canceled, and Remaining 20

Abbreviations

GAO	General Accounting Office
MW	megawatt
FERC	Federal Energy Regulatory Commission
NEPOOL	New England Power Pool
NERC	North American Electric Reliability Council
NIEP	National Independent Energy Producers
PUHCA	Public Utility Holding Company Act of 1935, as amended
PURPA	Public Utility Regulatory Policies Act of 1978, as amended

Background

The U.S. electric power industry is a combination of privately, publicly, federally, and cooperatively owned electric utilities. Privately owned utilities, also referred to as investor-owned utilities, account for more than 75 percent of the generating capability of all U.S. electric utilities. The majority of these companies are organized as integrated monopolies. An integrated utility is one that owns and operates the facilities used for all three stages of supplying electricity: generation, transmission, and distribution. As a monopoly, an electric utility provides electricity in its designated geographic service area, with no competition from other suppliers.

To obtain a franchise, electric utilities must provide service to all consumers in their territory at a reasonable price. Traditionally, utilities have relied on their own generating equipment to satisfy their electric power needs, but many utility companies have also joined "power pools," under which they coordinate plans for facilities and arrange purchases of power from one another to meet their obligations. Regulators permit utilities to earn a return on plants they build, while the costs of purchased electricity are passed directly to consumers.

Purchasing Power Through Competitive Bidding

The Public Utility Regulatory Policies Act of 1978, as amended, (PURPA) was enacted in part to encourage efficiency in generating electricity. In addition to providing incentives to utilities to use alternative fuel sources, the act encouraged the development of nonutility generators, that is, sources of electric power not primarily owned by utilities. PURPA promoted this development by requiring that utilities purchase power offered by qualifying facilities. Qualifying facilities are (1) small power production facilities with a generating capacity of less than 80 megawatts (MW)[1] using renewable energy resources such as geothermal or wood waste sources and (2) cogeneration facilities, which use one fuel source to produce heat or steam for industrial or commercial purposes and for electricity production. An example of a cogenerator is a university facility that produces steam in a central plant for heating campus buildings and also generates electricity with the steam.

The utilities are required to buy electricity from qualifying facilities at a price that does not exceed the utilities' "avoided cost," or the utilities' cost of generating power or obtaining it from another source, such as a neighboring utility. State utility commissions determine avoided costs

[1] A watt is the basic unit of measuring electrical power or the rate of doing work. A megawatt is 1 million watts.

following guidance issued by the Federal Energy Regulatory Commission (FERC), which is responsible for regulating wholesale electrical power transactions.

In part to help state regulators and utilities determine utilities' avoided costs and to help sort through a flood of bids, competitive bidding, which allows market forces to help determine prices, has emerged as a means of purchasing power from nonutility generators. Subsequently, competitive bidding has become a means of purchasing power from other sources, such as other utilities, and for selecting projects that are designed to conserve electricity by reducing demand.

Recognizing that some states were experiencing difficulty in determining avoided costs, in 1988 FERC proposed regulations endorsing competitive bidding as a tool in setting a utility's avoided cost. Competitive bidding is useful in determining avoided costs because it facilitates the identification of a utility's supply alternatives. The regulations included specific guidance on the use of competitive bidding and sanctioned such bidding as an option for purchasing power from qualifying facilities under PURPA. However, the regulations were issued in conjunction with other proposed regulations allowing changes in the electric generating industry that were controversial. The Commission has not taken final action on the proposals.

The use of competitive bidding to purchase electricity from nonutility sources has increased in recent years. According to the National Independent Energy Producers,[2] since 1984 utilities or public utility commissions in 27 states have adopted or developed competitive bidding systems, and as of December 1989, 41 competitive bidding solicitations have been conducted in 19 states. Further, the amount of power acquired from all nonutility sources is expected to increase in the future. The North American Electric Reliability Council (NERC)[3] estimates that nonutility generators will supply a small but increasing share of U.S. power in the coming years, growing from 2 percent in 1989 to 3.9 percent by 1998. NERC also estimates that between 1989 and 1998 these generators will supply 18,100 MW, or 25 percent of all projected increases (72,000 MW) in U.S. electric generating capacity.

[2]The National Independent Energy Producers is an organization representing nonutility generators.

[3]NERC, an association of nearly all the electric utilities in North America, was formed in 1968 to promote the adequacy of the power supply and the reliability of the electric system.

Competitive Bidding at Three Selected Utilities

Boston Edison, Central Maine Power, and Virginia Power were among the first utilities in the nation to use competitive bidding for purchasing electricity. Each is a regulated investor-owned utility operating as a franchise monopoly.

Central Maine Power is Maine's largest electric utility, serving about 70 percent of the state's population. It provides electricity for approximately 475,000 customers in an 11,000-square-mile service territory. In 1989 the utility had approximately $1.3 billion in total assets and $704 million in operating revenue.

Boston Edison serves a population of about 1.5 billion in its 590-square-mile service territory, which encompasses Boston and surrounding towns and cities within a 30-mile radius. In 1989 Boston Edison had approximately $2.9 billion in total assets and $1.3 billion in operating revenue. Like Central Maine Power, Boston Edison is a member of the New England Power Pool (NEPOOL), a voluntary association of electric utilities that generate about 99 percent of the electricity generated in the region. NEPOOL coordinates power generation throughout the region, distributing the most economical power first, as if the members' facilities were elements of a single system.

Virginia Power, a subsidiary of Dominion Resources, Inc., serves over 1.7 million customers in Virginia and North Carolina. The company serves 80 percent of Virginia's population. In 1989 the company's total assets were $10 billion, and operating revenues were $3.5 billion. Virginia Power is a member of the Virginia-Carolinas Subregion, a group in which each member utility dispatches power within its own system.

Each of these utilities expects to rely increasingly on nonutility generation sources to meet future needs. In 1989 Virginia Power, the largest of the three, had a system capability of 13,714 MW, of which only 2 percent was supplied by nonutility generators.[4] By the year 2000, the utility estimates that such sources could account for 19 percent of its capability. In 1989 Central Maine Power had 14 percent of its system capability of 2,077 MW provided by nonutility sources, while Boston Edison received less than 1 percent of its 3,483 MW capability from such sources. Both utilities estimate that nonutility generation could account for as much as 25 percent of their capability by the year 2000.

[4]System capability refers to a system's total generating station capability, plus capability available from other sources through firm contracts at the time of the system's peak demand.

As shown in table I.1, the three utilities have completed a total of eight solicitations for generating capacity and have awarded contracts to purchase 3,053 MW and to save an additional 18 MW of power through energy conservation projects. As of March 1990, two solicitations were in progress.

Table I.1: Utilities' Solicitations, Bid Offers, and Awards

	Solicitations			Bid Offers		Awards	
Utility	Number	Date	Capacity (MW)	Capacity (MW)	Number of projects	Capacity (MW)	Number of projects
Boston Edison	1st	1/87	200	1,850	61	341	8
	2nd	4/89	200	2,836	48	200	2
Central Maine Power	1st	5/84	100	462	65	150	27
	2nd	9/84	100	314	26	153	8
	3rd	6/87	100	1,444	51	123	8
	4th	12/87	100	908	45	18[a]	6[a]
	5th	5/89	700	2,841	50	[b]	[b]
Virginia Power	1st	3/88	1,750	14,653	95	2,086	19
	2nd	11/88	300	2,139	26	0[c]	0[c]
	3rd	8/89	1,100	11,600	78	[b]	[b]

[a]Central Maine Power awarded these contracts to energy conservation projects and requested that remaining bidders offer proposals in its fifth solicitation.

[b]At the completion of our review, bids were still under consideration.

[c]The solicitation was completed, but no awards were made.

For each solicitation, the utilities issue a request for proposals that typically indicates how much power the utilities will need and when they will need it, as well as any technical specifications the utilities require. After the utilities evaluate the bids, they award contracts to the winning bidders. The final terms of these contracts are often determined through negotiations. Boston Edison, Virginia Power, and Central Maine Power have used competitive bidding for long-term power purchases for periods of up to 20, 25, and 30 years, respectively.

The competitive bidding process at Boston Edison differs from the process at Central Maine Power and Virginia Power. Boston Edison provides more detailed information to the prospective bidders in its solicitation and is more tightly constricted by the results of the bidding process; Boston Edison's bidding process is the result of regulations the Massachusetts public utility commission has issued governing competitive bidding. The Maine and Virginia commissions have allowed utilities to develop their own bidding programs.

The extent to which utility management has discretion in final selection and contract negotiation differs among the three utilities. Boston Edison must award contracts to those bidders with the highest project scores. However, the utility has discretion in determining bid evaluation criteria and scoring systems. The utility can only exercise the right to reject bids in limited circumstances. Massachusetts commission regulations do not, in most instances, allow Boston Edison to initiate contract negotiations with the winning bidders; the utility must normally use a standard contract that has been approved in advance by the commission. Boston Edison is only allowed to negotiate on the specific provisions of a contract if the winning bidder initiates negotiations.

Impacts of Competitive Power Purchases on Long-term Reliability Are Uncertain

Because competitive bidding for purchasing electricity is a relatively recent development and time for construction is necessary for bringing new sources into service, assessing how power purchased competitively will affect the reliability of electric service in the long term is difficult. For the utilities that served as our case studies, the few sources that have entered service from which the utilities have competitively purchased electricity have operated reliably; however, each utility has accepted bids that were subsequently withdrawn before the projects entered service. The utilities have taken precautions to ensure the reliability of nonutility generators by specifying certain conditions in project selection criteria and contract terms. The utilities also have developed contingency plans.

Reliability of Electrical Systems

Utilities are responsible for providing reliable electric service to their customers. As defined by NERC, the reliability of a bulk electric power system is the degree to which system elements deliver power to consumers within accepted standards, in the amount desired and at the time desired. Components of reliability include the system's ability to supply the aggregate electric power demanded by consumers at all times, and its ability to withstand sudden disturbances such as short circuits or the unexpected failure of components.

NERC establishes operating guidelines and reliability standards for North American utilities. Because utilities are interconnected and the actions of one utility can affect others, NERC's regional councils and utilities have planning and operating guides to help coordinate utilities' actions and thus ensure reliable electric service.

Utilities employ a mix of generating facilities to maintain service, including "baseload" and "peaking" facilities. The former are those that utilities run more or less continuously to meet daily electricity demand. The latter type are those used during periods of peaking demand, such as on the hottest or coldest days. Achieving reliability in the generating portion of their electric systems requires utilities to maintain a certain amount of excess capacity, which must be sufficient to cover unexpected reductions in generating capability or unforseen increases in demand. The difference between a utility's generating capacity and its forecast peak demand is called its capacity margin.

In periods of growing electricity demand, utilities must secure additional generating sources to maintain an adequate capacity margin and ensure reliable service. The availability of a particular electricity generating

source, the degree to which it can be counted on to provide power when needed, can affect the reliability of the electrical system. While U.S. utilities have good records of supplying power when needed, they have experienced problems with the availability of individual plants.

Competitive Power Purchases Could Affect Reliability

The increase in the use of nonutility generators has led to concerns about how the reliability of electric service may be affected. Utilities have traditionally controlled source availability by owning the generating facilities; thus, contracting for electricity from a nonutility source introduces a new element of uncertainty. Furthermore, a source's "reliability" depends not only on how it performs once on-line, but also on an assurance that it will actually come into service on time.

NERC's 1987 guidelines for incorporating nonutility generators into the nation's bulk electric system point out ways in which utility companies' use of nonutility generators may affect reliability. First, utilities buying power from nonutility sources do not necessarily have direct control over the nonutilities' operational decisions that can affect the long-term availability of the sources and, in turn, the reliability of the system. Second, utilities' obligation to serve the public may not coincide with nonutility generators' interests. States obligate utilities to provide reliable service to all customers in their service territory; in contrast, nonutility generators are responsible only for fulfilling contract terms to provide power to utilities. Officials at one of the utilities we reviewed noted that without the obligation to serve the public, nonutility generators may have an incentive to abandon the enterprise if it should become unprofitable.

However, the use of nonutility generators also has the potential to enhance reliability in some ways. For example, most nonutility generators have tended to be relatively small units (the average generating capacity of units receiving contracts in the three utilities' first solicitations was 48 MW; in comparison, many coal and nuclear powered units are designed to produce 800 to 1,000 MW). By relying on a number of small plants rather than one large plant, utilities reduce the potential effects of the failure of a single plant because the temporary loss of a smaller unit has less impact on the stability of the entire system than an outage of a larger unit has. And, of course, the simultaneous outage of a number of plants is less likely than the temporary loss of a single plant. Further, because sales of electricity to utilities are the only source of

revenue for most nonutility generators (excluding cogeneration facilities), nonutility generators have a strong incentive to keep their units operating reliably.

Utilities Have Limited Experience With Competitively Purchased Power

Although among the first U.S. utilities to competitively purchase power, the three utilities we reviewed have had little experience incorporating competitively purchased power into their operating systems. The utilities first began soliciting bids 2 to 6 years ago, but, because there is a lag in time of up to 5 or more years between the contracting for and the delivery of power, only one of the utilities has begun receiving competitively purchased power. However, utility and commission officials have a favorable view of the reliability of nonutility sources that have come into service.

Table II.1 shows that among the three utilities' competitive purchases of electricity, 30 projects, with a generating capacity of 225 MW, have entered service. Of the three utilities in our case studies, Central Maine Power is the only one with operating projects that are generating competitively purchased power.

Table II.1: Status of Power Projects Selected Under Competitive Bidding

	Number of projects and their generating capacity (MW)					
	Under development		In operation		Total	
Utility	Number	Capacity	Number	Capacity	Number	Capacity
Boston Edison	2	268	0	0	2	268
Central Maine Power	9	195	30	225	39	420
Virginia Power	14	1,672	0	0	14	1,672
Total	**25**	**2,135**	**30**	**225**	**55**	**2,360**

Although they have limited experience in purchasing power from nonutility sources, the three utilities are expecting to rely increasingly on such power. For example, at Virginia Power and Central Maine Power, the amount of electricity purchased from nonutility generators is expected to be larger than their anticipated capacity margin in the year 2000, which suggests that the utilities plan to rely heavily on purchased power.

Early Projects Have Been Reliable

The nonutility sources that have entered service have operated reliably, according to utility officials. At Central Maine Power none of the 30 projects contracted under competitive bidding that have come into service has subsequently failed although three projects did not meet their initially scheduled dates for entering service. However, many of these sources existed prior to the advent of competitive bidding. Central Maine Power officials stated that their operational nonutility sources have done well and have generally been able to provide power when requested to do so. According to a Virginia Power official, nonutilities' performance for projects contracted before the advent of competitive bidding has been excellent. A Virginia public utility commission official noted that some nonutility generators have had greater availability than those owned by Virginia Power, but he noted this might be because the nonutility generating sources generally are newer.

Some Accepted Projects Have Failed to Enter Service

Each of the utilities we reviewed has selected projects that have subsequently been canceled, as shown in table II.2 Further, more projects could be canceled, because many are not scheduled to come into service until the early to middle 1990s.

Table II.2: Power Projects Awarded, Canceled, and Remaining

		Number of projects and generating capacity (MW)							
	Solicited	Awarded		Canceled		Remaining		Percent canceled	
Utility	capacity	Number	Capacity	Number	Capacity	Number	Capacity	Number	Capacity
Boston Edison	200	8	341	6	73	2	268	75.0	21.0
Central Maine Power	300	43	426	4	6	39	420	9.3	1.4
Virginia Power	1,750	19	2,086	5	414	14	1,672	26.3	19.8

Note. The table reflects only the results of completed solicitations—Boston Edison's and Virginia Power's first solicitations, and Central Maine Power's first three solicitations.

Projects have been canceled for a variety of reasons, including developers' (1) problems in obtaining financing, permits, or sites; (2) failure to post security deposits; (3) finding projects economically unfeasible; and (4) failure to meet interim project milestones. Still, the remaining projects for all three utilities are expected to provide about the same or more power than the utilities solicited.

Utilities Have Taken Steps to Ensure Reliability

In developing competitive bidding programs, each of the utilities has taken steps to help ensure the reliability of power purchased from nonutility generators. These steps include devising project selection criteria that favor more reliable projects and contract terms that specify certain conditions designed to promote reliability. The utilities also have developed contingency plans to compensate for the unexpected loss of a nonutility source.

Project Selection Criteria Foster Reliability

Each of the utilities uses project selection criteria to favor projects that not only will come into service as planned, but that will remain in service. For example, in choosing among the projects for which the utilities have received offers, ranging from projects that are still in the planning stage to fully operational ones, utilities consider before awarding contracts bidders' progress in obtaining permits, a site, financing, and an adequate fuel supply.

The utilities also use selection criteria to favor those nonutility generators that can best meet the utilities' operating needs. Because utilities desire to control the amount of power that nonutility generators deliver at any given time so the utilities can respond to fluctuations in demand, each of the three utilities favors projects that will dispatch power in response to demand.

The utilities have used their early experiences with competitive bidding to incorporate additional safeguards to ensure reliability. For example, in developing its selection criteria for its second solicitation, Boston Edison increased the weight of factors that ensure reliability. It also required that selected projects meet certain development milestones in order to keep them on schedule and to increase the likelihood of success.

Contract Terms Encourage Availability of Sources

The utilities have adopted various contract provisions designed to increase the likelihood of reliable service. For example, contracts require nonutility generators to make security deposits, which are forfeited if the project fails to enter or remain in service. Model contracts used by Boston Edison and Virginia Power require security deposits of $15 and $36 per kilowatt, respectively, which are forfeited if the project fails to enter service. Central Maine Power's standard contract imposes a security deposit of $68 per kilowatt, in accordance with NEPOOL requirements.

Once a project comes into service, the contracts Central Maine Power uses require owners to triple the security deposit to offset the possible costs of immediately replacing a lost power source. Boston Edison's selection process favors nonutility generators that volunteer to provide a deposit once a project is completed.

Other contract terms encourage the utilities' control over the power. Bidders offering to supply electricity to Central Maine Power and Boston Edison must agree to make the power their facility generates available, under certain conditions, to be dispatched by the regional power pools. Additionally, the projects are subject to periodic audits to ensure that they are operating at their claimed capability. The contracts Central Maine Power uses also impose a charge on generating sources if they fail to provide the prescribed quantity of energy, or if they fail to achieve a capacity factor averaging 80 percent.[1]

Virginia Power's contracting procedures generally ensure that power purchased through competitive bidding is dispatched in accordance with the needs of the utility's operations center. For example, project operators must provide daily information on project availability and must submit maintenance schedules to Virginia Power.

Contingency Plans Are Designed to Ensure Replacement Power

The utilities have also developed contingency plans to replace power should they experience any significant loss from nonutility generators. For example, in such a circumstance, Central Maine Power would use the security deposits posted by nonutility projects to purchase replacement power, if the power is available. According to utility officials, however, it is difficult to know whether security deposits would completely cover the costs of replacing the power.

At Virginia Power, some contracts give the utility the right to purchase a failing project at fair market value; through such a purchase, the utility could operate the generating source. Also, to compensate for the potential loss of projects, Virginia Power has contracted to purchase about 20 percent more power than it requested under its first bid solicitation. In addition, Virginia Power assumes in its planning process that half of the projects will be delayed past their originally established service dates.

[1]The capacity factor indicates the percentage of electricity (measured in kilowatt hours) a generator actually produces during a specific time period compared to the amount it could have produced if it had operated continuously at full capacity.

Boston Edison is reducing the potential amount of time it would need to replace lost power by prelicensing a former plant site on which the utility could build its own generating plant. In its long-range planning efforts, Boston Edison also considers the probability that some contracted projects will fail.

Effects of Competitive Power Purchases on Cost Are Difficult to Determine

Competitive bidding's effects on cost are difficult to determine because they require assumptions about future costs and demand for electricity, which are uncertain. The utilities serving as our case studies estimated the cost of power purchased through competitive bidding to be less than the cost of generating the power themselves or purchasing it through existing practices from another source, such as another utility. The potential impacts on cost are affected to some extent by the design and implementation of bidding programs. The impacts on cost may also be affected by factors that limit the competitiveness of wholesale electricity markets, such as constraints on the number of market participants.

Savings Estimates Rely on Assumptions About Future Costs

Determining the impact of competitive bidding on cost involves comparing (1) the utility's ultimate cost of providing electricity, including the cost of purchasing it from projects awarded contracts through competitive bidding with (2) the cost the utility would have incurred had it provided power under an alternative approach. To make this comparison, both of these future costs must be estimated and there are uncertainties affecting each option.

Estimates of the impact of competitive bidding on cost depend upon projections of up to 30 years into the future for a variety of factors that could influence the future cost of power. For example, two important factors affecting the cost, whether the power is competitively purchased or not, are the anticipated demand for electricity and the cost of fuel. Demand for electricity depends primarily on economic activity and electricity prices; thus, utilities must estimate these variables in order to estimate demand. However, these factors are in turn uncertain; for example, electricity prices are influenced by fuel prices, which have fluctuated in the past. According to a utility official, actual demand frequently differs from what is forecast because of unforeseen factors such as weather and changing economic conditions.

Uncertainty also surrounds estimates of future construction costs. Each of the utilities has based the estimated costs and operating characteristics of unbuilt plants on generic industry cost data, rather than on cost studies for specific projects in specific locations. Central Maine Power has also used the estimated cost of a coal-fired thermal generating unit planned by a neighboring Canadian utility. The utilities have stated that it would not be cost-effective to conduct detailed cost studies for plants they do not reasonably expect to build. However, relying on generic cost data may add further uncertainty to the estimates.

Additionally, the long-term cost of power, whether or not it is competitively purchased, depends on the reliability of the generating sources. Utilities incur additional costs if their own generating plants prove unreliable since they must replace the power a plant being repaired would have generated, generally with higher cost power from other plants within their system or with purchased electricity. Similarly, utilities may also have to replace the power nonperforming nonutility generators would have generated. Consequently, bidding systems may favor bids offering many features that would indicate reliability over bids with a lower price and fewer such features. (As noted in app. II, the utilities that were our case studies incorporate an assessment of the reliability of proposed sources into their bid evaluation criteria; thus, the cost of ensuring reliability is to some extent reflected in the price the utility agrees to pay.) The reliability of both utility and nonutility sources must be estimated in calculating the cost impact of competitive bidding.

Utilities Estimate Cost Savings From Competitively Purchased Power

Each of the three case study utilities estimated the cost of power purchased through competitive bidding to be less than their avoided costs. The calculations of avoided costs are not the same among the three utilities. We did not analyze in detail the methodologies or assumptions the utilities used to calculate their avoided costs or the projected cost savings from competitive bidding. However, each avoided cost calculation is subject to review by each utility's state regulatory commission.

Boston Edison determined that power purchased in its second solicitation would cost 18 percent less than its estimated cost to provide the power itself over the life of the contracts. According to Virginia Power officials, the power purchased from the utility's first solicitation was between 5 and 10 percent less than the utility's estimated cost to provide the power itself, but the utility rejected all bids from its second solicitation because they came in above the utility's estimated cost to provide the power.

At Central Maine Power, the avoided cost is estimated annually. At the time of its first two solicitations, Central Maine Power awarded contracts to purchase electricity at rates below its avoided cost. However, officials at Central Maine Power and the Maine Public Utilities Commission stated that the approved avoided costs have turned out to be somewhat high because of certain underlying assumptions, such as higher oil prices than those subsequently encountered. Therefore, savings from the early solicitations may not have been as great as anticipated. Central

Maine Power calculated that the costs of contracts from its third solicitation were 5 to 12 percent below its estimated costs to generate the power itself.

Design and Implementation of Bidding Systems Can Affect Potential Cost

The potential impacts of competitive bidding on cost depend in part on how utilities design and implement bidding systems. Important considerations are the bid evaluation criteria, the type and amount of information made available to potential bidders, and the bid selection process.

Bid Evaluation Criteria

When evaluating bids to purchase power through competitive bidding, utilities employ non-price factors as well as bid prices. One of the most important factors, as noted in appendix II, is the reliability of the bidder's proposed generating source. Because they are obligated to provide reliable electric service, utilities may incur extra costs to be able to supply power when a generating source fails to perform as expected. (Perhaps equally important, when a source fails, electricity consumers face potentially large costs from significant power interruptions since many modern conveniences depend on electricity.) Thus, there is an inherent relationship between the cost and reliability of electric service, and the emphasis placed on ensuring the reliability of a proposed generating source potentially can affect the ultimate cost of purchased power.

The relationship between reliability and cost enters utilities' bid evaluation process in utilities' consideration of non-price factors. For example, utilities need to coordinate output from generating sources with demand fluctuations so as to ensure a supply of electricity when and where it is demanded; thus, one non-price factor may be the ability of a proposed project to coordinate operations with the utility. Other desirable non-price factors might include an experienced management team, sound financing, and/or a secure fuel contract (if the source is a thermal generating unit). A proposed source with these non-price characteristics may be more likely to enter service when specified and to remain in service over the period of the contract than a proposed source without them.

Boston Edison, Central Maine Power, and Virginia Power have developed evaluation systems to account for both price and non-price factors. For example, Central Maine Power requires bidders to demonstrate the

feasibility of the project; the adequacy of the fuel supply; and the capability to finance, construct, and operate the project. Factors incorporated in project scoring at Central Maine Power have included the price of the bid, the ability of the project to meet power pool standards, the ability to post security deposits, and the ability of the proposed source to dispatch power when requested.

Boston Edison specifies in its solicitations the evaluation criteria it will use to choose successful bidders and the weight each criterion will carry. Factors used by Boston Edison when evaluating bids include the bidder's proposed cost, the economic risk to ratepayers, the likelihood that the proposed source will enter service, and the likelihood that the proposed source will operate efficiently over the life of the contract.

Virginia Power, when evaluating bids, assigns a weight of 70 percent to price and a total of 30 percent to non-price factors. The non-price factors include project viability, the proposed type of fuel, and the ability of proposed generating sources to dispatch power when requested.

Information Made Available to Bidders

The information utilities make available to potential bidders when soliciting bids can affect cost. For example, announcing a ceiling price that the utility will pay for electricity may affect the prices submitted by bidders. Some bidders may submit bids somewhat higher than they otherwise would have in order to increase potential profits. Conversely, some bidders may be induced to lower their bid prices to increase their chances of selection. A utility's selection of bids that have been lowered unrealistically (whether or not in response to an announced price) ultimately could increase the utility's cost if the selected projects fail to enter service or to operate reliably. Boston Edison and Central Maine Power have published ceiling prices in their solicitations, while Virginia Power has not.

Other types and the amount of information made available to potential bidders varied among the three utilities we reviewed. Massachusetts utility commission regulations require that Boston Edison's solicitations contain information on how the utility will determine eligibility, the selection criteria it will use to choose successful bidders, and the relative weight of each selection criterion. Consequently, potential bidders can determine if their projects are eligible before they submit their proposals, and each can calculate its score and make adjustments to increase the likelihood of its selection.

Central Maine Power included its avoided cost in its first four bid solicitations. The utility did not do so for the fifth solicitation; however, the avoided cost was available to the public at the Maine Public Utilities Commission. Central Maine Power will also provide bidders with enough information so that they can determine their project score; however, officials stated that the project score is not necessarily the determining factor in deciding to award a contract for power. Officials also observed that it would be difficult to determine whether stating the avoided cost in a solicitation increased or decreased the bid prices.

While Virginia Power informs bidders about the factors it uses to evaluate project proposals, bidders do not have enough information to calculate their project score. Like Central Maine Power, Virginia Power employs a computer model to perform analyses that bidders cannot replicate. In contrast with Boston Edison's scoring approach, Central Maine Power's and Virginia Power's approaches use non-price factors more subjectively to differentiate bidders, making it more difficult for bidders to evaluate their proposal.

Bid Selection Procedures

The collective impact on cost of a group of generating sources selected through competitive bidding depends in part on the process utilities employ in bid selection. Generally, if bids are evaluated independently of one another (incorporating both price and non-price factors), the projects are ranked and then selected beginning with those with the highest rankings. However, this process does not recognize bid interdependence, that is, the possibility that two or more projects with significantly different rankings may complement one another, or collectively complement the utility's system, costing less overall and/or enhancing the system's reliability. For example, a group of geographically dispersed projects might better serve a utility's scattered centers of demand than a group of projects in a single location.

Among the three utilities, both Virginia Power and Central Maine Power consider bid interdependence when evaluating bids. Both utilities evaluate groups of bids, assigning values to both price and non-price factors, rather than each bid independently, and use a computer model to determine the optimal composition of projects.

Constraints on Participation in Bidding Programs Limit Potential Effects on Cost

Competitive bidding for electric power sources represents a movement away from the traditional noncompetitive industry structure in which utilities have relied on their own generation facilities. The degree of competition and thus the effect on cost in part depend on the number of buyers and sellers involved in a market. Several factors limit the number of participants in wholesale electric generating markets, and thus the potential for competition and its effects on cost. These factors include the lack of access to transmission facilities, specific eligibility criteria, and certain regulatory restrictions.

Access to Transmission Facilities

In order to purchase or sell electricity, both the generating source (seller) and the utility (purchaser) must be connected via electrical transmission and/or distribution systems. Access to the transmission system can be limited by utility or commission policies, economic considerations, and physical constraints. For the three case study utilities, a lack of access to the transmission system has not been a problem in obtaining the quantity of power solicited, according to state regulatory commission and utility officials; in each case, more electricity was offered than the utilities solicited. However, according to a Central Maine Power official, the utility might have received even more bids if transmission access were completely unconstrained.

The extent to which a utility controls the transmission of electricity in its service territory can, from a potential bidder's point of view, limit the number of buyers for the bidder's electricity. For example, if a utility does not allow "wheeling" (the practice of using the utility's transmission facilities to send power to another utility or purchaser), then the utility in effect is the only available buyer. (Being forced to sell to a single buyer could lead to inefficiency if another potential buyer is willing to pay more for the same electricity). Similarly, from a utility's point of view, a lack of access to transmission facilities can also restrict the number of bidders. For example, the utility may be unable to obtain electricity from a potential bidder located outside the utility's service area if an intervening utility does not allow wheeling.

Both the public utility commissions of Maine and Massachusetts require utilities to wheel power from nonutility generators qualifying under PURPA. However, a Boston Edison official noted that some northeast utilities offer wheeling only when they are not fully using their transmission systems themselves. The Virginia commission has not required wheeling, but in its bid solicitations, Virginia Power offered to wheel

power from nonselected qualifying facilities to neighboring utilities to which it is interconnected.

Transmission access is also subject to physical constraints, which could limit the number of potential bidders. For example, officials told us that transmission facilities in parts of New England, particularly southern New Hampshire and northern Massachusetts, and facilities neighboring Virginia are being used nearly at full capacity. As a result there are constraints on wheeling additional power through these areas.

Even when capacity is available, wheeling may not be economical for the bidder to arrange; that is, the price may be prohibitive. For example, a Central Maine Power official noted that the amount of electricity imported to the utility from outside NEPOOL could be limited because of fees charged by intervening utilities.

Utility Eligibility Requirements

In bid solicitations, utilities may specify certain characteristics that bidders must meet to be eligible to participate. Such eligibility requirements, many of which are designed to enhance the reliability of contracted sources, may limit the number of potential sellers.

Two of the utilities studied—Central Maine Power and Boston Edison—limited their initial solicitations to nonutility generators qualifying under PURPA. Central Maine Power now employs "all source" bidding; that is, it also solicits bids from nonqualifying nonutility generators, U.S. and Canadian utilities, and energy conservation projects. Central Maine Power also requires that bidders finance their proposed projects with a minimum of 25 percent equity. Although this requirement could increase the cost for the bidder, the bidder's investment of its own funds gives added incentive for it to bring the project into service and operate the project reliably. The Massachusetts Department of Public Utilities has proposed requiring Boston Edison (and other Massachusetts utilities) to use all source bidding, which would include generating sources or conservation projects proposed by the soliciting utility itself.

Virginia Power solicits bids from both nonutility generators and other utilities but does not solicit bids from energy conservation projects or from affiliates.

Regulatory Restrictions

Some potential power producers may be excluded from bidding competitions by regulatory restrictions on the activities of utilities and power

producers. For example, state commissions may restrict power producers affiliated with a regulated utility from participating in competitive bid solicitations of that utility, in order to guard against possible improprieties. The Public Utility Holding Company Act of 1935, as amended, (PUHCA) also restricts utility owners in ways that could dissuade potential bidders from participating in the bidding process. Enacted to protect investors and consumers from potential abuses of utility holding companies, PUHCA gave the Securities and Exchange Commission broad authority over the structure, finances, and operations of holding companies that own more than 10 percent of an electric utility. Firms may decide not to propose generating projects if doing so would subject them to this oversight.

The costs imposed by regulatory requirements may also affect the number of potential bidders. We noted that the winning bidders in one solicitation by Virginia Power included a disproportionate percentage of nonutility generators that are qualifying facilities under PURPA. As qualifying facilities, these generators are exempt not only from certain PUHCA requirements but also from certain Virginia state regulations, such as regulation of their rate-of-return. According to a Virginia Power official, the exemptions may give these projects advantages that allow them to submit lower bids.

Because it is difficult to know how many potential bidders are dissuaded because of regulations, it is impossible to determine their impact precisely. Further, the impact regulatory restrictions have on cost is a matter of some debate. Appendix IV discusses additional reasons for possible differences between utilities' and nonutility generators' cost of production.

Differences Between Utilities' and Nonutility Generators' Cost of Production

The proliferation of small nonutility generating sources following passage of the Public Utility Regulatory Policy Act of 1978, as amended, (PURPA) has raised questions about the costs of generating electricity and has led to some debate among economists and others. For those concerned with minimizing electric rates for consumers while ensuring sufficient reliability, the reasons for such cost differences may be important.

A traditional economic argument for allowing electric utilities to exist as integrated franchise monopolies is that such an arrangement results in the lowest cost to consumers. This argument relies on the existence of certain economies of scale (declining unit costs as the scale of operations grows larger) in generation, transmission, and distribution. However, the trend in the sizes of plants constructed by utilities, as well as the existence of a number of nonutility generating sources, has raised some question about this argument for electricity generation.

We reviewed available literature and questioned utility and commission officials and representatives from associations of nonutility generators as to why nonutility generators were able to provide power at a lower cost than the utilities' cost of generating it themselves. The following summarizes some of the principal explanations.

The Efficiency of Cogeneration

Utility officials noted that cogenerators—one class of nonutility generators qualifying under PURPA—have an inherent advantage because they use the same fuel to produce steam for industrial or commercial purposes as well as for electricity production, and receive revenues from both sources. Utilities generally do not sell steam. This enables cogenerators to market electricity at a lower cost; for example, a cogenerator can cover its cost with revenues from selling electricity and from selling excess steam to an industrial plant, or from selling a product which requires steam in its manufacture, such as paper.

Capital Costs

Some argue that nonutility generating facilities that qualify under PURPA may enjoy lower capital costs (the costs of financing the construction of generation facilities), because PURPA exempts them from provisions of the Public Utility Holding Company Act that require power producers to maintain a certain debt-to-equity ratio. Qualifying facilities can therefore finance their projects with a higher percentage of debt, according to this argument, so their cost of capital is lower than a utility's would be.

In contrast, others, such as the National Independent Energy Producers, suggest that nonutility generators do not have lower capital costs. According to this view, nonutility generators must borrow at a higher interest rate than utilities because, unlike utilities, nonutility generators are not guaranteed the opportunity to earn a minimum financial return by regulators. However, some utilities may enjoy lower interest rates because they have a history of successful financial operations.

Other Theories

Officials we contacted during our review offered several other possible explanations as to why bidders in the solicitations reviewed may be able to provide power at a lower cost than the utilities themselves. The explanations include the following:

- Some industrial bidders can issue their own debt or are involved in consortia of architect/engineering firms, equipment firms and/or fuel suppliers. Such economies of integration may lower these bidders' costs.
- Nonutility generators have less corporate overhead cost than utilities. For example, the utilities must follow more regulatory procedures, which increases their costs.
- Nonutility generators may spend less on maintenance, especially during periods when other costs are increasing.
- In increasing generating capacity, cogenerators adding a boiler to an existing cogenerating facility may comply more easily with environmental regulations than would utilities constructing a new generating source. However, this may depend on the size of the addition.

It is important to note that the differences in the costs of generating electricity between utilities and nonutilities may be caused by institutions surrounding the industry. For example, rate-of-return regulation may provide utilities incentives to use an inefficient combination of inputs (capital, labor, and fuel), which may raise costs unnecessarily. In the case of cost of capital, differences in the tax treatment of debt versus the tax treatment of equity may make debt cheaper than equity; however, utilities' monopoly status and protection from competition may provide minimum financial returns.

Objectives, Scope, and Methodology

In April 1989 the office of the Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, asked us to review a number of issues relating to utilities' plans for meeting the nation's future electric power needs. On the basis of that request and a subsequent discussion, we agreed to examine selected utilities' experiences with purchasing electricity through competitive bidding and identify the potential impacts of purchasing from nonutility generating sources on the reliability and the cost of electricity.

We used a case study approach to identify how three selected utilities—Central Maine Power, Boston Edison, and Virginia Power—have conducted competitive bid solicitations for purchases of electric power and to identify factors that may influence the cost and reliability of power purchased competitively. In reviewing potential impacts on cost, we focused on the utilities' costs of supplying power, rather than on the ratepayers' prices because consumers' prices for electricity can be affected not only by the utilities' costs, but also by the ways in which state regulatory commissions treat utilities' costs.

The three utilities were selected because they were among the first utilities in the nation to use competitive bidding for purchasing power. We supplemented the information from these cases by reviewing the published literature on power purchases from nonutility generators, including reports, studies, and journal articles.

At each of the three utilities, we interviewed utility officials for information on their experience with competitive bidding. We reviewed utility requests-for-proposals from bidders, selection criteria, and model contracts. We did not analyze the methodologies or assumptions utilities used in estimating the costs they avoided by competitively purchasing power, nor did we review actual signed contracts.

Because the three selected utilities are investor-owned utilities subject to state regulation, we interviewed public utility commission officials in Maine, Massachusetts, and Virginia. We also reviewed pertinent state legislation, regulations, and policies.

We discussed competitive bidding with officials at the U.S. Department of Energy, the Federal Energy Regulatory Commission, and of two organizations representing nonutility generators: (1) the Cogeneration and Independent Power Coalition of America and (2) the National Independent Energy Producers. We discussed concerns about the reliability of

nonutility generators with officials of the North American Electric Reliability Council and reviewed the organization's relevant reports.

Although we did not obtain official comments from those entities included in our review, we discussed the report's factual contents with appropriate utility and commission officials. We performed our work in accordance with generally accepted government auditing standards. Our audit work was conducted between May 1989 and April 1990.

Major Contributors to This Report

Resources, Community, and Economic Development Division Washington, D.C.	Judy England-Joseph, Associate Director David G. Wood, Assistant Director Charles W. Bausell, Jr., Senior Economist Philip G. Farah, Staff Economist Alice M. Alexander, Staff Evaluator Peter H. Griffes, Doctoral Research Fellow
Boston Regional Office	James S. Jorritsma, Regional Manager's Representative Bruce Skud, Evaluator-in-Charge Linda W. Dunbrack, Staff Evaluator

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