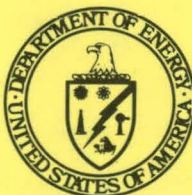


MASTER

**Guideline No. 2
Under the
Public Utility Regulatory Policies
Act of 1978**

**Solar Energy and
Renewable Resources
in Relation to the 11
Purpa Standards**

**U. S. Department of Energy
Economic Regulatory Administration
Office of Utility Systems**



February 1980

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February 1980

DEPARTMENT OF ENERGY

Economic Regulatory Administration

(Docket No. ERA-R-79-46)

VOLUNTARY GUIDELINE FOR SOLAR ENERGY AND
RENEWABLE RESOURCES RESPECTING THE FEDERAL STANDARDS
UNDER THE PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978

AGENCY: Economic Regulatory Administration, Department of Energy.

ACTION: Notice of Voluntary Guideline.

SUMMARY: On June 20, 1979, the President directed the Department of Energy (DOE) to develop and publish within 120 days a voluntary guideline, applying specifically to solar energy and renewable resources, for the ratemaking and other regulatory policy standards established under Title I of the Public Utility Regulatory Policies Act of 1978 (PURPA).

On October 12, 1979, the Department of Energy (DOE) issued a Notice of Proposed Voluntary Guideline and Public Hearings for Solar Energy and Renewable Resources Respecting the Federal Standards Under the Public Utility Regulatory Policies Act of 1978 (PURPA) (44 FR 60236, October 18, 1979). This Notice summarizes in the Preamble the public comments DOE received and presents the voluntary guideline in its final form as the Appendix hereto.

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SUPPLEMENTARY INFORMATION:

I. Background.

On June 20, 1979, the President directed DOE to develop and publish within 120 days a voluntary guideline, applying specifically to solar energy and renewable resources, for the 11 standards established in Title I of the Public Utility Regulatory Policies Act of 1978 (PURPA), Pub. L. 95-617, 92 Stat. 3117 et seq. (16 U.S.C. 2601 et seq.). These 11 standards apply to those electric utilities whose annual retail sales exceed 500 million kilowatt-hours in any calendar year beginning after December 31, 1975, and before the immediately preceding calendar year. The 11 standards, specified in detail by sections 111(d) and 113(b) of PURPA, are summarized as follows:

- (1) Cost-of-Service Standard: Rates to each class of consumers shall be designed to the maximum extent practicable to reflect the costs of providing service to that class;
- (2) Declining Block Rates Standard: Declining block energy charges that are not cost-based shall be eliminated;
- (3) Time-of-Day Rates Standard: Time-of-day rates shall be established, if cost-effective, where costs vary by time-of-day;

- (4) Seasonal Rates Standard: Seasonal rates shall be established where costs vary by season;
- (5) Interruptible Rates Standard: Interruptible rates based on the costs of providing interruptible service shall be offered to commercial and industrial customers;
- (6) Load Management Techniques Standard: Load management techniques shall be offered to consumers where practicable, cost-effective, reliable and useful to the utility for energy or capacity management;
- (7) Master-Metering Standard: Master metering shall be prohibited or restricted for new buildings to the extent necessary to carry out the purposes of Title I of PURPA;
- (8) Automatic Adjustment Clauses Standard: Automatic adjustment clauses shall not be allowed unless they provide efficiency incentives and are reviewed in a timely manner;
- (9) Consumer Information Standard: All consumers shall receive a clear and concise explanation of applicable and proposed rate schedules, and annual consumption, upon request;
- (10) Procedures for Termination of Service Standard: Service shall not be terminated except pursuant to certain enumerated procedures; and
- (11) Advertising Standard: Political or promotional advertising shall not be charged to ratepayers.

PURPA requires State regulatory authorities and certain nonregulated electric utilities to consider the standards within the time frames, procedures and other requirements established by PURPA and to make a specific determination with respect to the implementation or adoption of each standard.

Section 131 of PURPA gives the Secretary of Energy the authority to prescribe voluntary guidelines respecting consideration of the standards. Congress intended that, in formulating these guidelines, the Secretary utilize a procedure involving significant input from concerned persons.

On August 20, 1979, DOE issued a Notice of Intent (44 FR 49998, August 24, 1979) setting forth, among other things, its intentions with respect to the exercise of its authority under PURPA to promulgate voluntary guidelines for the standards. On August 24, 1979, DOE issued a Notice of Inquiry (44 FR 50635, August 29, 1979) to solicit public comments for consideration in developing a guideline for applying the PURPA standards to solar energy and renewable resources.

On October 18, 1979, DOE published the proposed guideline in the Federal Register (44 FR 60236) and solicited public comment for consideration in the development of the final guideline. At a public hearing held in Kansas City, Missouri

on November 29, 1979, testimony was received from 10 speakers. Testimony was also received from 10 speakers at a public hearing held in Washington, D.C. on December 4, 1979. In all, oral and/or written comments were received from 48 respondents. Among those responding were State public utility commissions (2), a State energy commission, electric utilities (19), public interest groups (4), industrial trade associations (3), electric utility industry associations (2), concerned individuals (11), energy research and development firms (3), a builder/developer, a magazine publisher, and a labor union.

DOE evaluated the proposed guideline in light of each of the comments received. When, after review, DOE determined that a comment warranted changes in the proposed guideline, the guideline was modified accordingly. When the rationale supporting the proposed guideline was stronger than the arguments challenging it, the guideline was left unchanged. Part III of the Preamble describes by section the more significant comments received and DOE's responses.

II. Purpose.

The purpose of this voluntary guideline is to assist State regulatory authorities and nonregulated utilities in their consideration of the ratemaking and other regulatory policy standards established under Title I of PURPA as they apply specifically to solar energy and renewable resource systems. The voluntary guideline addresses each of the 11 standards presented in sections 111(d) and 113(b) of PURPA.

The policy guidance set forth herein is voluntary in nature and is not legally binding. It constitutes DOE's opinions on the ratemaking and other regulatory policy standards as they apply specifically to solar energy and renewable resource systems. Moreover, the guideline complements and is fully consistent with the other activities undertaken by DOE pursuant to PURPA.

Section 131 of PURPA authorizes the Secretary of Energy to prescribe voluntary guidelines for the standards established under Title I of PURPA for electric utilities. The decisions made by State regulatory authorities and nonregulated utilities with respect to the standards can affect, in some cases significantly, the benefits obtained nationally and locally from solar energy and renewable resource systems. For this reason DOE believes that the guideline should be of interest to and useful to State regulatory authorities and nonregulated utilities in their consideration processes.

III. Discussion of Comments and DOE's Response.

The following is a discussion of comments received on the proposed voluntary guideline, and DOE's response to these comments. The discussion is organized according to general issues, coverage of the guideline, definitions, and issues relating to application of each of the 11 PURPA standards to solar energy and renewable resources.

A. General Comments

(1) Voluntary Nature of the Guideline. Several commenters indicated that there was insufficient emphasis on the voluntary, nonbinding nature of the guideline. Further, some commenters suggested that the guideline did not recognize the flexibility and discretion traditionally accorded to State regulatory authorities and nonregulated utilities, particularly in the areas of rate design and cost-of-service.

The voluntary and nonbinding nature of DOE's guidance was clearly indicated in the proposed guideline and has been reemphasized in the final guideline. DOE recognizes, subject to the requirements contained in PURPA, the legal authority and discretionary powers of State regulatory authorities and non-regulated utilities over utility ratemaking and regulatory policy. PURPA requires State regulatory authorities and certain nonregulated utilities to consider the 11 standards within the time frames, procedures and other requirements established by PURPA and to make a specific determination with respect to the implementation or adoption of each standard.

(2) Specific Guidance in the Guideline. Several commenters indicated that the guideline should include specific guidance-- in the form of description and analysis--on factors such as marginal costing methodologies, revenue related rate adjustment methodologies, criteria for identifying or assessing rate discrimination, and quantification of nonfinancial costs. On the other hand, one commenter suggested that the guideline should be more results oriented rather than procedurally oriented.

In this guideline DOE's intent is to provide general policy guidance. Voluntary guidelines which DOE plans to issue on several of the PURPA standards individually will treat the standards in more depth. Furthermore, DOE intends to prepare technical assistance materials and studies which will treat specific issues relating to the PURPA standards in more detail than provided in the guideline.

(3) Consistency of the Guideline With Other Federal Laws and Rules. Some commenters indicated that certain provisions in the guideline are in conflict with or are not consistent with other Federal laws and rules--specifically, various sections of PURPA, the Federal Power Act, and final or proposed rules and regulations issued by the Federal Energy Regulatory Commission (FERC) on sections 133 and 210 of PURPA. Some of these comments addressed conflicts or inconsistencies in definitions and are treated in section III.C. of the Preamble. One commenter indicated that section E of the guideline (cost-of-service) is in direct conflict with FERC section 133 rules, although no specific conflicts were cited. Other commenters suggested that since the section 133 rules did not advocate a specific costing methodology, the guideline should reaffirm the discretion of State regulatory authorities and nonregulated utilities in the choice of an appropriate cost methodology. Another commenter viewed as inconsistent DOE's advocacy of marginal cost pricing in the guideline and the section 133 rules which require collection of both marginal and embedded cost data.

A commenter felt the discussion of the information requirements of Title II of the National Energy Conservation Policy Act (NECPA), Pub. L. 95-619, 92 Stat. 3206 et seq., was inappropriate in the treatment of the advertising standard. Another commenter suggested that rates for solar energy and renewable resource backup service should include provisions for "avoided costs" as described in the proposed PURPA section 210 rules as a means of providing solar discounts.

After reviewing these comments DOE has not identified any conflicts which warrant changes in the voluntary guideline. With respect to FERC section 133 rules, DOE does not consider there to be any inconsistency between the FERC requirements to collect both embedded and marginal cost data and DOE's advocacy of marginal costing principles. Furthermore, section 115(a) requires that marginal costing principles be taken into account in considering the cost-of-service standard. DOE can simultaneously recommend marginal costing yet recognize that it is ultimately the State regulatory authorities' and nonregulated utilities' decisions as to which costing methodologies are implemented.

The reference to NECPA merely calls attention to the information requirements concerning solar energy and renewable resources. DOE believes that it is appropriate to include these references in the guideline for purposes of coordination.

This guideline does not apply in situations regarding either the sale of electric energy to qualifying cogenerators and small power producers or the purchase of electrical energy from such facilities since they are subject to the provisions of section 210 of PURPA and any rules promulgated by FERC under section 210.

(4) Separate Application of Marginal Cost Pricing to Solar Energy and Renewable Resource System Auxiliary Power. Several commenters expressed concern that application of marginal cost pricing principles solely to solar energy and renewable resources customers and not to other utility customers could be discriminatory and could inhibit the market penetration of solar energy and renewable resource systems. Some of these commenters indicated that such separate treatment could penalize the user of solar energy and renewable resource systems.

DOE agrees with this concern. Both in the proposed and the final forms, the guideline states that marginal cost pricing should apply to all customers, not only to solar energy and renewable resource customers. As discussed more fully in section III.D.(1) below, DOE believes that all rates for electric utility customers should be based on marginal costs. Such rates are nondiscriminatory, promote efficient energy use decisions by all customers, and provide an environment in which solar energy and renewable resources are neither subsidized nor penalized by electric utility rates.

Another group of commenters expressed the view that the guideline was too broad and should have focused exclusively on issues relating to solar energy and renewable resources. DOE's advocacy of marginal cost-based rates for all customers was cited specifically. The principal purpose of the guideline, as directed by the President, is to address the PURPA standards as they relate to the implementation of nondiscriminatory rates for solar energy and renewable resources. Rate discrimination can be assessed from an economic perspective only with respect to the costs incurred in providing a kilowatt-hour or a kilowatt of electricity. For this reason the guideline advocates the use of marginal cost pricing as a means of designing rates which are nondiscriminatory not only to solar energy and renewable resource customers but also to all other customers. The discussions of certain standards in the guideline reflect this generic consideration.

(5) DOE's Authority to Issue the Guideline. Several commenters questioned DOE's authority to issue a guideline applying the 11 PURPA standards to solar energy and renewable resources. They asserted, among other things, that (1) issuance of this guideline exceeds the scope of section 131 of PURPA by establishing a twelfth standard; (2) the Presidential directive lacks the specificity necessary for the development of a meaningful guideline; and (3) the proposed solar guideline, without adequate notice and public participation, becomes the generic guideline for each of the 11 PURPA standards.

Section 131 of PURPA provides that voluntary guidelines prescribed by the Secretary "may not expand the scope or legal effect" of the PURPA standards or establish additional standards. The proposed guideline does not expand the scope or legal effect of the PURPA standards; neither does the guideline establish additional standards for solar energy and renewable resource systems. The guideline addresses the 11 PURPA standards in the context of solar energy and renewable resource use. It does not advocate that solar energy and renewable resource systems be accorded special treatment outside the scope of the PURPA provisions relating to the standards. It is DOE's opinion that the guideline carries out the intent of the Presidential directive; that is, to provide guidance for consideration of the PURPA standards with particular reference to solar energy and renewable resources.

Finally, the solar guideline is not intended to take the place of generic guidelines respecting each of the 11 PURPA standards. While the guideline necessarily addresses generic consideration of the PURPA standards, its primary purpose is identifying the implications of each of the PURPA standards for the introduction and use of solar energy and renewable resources within a utility's service area. DOE plans to issue generic guidelines respecting certain of the PURPA standards, including cost-of-service. Public participation in the form of written and oral comments will be a necessary part of this process.

B. Coverage of the Guideline

A few comments were received on issues relating to buy-back rates for utility purchases of electricity generated by dispersed solar energy and renewable resource systems. Buy-back rates are not addressed in the final guideline. This guideline does not apply in situations involving either the sale to or purchase of electric energy by an electric utility from qualifying cogenerators and small power producers covered by the section 210 rules promulgated by the FERC. Section B, "Coverage of the Guideline," in the appendix has been changed to reflect this. As indicated in the proposed guideline, DOE has, in the past, submitted its opinions to FERC on cost-of-service and buy-back rates.

C. Definitions

(1) Inclusion of Waste Heat in the Definition of Solar Energy and Renewable Resources. One commenter indicated that waste heat generated by air conditioning/refrigeration systems should be included in the definition of solar energy and renewable resources presented in section C of the guideline, since waste heat can be used--among other possible end-uses--to heat water for commercial establishments. DOE believes that the productive use of waste heat should be encouraged to the extent that it increases the efficiency of energy use and promotes conservation. However, because waste heat is a by-product of energy consumption it does not qualify as a solar energy or renewable resource. Accordingly, the definition of solar energy and renewable resources has not been changed to include waste heat.

(2) Inclusion of Air-Source Heat Pump Systems in the Definition of Solar Energy and Renewable Resources. A second commenter observed that the definition of solar energy and renewable resources would cover the use of air-source heat pumps since the definition includes "energy received by the sun indirectly in the form of stored radiant energy in...the atmosphere...." DOE does not consider mechanical, air-source heat pumps to be included in the definition of solar energy and renewable resources.

(3) Conflict in the Guideline Definition of Class With the Definition of That Term in Other Federal Laws and Regulations. A third commenter indicated that the definition of class used in the guideline was in conflict with the use of the term in the Federal Power Act, PURPA, and the PURPA section 133 and section 210 rules. Since the guideline definition of class is identical to the PURPA definition of that term, DOE does not agree that there is any conflict in the use of the term "class."

D. Cost-of-Service Standard and Rate Design Standards

A majority of the comments on the guideline addressed DOE's treatment of the cost-of-service standard and the rate design standards. Because the issues addressed are closely related, the comments on these standards and DOE's responses have been combined in this section. The discussion is organized as follows:

- (1) Advocacy of Marginal Costs as a Basis for Ratemaking.
 - (a) General comments.
 - (b) Economic efficiency.
 - (c) Nondiscriminatory rates.
 - (d) Energy savings.

- (2) Application of Marginal Cost Pricing Principles.
 - (a) General comments.
 - (b) Measurement of marginal costs.
 - (c) Adjustments to marginal costs.
 - (d) Volatility of marginal costs and revenue recovery.
- (3) Structure of Marginal Cost-Based Electric Rates.
 - (a) General comments.
 - (b) Time-of-day and seasonal rates.
 - (c) Interruptible rates.
 - (d) Time varying fuel costs.
- (4) Customer Class.

- (1) Advocacy of Marginal Costs As a Basis for Ratemaking.

- (a) General comments. Several comments were received relating to DOE's advocacy of the use of marginal costs as the cost basis for electric ratemaking. Several commenters agreed with DOE's position. However, some commenters felt that advocacy of a single costing approach is not consistent with section 115(a) of PURPA and restricts or usurps the discretionary powers of State regulatory authorities and nonregulated utilities in making such determinations. Related to this, some commenters indicated that the guideline should allow State regulatory authorities and nonregulated utilities maximum flexibility in specifying appropriate costing methodologies and other factors important to ratemaking. Other comments were received indicating

that a principal purpose of the guideline--the establishment of nondiscriminatory rates for solar energy and renewable resource system backup power--can be accomplished by basing rates on costs other than marginal costs. Several commenters indicated that application of marginal cost pricing to solar energy and renewable resource backup power, but not to other classes of service, could result in discriminatory, higher rates for solar customers than for other customers.

As noted earlier, the guideline should not be interpreted as advocating that marginal cost-based rates should be applied only to customers using solar energy or renewable resource systems. Rather, DOE believes that pricing electricity to all customers based on marginal costs will lead to end-use conservation of electricity, efficient use of scarce fuels and capacity by utilities, and equitable rates to consumers (i.e., the three purposes of Title I of PURPA). The use of average, or embedded costing principles is less likely to promote the PURPA goals to the same extent. Moreover, nondiscriminatory rates for solar energy and renewable resource customers are, in an economic sense, most likely to occur if all rates are based on marginal costs.

The adoption of marginal costing principles is consistent with section 115(a) of PURPA. Although Title I of PURPA does not specifically mention marginal costs (nor does it mention accounting methods or embedded costs), DOE interprets section 115(a) as requiring consideration of marginal costing principles. Section 115(a) requires that when a State regulatory authority

or nonregulated utility prescribes methods for undertaking cost-of-service determinations, it must take into account the extent to which total costs to an electric utility are likely to change if additional capacity is added to meet peak demand relative to base demand, and if additional kilowatt-hours of electric energy are delivered to electric consumers.

In addressing these marginal costing principles in a voluntary guideline, DOE is not restricting or usurping the authority of State regulatory authorities and nonregulated utilities in determining what costing methodologies or other factors should be used to design rates for utility services within their jurisdictions. Under PURPA, State regulatory authorities and nonregulated utilities must consider the use of marginal costing principles in making their considerations and determinations on the cost-of-service standard. Moreover, for the reasons stated in section E of the guideline and immediately below, marginal costing principles are most likely to be consistent with the purposes of PURPA and the objective of nondiscriminatory rates for solar energy and renewable resource customers.

(b) Economic efficiency. As discussed in section E of the proposed guideline, the efficient allocation of scarce resources in a market economy is promoted when prices for goods reflect the value of the scarce resources used to produce those goods. In order for scarce fuels and capital to be used

efficiently, consumers of electricity should face a price which reflects to the maximum extent practicable the cost of resources used to produce one more or one less kilowatt-hour or kilowatt. That is, they should face a price which reflects the marginal cost of electricity.

Prices which equal the average or embedded cost of electricity do not reflect the cost of an additional kilowatt-hour or kilowatt unless the average cost of production happens to equal the marginal cost of production. Where marginal costs are equivalent to embedded costs, both average and marginal cost-based rates will meet the three purposes of PURPA and be nondiscriminatory in an economic sense. Under many circumstances, however, average and marginal cost-based rates will be different. Average or embedded cost pricing will lead to electricity rates which reflect the accounting costs of (a) past utility investment decisions, and (b) average fuel costs for a billing period, not the current costs actually incurred at any moment in providing one more kilowatt or kilowatt-hour of electricity.

An example may be appropriate. If high cost imported oil is required to generate an extra kilowatt-hour during a period of peak utility demand, the consumer's decision to purchase or not to purchase that kilowatt-hour should be guided by a price which reflects the cost of the oil. Prices which reflect

the marginal cost will make electricity consumers aware of the cost implications of their decisions and provide them with strong incentives to conserve scarce fossil fuels by reducing their peak period electricity use. Embedded cost-pricing, which averages the highest fuel costs of the peak period with lower fuel costs (possibly from baseload capacity which is either coal or nuclear), will undervalue electricity in the peak period. More peak period electricity will be consumed than if prices had been based on marginal costs and the need to import those scarce fossil fuels used to generate electricity will be greater. Moreover, offpeak electricity prices, which will also be based on average fuel costs, will not reflect the lower cost of offpeak energy which comes from baseload plant. As a consequence, consumption of offpeak energy will be discouraged by a rate which exceeds the cost of providing that energy.

In addition to energy charges which are too low during the peak period, embedded cost-pricing may also lead to demand charges which are unnecessarily high. Under embedded cost ratemaking, demand costs are determined by averaging the costs of all types of capacity--peaking units, cycling units, nuclear units, coal units, and others. Such an approach fails to recognize the substantial fuel cost savings associated with adding baseload coal and nuclear units. As a result, it implies that capacity is expensive when, in fact, that capacity will reduce consumption of scarce fossil fuels and, in many cases, reduce the total value (and the present value) of consumer rates over the life of the plant.

(c) Nondiscriminatory rates. Marginal costs are generally higher in periods of "peak" electric demand (particularly when scarce fossil fuels are used for peak generation) and lower during "offpeak" demand periods. Electric rates are nondiscriminatory when they reflect these variations in cost. For rates to be nondiscriminatory in an economic sense, customers who consume power at the same time should pay the same rates for electricity, subject to cost variation with respect to the characteristics of service received (e.g., voltage level), and the cost-effectiveness of metering and billing consumption by time-of-day.

By basing electricity prices on marginal costs, all customers pay for electricity in proportion to the costs of resources used to produce the electricity. Consumers who use electricity generated by oil-fired units during peak periods pay the cost of imported oil rather than having these costs averaged across the kilowatt-hours consumed by all customers. No individual consumer is "favored," nor is his or her electricity consumption subsidized by others. Economic discrimination, whether favorable or unfavorable to solar energy and renewable resources, does not occur under marginal cost pricing.

For a number of reasons, a precise application of marginal cost pricing for setting electric rates may not be possible. In some cases, the development of rate structures which reflect hourly and daily differences in marginal costs may not be cost-effective. Rate design requires informed judgment by regulatory

authorities and utilities in the consideration of equity issues and other practical matters. However, as will be discussed in section III.D.(2), discrimination can be minimized by designing rate structures with characteristics which deviate least from the characteristics of the schedule of marginal costs.

(d) Energy savings. Several comments were received addressing the effects of marginal cost pricing and the introduction of solar energy and renewable resource systems on conservation of electric energy and scarce fossil fuels. A few commenters suggested that there was little or no evidence that marginal cost pricing results in end-use conservation of electricity. One commenter observed that low offpeak electric prices under a time-of-day rate structure could result in an increase in electric usage.

Even in cases where only a small reduction in electric usage occurs, significant savings of scarce fossil fuels can result. Marginal cost-based time-of-day prices shift usage from peak demand periods when high fuel cost peaking units are used to generate electricity to offpeak demand periods when baseload units are relied upon for generation. This results in increased utilization and/or expanded capacity of baseload plant. For utilities which use primarily coal and nuclear for baseload generation and gas and oil for peaking generation, there are direct gas and oil savings. For utilities which use gas or oil as a baseload fuel, an increase in baseload

capacity requirements can provide additional incentives for building new nuclear- or coal-fired capacity to displace oil usage and lower the total value (and the present value) of consumer rates over the life of the plant.

Finally, the principal objective of marginal cost-based electricity rates is not the minimization of electricity consumption but the economically efficient use of electricity by consumers. Solar energy and renewable resource systems with electric backup may increase electricity consumption if they replace oil heating. However, if the increased electricity consumption is provided from coal or nuclear generating plants, oil imports would be displaced by a plentiful domestic fossil fuel.

Another commenter indicated that pricing electricity at marginal costs could lead to solar auxiliary systems powered by natural gas and oil rather than electricity. In this way, increased market penetration of solar energy and renewable resource systems could lead to increased oil and gas use. This might possibly occur, particularly if oil and gas prices do not reflect marginal costs. However, oil prices are being deregulated and wellhead prices of gas are due to be deregulated under the Natural Gas Policy Act of 1978. Both of these changes

should result in a better relationship between prices and marginal costs for these fuels. Moreover, even in the short run, marginal cost-based time-of-day rates could make the use of offpeak electricity more competitive with gas and oil as a backup source of energy. The lower capital costs for electric backup systems and the general availability of electricity will also provide incentives for installation of electric rather than oil and gas backup systems.

One commenter indicated that the displacement of conventional electric end-use technologies with solar or renewable resource technologies would not necessarily decrease oil and gas usage in electricity generation, but could displace coal and nuclear-powered generation instead. This comment is accurate for utilities which have very little oil and gas generation, and section E.3 of the guideline has been revised to indicate this possibility. However, for other utilities, the displacement of conventional electric end-use technologies with solar energy and renewable resource technologies would tend to reduce utility consumption of these scarce fossil fuels. Furthermore, the use of storage with solar energy and renewable resource systems will shift loads from peak demand periods to offpeak demand periods and tend to advance the PURPA purpose of efficient use of utility resources.

(2) Application of Marginal Cost Pricing Principles.

(a) General comments. Several commenters addressed issues associated with the application of marginal cost pricing principles, particularly with regard to the measurement of marginal costs and constraints on the use of marginal costs in electric rate design. DOE recognizes that the realities of utility ratemaking and market conditions preclude a strict, precise application of marginal cost pricing in setting electric rates.

Electric utility ratemaking will always involve judgments, practical considerations and a careful review of the impacts of alternative rate designs. These judgments and considerations should, however, be applied with the aim of furthering the purposes of PURPA--end-use conservation, utility efficiency, and equity.

(b) Measurement of marginal costs. Comments were received indicating that there is little consensus on the definition of marginal cost and a lack of consistency in the application and results of various marginal costing methodologies. Two much discussed issues are whether short run or long run marginal costs are the more appropriate measure and how to quantify short and long run marginal costs. In concept, the more appropriate measure will depend upon the characteristics of the utility system under study. Short run marginal costs would be more

appropriate for systems which have more generating capacity than required to meet reliability targets and/or for which the mix of generating capacity is perfectly adjusted to demand (i.e., the system is in equilibrium). For systems which are short of capacity, either an estimate of short run marginal costs which includes a congestion charge or an estimate of long run marginal costs which reflects both the congestion costs of inadequate capacity and operating and maintenance costs would be the more appropriate measure.

In practice, the distinction may be of little importance if short run and long run marginal costs do not differ by much or if the structure of rates based on long run marginal costs approximates the structure of rates based on short run marginal costs. Experience suggests that one or the other of these conditions is likely to hold. DOE has included the elements of a definition of marginal cost in section E of the guideline.

In general, DOE does not believe that debates concerning the appropriate definition of marginal costs should impede or prevent the useful application of marginal costs in rate design. Controversy exists over many concepts used in utility rate regulation. For example, the debates over how to determine the cost of equity capital to a utility do not prevent or make inappropriate rate of return regulation. Similarly, debates over what items should be allowed in a utility's rate base do not prevent the definition of a rate of return on rate base for use in determining utility revenue requirements.

Furthermore, different estimates of marginal costs are attributable primarily to the features of the different methods used to calculate marginal costs and the application of these methods, not to differences in definitions of marginal costs. Many marginal costing methodologies are of recent vintage and are still evolving. As these methodologies evolve, some inconsistencies will be eliminated and the effects of remaining inconsistencies on estimates of marginal costs will be better understood.

To date, several utilities have conducted or have commissioned the conduct of marginal cost studies and have designed rates based on these studies. The choice of method should be at the discretion of the State regulatory authority or nonregulated utility. While comparative evaluations of alternative methods for calculating marginal costs have been made (e.g., an evaluation by the California Energy Commission and an evaluation of four methodologies prepared for the Electric Power Research Institute), there is no consensus on a "best" method. The choice of method must reflect many factors, including the ability of the method to model specific operating characteristics of utilities and their resulting cost structure (e.g., the use of hydro power as peaking generation), data requirements and data availability, and costs of application. Section E.2. of the guideline has been added to reflect this position.

(c) Adjustments to marginal costs. As mentioned above, the application of marginal cost pricing to electric utilities may require adjustments to marginal costs in developing rates for implementation. These adjustments relate principally to market imperfections which either are introduced by the regulatory process or are not accounted for in the measurement of marginal costs.

Commenters specifically cited the following related issues: (i) marginal costs must be adjusted to rate levels consistent with an embedded cost-based revenue requirement and this adjustment must be done subjectively; (ii) inconsistencies in the application of marginal cost principles between electric and other energy markets will result in losses in efficiency if rates are not adjusted to reflect these inconsistencies; and (iii) results of marginal costing methodologies which measure only marginal private (utility) costs must be adjusted to reflect marginal social costs (real resource costs).

(i) Revenue related rate adjustments. Several commenters asserted that rate adjustments reflecting embedded cost-based revenue requirements result in rates which are no longer equal to marginal costs, and which are, therefore, discriminatory. One commenter noted that such rate adjustments would inject an "intolerable measure of subjectivity" into ratemaking. Several commenters had views on various specific methods of making rate adjustments (e.g., application of the inverse

elasticity rule), and some commenters suggested that few data were available to evaluate these alternative methods. One commenter interpreted the guideline as suggesting that the discriminatory nature of revenue-related rate adjustments should be reviewed solely in terms of the consequences with regard to solar energy and renewable resources. Another commenter suggested that rate adjustments should not discourage the use of solar energy and renewable resource systems in favor of other uses such as thermal energy storage systems.

Under rate of return regulation, it may be necessary in many cases to adjust marginal costs up or down in order to obtain rates which will recover an embedded cost-based revenue requirement. The need to make such adjustments should not limit the application of marginal costing principles in determining the structure of electric rates. Marginal costs for some utilities may result in small amounts of excess revenue. Adjustments to rates to eliminate these excesses will result in small changes and have insignificant effects on consumers' decisions to invest in solar energy and renewable resource systems. In addition, rate adjustments made to meet a revenue requirement can be done in a manner which balances the efficiency and conservation goals of PURPA with the equity goal and applicable State laws.

However, any adjustments to marginal costs should be made in recognition of the impacts of rate structures on scarce fuel usage, peak demands, rate stability, and consumers. Adjustments which lead to reduced reliance on scarce fossil fuels, greater rate stability and which result in gradual rather than abrupt changes in rates are preferred to rate adjustments which do not promote such goals. In general, for cases in which rate levels must be consistent with embedded cost-based revenue requirements, DOE advocates that rate structures be determined based on marginal costs, and that rates reflect the pattern of marginal costs to the maximum extent practicable (i.e., in a manner which results in the least deviation from the structure of marginal costs).

Judgment and subjective considerations have always influenced rate design decisions made under embedded cost procedures. The guideline emphasizes that State regulatory authorities and nonregulated utilities should attempt, in making adjustments to marginal cost-based rates, to minimize any possible rate discrimination not only with regard to solar energy and renewable resource users but also with respect to other electric customers. Section F.4. of the guideline has been revised to reflect this emphasis.

(ii) Inconsistency in the application of marginal cost pricing among energy markets. Some commenters suggested that the inconsistent application of marginal cost pricing among energy markets will result in allocative inefficiencies through distortion of fuel use choices. Specifically, the contention is that if electricity is priced at marginal cost while gas, oil and coal--substitutes and complements for electricity--are not, consumers will be given improper price signals and will substitute other energy sources for electricity in an economically inefficient manner. With regard to solar energy and renewable resources, this problem could manifest itself in a relative increase in gas and oil backup systems.

These commenters proposed either that marginal cost prices for electricity should be adjusted to counter this problem, or that marginal cost pricing should be abandoned. DOE does not believe that a significant inconsistency problem associated with marginal cost pricing of electricity has been demonstrated. Currently coal prices are not subject to governmental price controls and prices for gas and oil are moving toward marginal costs due to decontrol. Common sense and sound economic policy suggest that rather than adjust electric rates to accommodate remaining market imperfections in all energy markets, these imperfections should be corrected.

(iii) Measurement of marginal social costs. Several commenters observed that social costs such as air pollution, and decreased safety should be reflected in electricity rates. As a result of both Federal and State environmental and safety regulation, some very important social costs are taken into account when electric utility rates are set. The marginal costs that a utility incurs in producing electricity will reflect the social costs of pollution abatement and the maintenance of public health and safety. The opportunity to include other social costs in electricity rates depends upon the ability to measure these costs precisely. However, at this time precise measurement of these costs does not appear to be feasible.

(d) Volatility of marginal costs and revenue recovery.

A commenter asserted that, under marginal cost pricing, a utility would be less able to recover allowed revenues because marginal costs vary much more than embedded costs.

Marginal costs may vary more than embedded costs since changes in conditions affecting costs (particularly changes in electric usage patterns) will be reflected more quickly and fully in marginal cost calculations than in embedded cost calculations. However, rather than being a disadvantage, this can be a benefit. Stability of utility earnings is improved with marginal cost pricing because changes in revenues, brought about by a change in sales, are more closely related to the changes in costs which also occur as sales change.

(3) Structure of Marginal Cost-Based Electric Rates.

(a) General comments. Several comments were made on the treatment of time-of-day, seasonal, and interruptible rates in the guideline. Some commenters suggested that nondiscriminatory rates for solar energy and renewable resources could be designed based on (i) inverted block rate structures, or (ii) rates that utilities use to buy electricity from small power producers and cogenerators.

Several rate structures are consistent with marginal cost pricing. Where marginal costs vary by time-of-day, DOE proposes that time-of-day rates be implemented where cost-effective. However, where utility costs do not vary significantly by time-of-day or where implementation of time-of-day rates otherwise would not be cost-effective, other marginal cost-based rate structures may be appropriate. For example, where utility marginal costs vary seasonally, rates should reflect this cost variation.

While the PURPA rate design standards do not specifically address inverted block rates, they, along with other innovative rate forms which are made to reflect marginal costs, can be consistent with the purposes of PURPA.

As indicated previously this guideline does not address situations regarding either the sale of electric energy to qualifying cogenerators and small power producers or the purchase of electric energy from such facilities if the sale and purchase are subject to the provisions of section 210 of PURPA and FERC regulations.

(b) Time-of-day and seasonal rates. Several commenters indicated that time-of-day and seasonal rates can be developed from embedded costs and do not necessarily have to be based on marginal costs of service.

Time-of-day and seasonal rates can be developed without reference to marginal costs, but unless--by coincidence--these rates happen to reflect marginal costs-of-service, there are no reasons in theory or in practice to assume that they will achieve the purposes of PURPA or result in nondiscriminatory rates for solar energy and renewable resource customers. In general, embedded cost rates cannot be determined to be consistent with the purposes of PURPA or be deemed nondiscriminatory unless they are compared with and found similar to marginal cost-based rates.

(c) Interruptible rates. One comment received indicated that the discussions of interruptible rates in the proposed guideline extended the coverage of the PURPA standard on interruptible rates from commercial and industrial customers to solar energy and renewable resource customers more generally. Another commenter suggested that offering interruptible rates to solar energy and renewable resource customers but not to other customers would be discriminatory.

DOE did not intend to extend the coverage of the interruptible rate standard in PURPA. Section F.3. of the guideline has been revised to emphasize that public utility commissions and non-regulated utilities are required by PURPA to consider the interruptible rate standard only with respect to commercial and industrial customers.

(d) Time Varying Fuel Costs. Several commenters indicated that the determination of time-differentiated fuel surcharges on a marginal cost basis would require costly analyses, administrative procedures, and regulatory procedures. This is due in large part to the variability of fuel costs and purchases from period to period and the need to adjust marginal cost-based fuel surcharges so as not to over-collect allowable costs. One commenter suggested that a time-differentiated, cost-based fuel surcharge might produce no major change in the price signals provided to customers. Another commenter indicated that billing for time-differentiated fuel adjustment clauses would require time-of-day metering and additional administrative expenses and may not be cost-effective. The commenter also pointed out that if time-of-day metering can be justified only for certain customers, application of time-differentiated fuel adjustment clauses might lead to intra-class or inter-class discrimination and would change the relation between rates and marginal costs.

DOE agrees that a time-differentiated fuel adjustment clause may not be cost-effective if frequent and costly analyses and special metering are required to implement it. In addition

marginal-based fuel adjustment clauses could lead to over-collection of revenue. DOE recommends that where time-of-day rates based on marginal costs are used, the fuel cost surcharge be structured in a manner so as to preserve the economic significance of time of day rates based on marginal costs to the maximum extent practicable between complete rate investigations. In addition, DOE believes that fuel adjustment surcharges should be rolled into base rates on a timely basis. Section F.6. has been revised accordingly.

(4) Customer Class.

Many commenters asserted that solar energy and renewable resource customers should not be put into separate customer classes. The commenters felt that this would create the potential to discriminate against solar energy and renewable resource customers, for example, by applying marginal cost-based rates to these customers, but not to other customers. Several commenters also noted that sufficient load data for solar energy and renewable resource customers are not presently available to determine whether separate classes are warranted.

Both the proposed and the final guidelines state that the creation of a separate class for solar energy and renewable resource customers should be done with caution and only under special conditions and that these customers should be treated the same as other customers, in that marginal costing principles should be used as the basis for rate design for all customers. Marginal

cost-based rates will minimize the need for separate customer classes where these classes would otherwise reflect diverse customer load patterns. The principal cost differences between customers relate largely to the voltage level at which they are served and the resulting level of costs for serving them. Marginal cost-based rates in general, and time-of-day rates specifically tend to produce electric bills for all customers in direct proportion to the costs of serving them. Thus, solar energy and renewable resource customers could be billed using the same marginal cost-based rate as all other customers at the same voltage level without any discriminatory consequences for or against solar energy and renewable resource users.

For these reasons, it is DOE's position that solar energy and renewable resource customers should not be placed in a separate rate class unless analysis indicates that their load characteristics are substantially different from the rest of the customer class of which they normally would be a part, and these different load characteristics have a concomitant impact on the cost-to-serve. Section F.5. of the guideline has been revised to indicate that the creation of separate rate classes may not be warranted in the near-term, given the paucity of backup load data and a lack of evidence that discriminatory treatment would result if solar energy and renewable resource customers are included in an existing rate class. However, where backup load data are available in sufficient quality and quantity

to demonstrate that costs of service are significantly different, the guideline offers several conditions which should be considered in establishing separate classes for solar energy and renewable resource customers.

DOE agrees that existing electric load data for solar energy and renewable resource systems may be of limited use in specific utility rate design analyses because: (i) load monitoring programs are new; (ii) data are available only for short time periods from most programs; and (iii) there are uncertainties regarding the representativeness and reliability of the data. However, electric auxiliary load data for solar energy and renewable resource systems are currently being developed and evaluated through publicly- and utility-sponsored demonstration projects and research programs. In addition, solar energy system backup load data will eventually be made available through the National Solar Data Bank.

E. Load Management Standard

(1) Energy Conservation. One commenter suggested that onpeak energy conservation rather than load shifting should be promoted for energy constrained utilities. Even though solar energy and renewable resource systems with chargeable storage do shift load, they also use more energy overall partially because of standby losses. The commenter further asserted that only solar energy and renewable resource systems which display peak coincident operation will benefit the customer and utility.

DOE believes that within the definition of load management provided in section 3(8) of PURPA, and the criteria established in sections 111(d)(6) and 115(c), solar energy and renewable resource systems with chargeable storage capability may provide substantial load management and energy conservation benefits. In many cases these solar energy and renewable resource systems will also permit the overall conservation of scarce fossil fuels. However, since the constraints on utilities are different, and the operational characteristics of solar energy and renewable resource systems vary, the potential effects on utility systems should be considered before advocating a particular solar energy and renewable resource system as a load management option.

(2) Impacts on Capacity. One commenter suggested that the impacts of solar energy and renewable resource systems on generating capacity deferral and distribution plant should be assessed.

DOE agrees that this is an important criterion in an evaluation of the load management potential of solar energy and renewable resource systems. An additional item, "Impact on Generating Capacity Deferral and Distribution Plant," has been added to the list of evaluation criteria in section F of the guideline.

(3) Cost-Effectiveness Analysis. One commenter asserted that the criterion in the guideline for cost-effectiveness of load management techniques is too rigid and suggested that the cost-effectiveness analysis must be compatible with ratemaking considerations.

DOE disagrees with this comment since the criterion which is taken directly from the language of section 115(c) of PURPA is considered appropriate and sufficiently flexible.

(4) Interruptible Electric Service. As mentioned above in (3)(c), Interruptible Rates, DOE did not intend to extend the interruptible rate standard to include other than commercial and industrial customers. However, DOE considers interruptions to customer requirements for electricity to be a viable load management technique for all customer classes and one which is consistent with the definition of load management provided in section 3(8) of PURPA. Rates which are based on the cost-of-service for providing interruptible power can be an effective way (i) to provide incentives for solar energy and renewable resource investment; (ii) to manage auxiliary loads; and (iii) to limit the effects of auxiliary loads on utility system peaks. In comparison to other rate designs, such rates may produce lower electric bills for solar energy and renewable resource customers, thus providing considerable incentive for investment in these systems. To the extent that these rates promote the use of solar energy and renewable resources, conservation of scarce fossil fuels may result.

For these reasons and because utilities have used this type of load management or interruptible rates in the residential sector to control water heating and air conditioning loads, these rates may be appropriate and might usefully enter into the consideration of rates for residential, agricultural, public or other users of solar energy and renewable resources.

F. Master Metering Standard.

(1) No Exclusions. One commenter suggested that the guideline should not provide an exemption from the standard for centralized solar energy and renewable resource building heating and cooling systems, since this would result in an inappropriate price signal for customers.

The guideline does not provide a special exemption from the standard for centralized solar energy and renewable resource building heating and cooling systems but rather points out that in such cases the benefits of separate metering may not exceed the costs. For example, greater conservation might result from a master-metered solar energy and renewable resource system with a central energy storage backup system than from separate metering without solar energy and renewable resource systems. Moreover, the guideline recommends that separate metering should be considered for all electricity end-uses which do not involve the centralized building heating and cooling system. Such separate metering would preserve at least in part an appropriate price signal to the consumer.

(2) Data Availability. One commenter suggested that there are insufficient performance and cost data on centralized solar energy and renewable resource building heating and cooling systems to support the standard.

DOE recognizes the paucity of operational data for these systems, but believes that the guideline allows State regulatory authorities maximum flexibility in implementing this standard.

(3) Storage Devices. One commenter suggested that coverage of the standard should be extended to centralized energy storage devices, whether they are used in conjunction with solar energy and renewable resource systems or not. Although cost-effective centralized thermal energy storage applications also may not be possible with separate metering, they are not included under the coverage of this guideline.

(4) Proof of Cost-Effectiveness. One commenter suggested that the guideline indicate that the developer--and not the utility--should be required to show cause whether a variance on the master metering standard is warranted. In DOE's opinion, this aspect of the subject is beyond the intended scope of the guideline.

G. Automatic Adjustment Clauses Standard.

Several critical comments were received from utilities on the treatment of the automatic adjustment clauses standard in the proposed guideline. Some indicated that PURPA proceedings were not the proper arena to assess centralized solar energy and renewable resource technology alternatives but that, for example, capacity planning proceedings were more suitable. One comment

indicated that the guideline expanded the scope of sections 113(b)(2) and 115(e) of PURPA by conditioning approval of automatic adjustment clauses on the consideration of solar and renewable resource technology alternatives. Another commenter noted that the level of resources which utilities would have to commit to such considerations would be high. Related to this, commenters noted that the basic cost-effectiveness of centralized solar energy and renewable resource technologies had not been established, and to do so would be very expensive and time-consuming. Another commenter suggested that delaying approval of automatic adjustment clauses pending the development of information on and the consideration of solar energy and renewable resource technology alternatives could be counterproductive to national energy policies by increasing costs or imposing other difficulties on a utility's ability to attract capital to build, for example, oil replacement capacity. Further, it was suggested that the proponents of solar energy and renewable resource alternatives--and not the utilities--should bear the burden of proof of the benefits and costs of these alternatives.

Even though Federal- and utility-sponsored projects demonstrating the technical and economic feasibility of centralized solar energy and renewable resource technologies are ongoing, the development and use of these technologies can still be assessed by State regulatory authorities based on information

presented by utilities and others. Such technologies may result in significant conservation of nonrenewable energy resources. DOE agrees, however, that the wording of the guideline which conditions approval of automatic adjustment clauses on an evaluation of centralized solar and renewable technologies is premature. Section I of the guideline has been revised accordingly.

H. Information to Consumers Standard

Several commenters asserted that the guideline extends section 115(f) of PURPA which requires only that information to consumers include a summary of existing rate schedules. DOE acknowledges that the PURPA requirements do not include information on the potential cost savings of solar energy and renewable resource systems. However, cost savings estimates are required under NECPA, and section J of the guideline has been revised to make a logical connection between the NECPA data requirements and the rate schedule information required under PURPA. Another commenter suggested that dissemination of information on the cost-effectiveness of solar energy and renewable resource systems should be the responsibility of the vendors of these systems. DOE disagrees with this comment. The utility does not have to consider specific system types, but could address the issue generically by providing information on the likely cost savings a customer may experience under the utility's different rate structures.

I. Advertising Standard.

One commenter suggested that the guideline added NECPA data requirements to a PURPA guideline, which is not appropriate. DOE disagrees with this comment. Section 115(h)(2)(B) of PURPA specifically mentions the advertising required under NECPA. The guideline does not require these data, but rather calls attention to the NECPA data requirements concerning solar energy and renewable resources. Another commenter asserted that utilities should not be required to bear the expense of compliance with the standard. DOE disagrees with this comment because the information is already required under NECPA.

IV. PURPA Guideline For Solar Energy and Renewable Resources.

A. General.

The appendix to this Notice contains the final guideline. The guideline is adopted as proposed except for the modifications described above and minor clarifying and conforming modifications. This guideline is intended to provide assistance to State regulatory authorities and nonregulated electric utilities in their consideration of the PURPA standards with respect to the use of solar energy and renewable resources by utility customers.

The guideline sets forth DOE's opinion regarding consideration of the PURPA standards by discussing (1) issues which are pertinent to consideration of the standards with respect to solar energy and renewable resources, and (2) particular factors which should be considered in addressing

the issues and making the PURPA determinations. DOE intends to supplement this guideline, as necessary, with technical information manuals and other resource materials which address specific analytical issues that may arise in the consideration of these standards as they affect the introduction and use of solar energy and renewable resource technologies.

The final guideline is advisory and contains DOE's opinion on the relationship between consideration of the 11 PURPA standards and the use of solar energy and renewable resources by utility customers. In the final guideline, DOE's concern is focused primarily on ensuring: (1) that utility regulatory and ratemaking policy neither favor nor penalize use of solar energy and renewable resources by customers, and (2) that consideration of the PURPA standards furthers the three purposes of Title I of PURPA (that is, conservation of energy supplied by utilities, optimization of the efficient use of facilities and resources by utilities, and equitable rates to consumers).

B. Summary of the Final Guideline.

Following is a brief summary of the final solar and renewable resource guideline for each of the PURPA standards:

(1) Cost-of-Service. DOE proposes that marginal costing principles be used in determining cost-of-service. Marginal cost pricing is consistent with the PURPA goals of efficient use of facilities and resources and conservation of energy. In addition, marginal cost pricing is necessary if rates are, in an economic sense, to be nondiscriminatory and therefore equitable for all customers, including solar energy and renewable resource customers.

(2) Rate Design Standards: Declining Block, Time-of-Day, Seasonal and Interruptible. The final guideline advocates the development of rate structures which reflect marginal costs to the maximum extent practicable. Depending upon circumstances unique to a utility, these rate structures may include time-of-day rates (where cost-effective), seasonal rates, and interruptible rates.

(3) Load Management Techniques. Within the context of section 115(c) of PURPA, solar energy and renewable resource systems may be utilized as load management devices. Depending on the type of solar energy or renewable resource system used, particularly its storage capacity, a solar energy or renewable resource system may reduce both energy and maximum kilowatt demand on the utility. The final guideline emphasizes the importance of this effect when a State regulatory authority or nonregulated utility is assessing alternative load management options.

(4) Master Metering. Cost-effective use of solar energy and renewable resource systems in some facilities may not be possible with separate metering, at least for centralized building heating and cooling systems. In such instances, master metering in combination with solar energy and renewable resource systems may be appropriate. The final guideline recommends that the benefits of and costs associated with the installation of individual meters be carefully weighed against

the benefits and costs of master metering combined with solar energy and renewable resource systems. This is consistent with the cost-benefit requirements relative to this standard as included in section 115(d)(3) of PURPA.

(5) Automatic Adjustment Clauses. Section 115(e)(1)(A) of PURPA requires that fuel adjustment clauses provide incentives for efficient use of resources, including incentives for economical purchase and use of fuel and electric energy, by a utility. The final guideline emphasizes the potential of solar energy and renewable resources as alternatives to the purchase of conventional fuels and sources of power, but does not condition approval of the automatic adjustment clause on formal consideration of such alternatives.

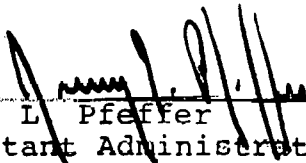
(6) Information to Consumers. The final guideline points out the importance of consumer knowledge of rate schedules, particularly those pertaining to solar energy and renewable resource customers.

(7) Procedures for Termination of Electric Service. Since specific attention to solar energy and renewable resource systems is not necessary when considering this standard, no treatment of this standard is contained in this guideline. PURPA Guideline No. 1 is DOE's generally applicable interpretation of this standard.

(8) Advertising. The final guideline emphasizes the positive implications of the Residential Conservation Service Program established under the National Energy Conservation Policy Act of 1978 (NECPA), Pub. L. 95-619, 92 Stat. 3206 et seq., for the utilization of solar energy and renewable resource devices by utility customers.

(Public Utility Regulatory Policies Act of 1978, Pub. L. 95-617, 92 Stat. 3117 et seq. (16 U.S.C. 2601 et seq.); National Energy Conservation Policy Act of 1978, Pub. L. 95-619, 92 Stat. 3206 et seq.; Department of Energy Organization Act, Pub. L. 95-91 (42 U.S.C. 7101 et seq.)).

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APPENDIX

PURPA VOLUNTARY GUIDELINE NUMBER 2: SOLAR ENERGY AND RENEWABLE RESOURCES

A. Introduction

This voluntary guideline identifies the implications of each of the ratemaking and regulatory policy standards, established by Title I of the Public Utility Regulatory Policies Act of 1978 (PURPA), for the introduction and use of solar energy and renewable resources within an electric utility's service area. The guideline sets forth the issues and factors the Department of Energy (DOE) considers pertinent to consideration of the PURPA standards as they apply specifically to solar energy and renewable resources. In particular, it addresses the effect that adoption of these standards might have on the utilization of solar energy and renewable resources by utility customers. The guideline, itself, is voluntary and does not in any way modify or condition existing State regulatory authority and nonregulated utility practices or applicable State law.

Although the focus of this guideline is the treatment of solar energy and renewable resources in the consideration of the 11 PURPA standards, utility customers who invest in or employ solar energy and renewable resource systems are, in general, not distinguished from other customers or otherwise treated as a separate customer class.

B. Coverage of the Guideline

The guideline covers the 11 ratemaking and regulatory policy standards established in sections 111 and 113, Title I, of PURPA. The voluntary guideline does not in any way modify or condition the rules and regulations which have been promulgated by the Federal Energy Regulatory Commission (FERC) under section 133 of PURPA for cost-of-service information, or which will be promulgated by the FERC under section 210 of PURPA for small power producers and cogenerators. Consequently, this guideline does not apply in situations regarding either the sale of electric energy to qualifying cogenerators and small power producers or the purchase of electrical energy from such facilities if the sale and purchase are subject to the provisions of section 210 of PURPA and any rules promulgated by the FERC pursuant thereto.

C. Definitions

As provided in this guideline, except as otherwise specifically provided--

"Solar energy and renewable resources" means energy received from the sun directly in the form of radiant energy, including photovoltaics, and energy received from the sun indirectly in the form of stored radiant energy in biomass (i.e., wood, vegetation and organic solid wastes), the atmosphere, heated surface waters, the potential and kinetic energy of water elevated via the hydrological cycle, and the kinetic energy of the wind. The term is restricted to dispersed (on-site)

technologies for which solar energy and renewable resource systems provide only a portion of end-use requirements, the remainder being provided through retail purchases of utility generated electricity.

"Class" means, with respect to electric consumers, any group of such consumers who have similar characteristics of electric energy use.

"Electric consumer" means any person, State agency or Federal agency, to which electric energy is sold other than for purposes of resale.

"Electric utility" means any person, State agency, or Federal agency, which sells electric energy.

"Federal agency" means an executive agency (as defined in section 105 of Title 5 of the United States Code).

"Load management technique" means any technique (other than a time-of-day or seasonal rate) to reduce the maximum kilowatt demand on the electric utility, including ripple or radio control mechanisms, and other types of interruptible electric service, energy storage devices, and load-limiting devices.

"Nonregulated electric utility" means any electric utility other than a State regulated electric utility.

"Person" means an individual, partnership, corporation, unincorporated association or any other group, organization or entity.

"Rate" means (a) any price, rate, charge, or classification made, demanded, observed, or received with respect to sale of electric energy by an electric utility to an electric consumer, (b) any rule, regulation, or practice respecting any such rate, charge, or classification, and (c) any contract pertaining to the sale of electric energy to an electric consumer.

"Ratemaking authority" means authority to fix, modify, approve, or disapprove rates.

"Rate schedule" means the designation of the rates which an electric utility charges for electric energy.

"Secretary" means the Secretary of Energy.

"State" means a State, the District of Columbia, and Puerto Rico.

"State agency" means a State, political subdivision thereof, and any agency or instrumentality of either.

"State regulated electric utility" means any electric utility with respect to which a State regulatory authority has ratemaking authority.

"State regulatory authority" means any State agency which has ratemaking authority with respect to the sale of electric energy by any electric utility (other than such State agency), and in the case of an electric utility with respect to which the Tennessee Valley Authority has ratemaking authority, such term means the Tennessee Valley Authority.

D. Table of Contents

1. Cost-of-Service Standard.
2. Rate Design Standards: Declining Block, Time-of-Day, Seasonal, and Interruptible.
3. Load Management Technique Standard.
4. Master Metering Standard.
5. Automatic Adjustment Clauses Standard.
6. Termination-of-Service Standard.
7. Information to Consumers Standard.
8. Advertising Standard.

E. Cost-of-Service Standard.

Under section 111(d)(1) of PURPA, the following is established as a Federal standard: rates charged by any electric utility for providing electric service to each class of electric consumers shall be designed, to the maximum extent practicable, to reflect the costs of providing electric service to such class. In addition, section 115(a) of PURPA requires that when a State regulatory authority or nonregulated utility prescribes methods for determining cost-of-service, it must take into account, if at all possible, the extent to which total costs to an electric utility are likely to change if additional capacity is added to meet peak demand relative to base demand and additional kilowatt-hours of electric energy are delivered to electric consumers.

1. Costing principles. In DOE's opinion, marginal costing principles, rather than embedded costing principles, should be used in determining cost-of-service for all customers for the following reasons:

a. DOE interprets section 115(a) as referring to marginal costing principles and requiring that these be taken into account in considering the cost-of-service standard. In a general sense, for an electric utility, marginal cost is the additional cost required to produce one more unit of electricity or the savings from producing one less unit of electricity (usually kilowatt-hour or kilowatt). This broad definition of marginal cost is consistent with the section 115(a) requirement that, to the maximum extent practicable, the methods to be prescribed by State regulatory authorities or nonregulated utilities take into account the extent to which total costs to an electric utility are likely to change if additional capacity is added or additional kilowatt-hours of electric energy are delivered.

b. Marginal costing methods are more likely to be consistent with the PURPA purposes of efficient use of facilities and resources and energy conservation than embedded costing methods. In an economy where resources, and in particular fossil fuels, are scarce, the production of a good or service must be justified by the satisfaction individuals obtain from

the consumption of that good or service. Scarce resources should be used to produce a good, only if consumers are willing to pay a price for it which equals or exceeds the value of the resources needed to produce it. If consumers are not willing to pay such a price, scarce resources should not be used to produce that good but should instead be used to produce other goods for which consumers are willing to pay a price equal to or greater than the value of the resources used in production.

In order for scarce fuels to be used efficiently, consumers of electricity should face a price which reflects to the maximum extent practicable the resource cost of producing one more or one less kilowatt-hour or kilowatt. When confronted with such a price consumers can more accurately determine whether they want additional scarce resources to be used to produce more electricity or whether they would prefer that those resources be used to produce other goods. Under average cost pricing consumers' decisions to purchase or not to purchase an additional unit of electricity are frequently not based on adequate information about real resource costs. As a consequence, in any rating period more (if average costs are less than marginal costs) or less (if average costs are more than marginal costs) electricity is consumed than consumers would be willing to pay for if prices reflected marginal costs. In particular, if average costs are less than marginal costs, not only will more electricity be produced than is justified by its resource costs, but also

than is justified by its resource costs. In addition, the need to import those scarce fossil fuels used in generating electricity will be higher than it would be if rates reflected marginal costs.

c. In an economic sense, nondiscriminatory or equitable treatment of both users and nonusers of solar energy and renewable resource systems is more likely to occur if electricity rates for both are based on marginal costs than if rates for both are based on embedded costs. To the extent practicable, marginal costing procedures will result in equal treatment for all customers who impose the same costs (for a kilowatt-hour or a kilowatt of demand) on an electric utility. Customers who impose different levels of cost (for a kilowatt-hour or a kilowatt of demand) will be treated differently but only to the degree indicated by differences in the costs they impose on the utility.

Rates that reflect marginal cost-of-service will encourage use of solar energy and renewable resource systems commensurate with the costs of the resources needed to build and operate these systems, and the costs of alternate approaches to meeting the nation's energy needs. As a consequence, marginal cost pricing of electricity is more likely to lead to non-discriminatory rates and efficient energy use decisions by all customers.

2. Marginal cost methods. Several methodologies exist for the estimation of electric utility marginal costs. The selection of a marginal costing method and its specific application should be determined by a State regulatory authority or nonregulated utility after a careful analysis of the characteristics of the electric utility and its customers, and the characteristics of each marginal costing methodology.

3. Energy savings. Solar energy and renewable resource systems will reduce the amount of electric energy consumed by conventional electric end-use devices which they displace in whole or in part. As a consequence, scarce fossil fuels may be conserved. In some utility systems solar energy and renewable resource technologies may for a while defer new baseload capacity additions which would have replaced oil and gas-fired plants in the generation of electricity. In the long run, however, even for these utilities, solar energy and renewable resource systems have the potential to reduce the use of oil and gas for the generation of electricity.

To determine the savings in scarce fossil fuels that may accrue to the electric utility as a consequence of the use and introduction of solar energy and renewable resource systems, the following should be considered:

- a. timing of a utility's peak demand;
- b. utility fuel mix as a function of load range;

- c. local meteorological conditions - how they affect the operation of solar energy and renewable resource systems and thus the utility's load curves;
- d. storage capacity of solar energy and renewable resource systems;
- e. extent of solar energy and renewable resource end-use market penetration;
- f. reliability of solar energy and renewable resource systems; and
- g. characteristics of the solar energy and renewable resource system load.

F. Rate Design Standards: Declining Block, Time-of-Day, Seasonal, and Interruptible.

Subsections 111(d) (2) through (5) of PURPA establish Federal standards with respect to declining block rates, time-of-day rates, seasonal rates, and interruptible rates. These standards provide that declining block rates that are not cost-based shall be eliminated; time-of-day rates shall be established, if cost-effective, where costs vary by time-of-day; seasonal rates shall be established where costs vary by season; and interruptible rates based on the costs of providing interruptible service shall be offered to commercial and industrial customers.

1. Nondiscriminatory rates. Whether time-of-day, seasonal, interruptible, and declining block rates are discriminatory in an economic sense depends on whether and how well they track

marginal costs. Rates that do not reflect marginal costs to the maximum extent practicable are likely to be discriminatory in an economic sense, whereas rates that do reflect marginal costs to the maximum extent practicable are likely to be nondiscriminatory in an economic sense.

Two consequences may result from the economic discrimination brought about by rates which do not reflect marginal costs. On the one hand, levels of investment in solar energy and renewable resource systems may be lower and, consequently, savings of oil and gas may be smaller than would result with marginal cost-based rates. That is, fewer customers may invest in solar energy and renewable resource systems and those that do may build systems with smaller energy displacement capability, smaller storage capacity, and more limited control capability for the operation of storage systems than they would under marginal cost-based rates. On the other hand, if rates economically discriminate in favor of solar energy and renewable resource customers, more customers may invest in solar energy and renewable resource systems and may build larger systems than they would with marginal cost-based rates. In this situation, many of those who do not invest in solar energy and renewable resource systems will pay higher bills and subsidize the consumption of electricity by those who do invest in these systems.

2. Time-of-day and seasonal rates. When time-of-day and seasonal rates are based on marginal costs, a customer is provided with an incentive to shift consumption from times of high marginal cost (peak period) to times of low marginal cost (offpeak period). Solar energy and renewable resource systems in many cases will permit a customer to maintain energy consumption during the peak period and yet avoid the high costs of electrical energy. Inclusion of chargeable storage capability in these systems will permit further displacement of onpeak electricity consumption (if meteorological conditions affect functioning) and may permit displacement of offpeak consumption.

As provided in section 115 of PURPA, time-of-day rates are determined to be cost-effective if the long-run benefits to the electric utility and its electric customers are likely to exceed metering and other associated costs. Where metering costs for time-of-day rates are not justified by the benefits, seasonal rates which track marginal costs may be an appropriate alternative. Such rates do not require the installation of special meters and may permit nondiscriminatory treatment, in an economic sense, of customers.

3. Interruptible rates. Interruptible rates and/or offpeak storage rates which are based on marginal costs may also be effective rate designs for solar energy and renewable resource systems. These rates provide incentives for solar energy and renewable resource investments and provide a means of limiting

the effect high levels of market penetration by these systems may have on utility peak demand. In comparison with other rate designs, interruptible rates may produce lower electric bills for solar energy and renewable resource customers. In addition, they can assure peak period capacity savings from these customers.

4. Revenue related rate adjustments. With rate-of-return regulation, it may not be possible to set prices equal to marginal costs without exceeding or falling short of a utility's allowed revenue level. Under these circumstances adjustments to marginal cost-based rates may be required. These adjustments should be made in a manner which minimizes any losses in the efficient use of resources and facilities. DOE recognizes that the adjustments to be made in any instance will also be influenced by equity considerations; however, the adjustments should be reviewed in terms of their discriminatory consequences, for or against all customers, including solar energy and renewable resource users.

5. Customer class. In DOE's opinion, the creation of separate rate classes for solar energy and renewable resource customers may not be warranted in the near term. Few data are available on the costs-of-service imposed by such customers, and the market penetration of such devices is likely to be low in the near term. Therefore, DOE recommends that solar energy

and renewable resource customers not be considered for separate classification unless the load curves and costs-of-service imposed by such customers can be determined to be significantly different from the load curves and costs-to-serve of the customers in the existing rate class. For ratemaking purposes, separate rate classes should be created only if it can be established that undue economic discrimination for or against solar energy and renewable resource customers would occur between customers in an existing rate class and solar energy and renewable resource customers which are part of that class.

In general, the creation of a separate rate class or modification of an existing one for application to customers using solar energy and renewable resource systems should satisfy the following conditions:

a. the costs of serving the solar group load pattern differ substantially from those imposed by the existing customer class;

b. there is no reasonably available method of reflecting these cost differences within the existing classes;

c. the solar energy and renewable resource group is discretely identifiable; and

d. the costs of administration (including separate billing or special metering equipment) are not excessive.

Consistent with these criteria, a separate customer class may be established if solar energy and renewable resource systems possess special characteristics which offer unique opportunities in rate design to promote their use as load management devices. Rates offered to customers in this class--as in other classes--should reflect marginal cost-of-service to the maximum extent practicable.

6. Time varying fuel costs. Current fuel cost surcharges are generally nontime-differentiated. As a consequence, they will raise offpeak electricity rates proportionately more than onpeak electricity rates and thereby distort the relationship between time-of-day rates based on marginal costs and marginal costs. Where time-of-day rates based on marginal costs are used, DOE recommends that the fuel cost surcharge be structured in a manner which will preserve the economic significance of these rates to the maximum extent practicable between complete rate investigations. In addition, fuel adjustment surcharges should be incorporated into base rates on a timely basis.

G. Load Management Techniques Standard.

Under section 111(d)(6) of PURPA, electric utilities are required to offer to customers load management techniques which a State regulatory authority or nonregulated electric utility determines are practicable, cost-effective, reliable, and will

provide useful energy or capacity management advantages. A load management technique is cost-effective if it is likely to reduce maximum kilowatt demand and the long-run cost savings to the utility of such reductions are likely to exceed the long-run costs to the utility associated with implementation.

With chargeable storage capacity, solar energy and renewable resource systems may provide substantial load management benefits within the definition provided in section 3(8) of PURPA. Utilities should be encouraged to provide information about the load management implications of solar energy and renewable resource systems. In addition, when a utility is assessing alternative load management options, solar energy and renewable resource systems should be considered in that assessment.

Any evaluation of the load management potential of solar energy and renewable resource systems should address the following:

1. effect on utility load curve, i.e., predictability of solar energy and renewable resource customer demand;
2. utility fuel mix by load type;
3. costs associated with load management potential of solar energy and renewable resource systems;
4. interface with other load management techniques;
5. level of penetration necessary to produce a beneficial impact;
6. utility system reliability; and
7. impacts on generating capacity deferral and distribution plant.

H. Master Metering Standard.

Section 115(d) of PURPA requires separate metering for any new building if there is more than one unit in the building, the occupant controls a portion of the electric energy used in his unit, and with respect to such portion of electric energy, the long-run benefits to the electric consumers in the building exceed the costs of purchasing and installing separate meters in the building.

In requiring that the master metering standard be considered, Congress sought to encourage conservation of energy. Separate metering of individual units provides consumers with information about the direct costs of their consumption and improves their ability to determine how they would like scarce resources to be used. In making determinations on the master metering standard Congress intended that State utility regulatory authorities and nonregulated utilities be guided not only by potential energy savings but also by the cost of purchasing and installing individual meters. Under section 115(d)(3) of PURPA, separate metering for any new building is appropriate if the long-run benefits of the meters exceed the costs of purchase and installation.

However, cost-effective use of solar energy and renewable resource options in some facilities may not be possible with separate metering, at least for centralized heating and cooling systems. In such instances, master metering in

combination with solar energy and renewable resource systems may be appropriate. Such a combination might produce greater conservation of energy and scarce fossil fuels than would separate metering without solar energy and renewable resource systems. DOE encourages the evaluation of the costs and benefits associated with the use of master metering versus separate metering, in combination with solar energy and renewable resource options, on a case basis. To address this possibility the following should be included in the consideration of this standard:

1. scarce fossil fuel savings with master metering and separate metering;
2. the life expectancy of the building;
3. the most likely heating and cooling system alternatives and their characteristics; and
4. the possibility of separate metering for a portion of total electric consumption.

I. Automatic Adjustment Clauses Standard.

As specified in sections 113(b)(2) and 115(e) of PURPA, automatic adjustment clauses may not be allowed unless they provide incentives to utilities for economic purchase and use of fuel and electric energy. It must be determined, in an evidentiary hearing at least once every 4 years, that an automatic adjustment clause provides such incentives. In addition, at least every 2 years, the clause must be reviewed to insure maximum economies in those operations and purchases which affect the rates to which the clause applies.

Although the standard is primarily procedural in nature, the intent of Congress was to encourage the efficient use of resources and the economical purchase and use of fuel and electric energy by an electric utility. DOE feels that State regulatory authorities and nonregulated utilities, in reviewing automatic adjustment clauses, ought to consider the impact of such clauses on supply-side (nondispersed) solar energy and renewable resource technologies. Automatic adjustment clauses may establish disincentives for supply-side conservation of scarce fossil fuels, including conservation through solar and renewable resource technologies.

J. Information to Consumers Standard.

Section 113(b)(3) of PURPA establishes the information to consumers standard which requires each electric utility to transmit information regarding rate schedules to each of its electric consumers in accordance with the requirements of section 115(f) of PURPA.

Under this standard an electric utility should be required to provide information to customers about the implications of its rate structure for the use of solar energy and renewable resource systems. Possible cost savings a customer with these systems may experience under the utility's rate structure should be identified. In addition, any provision that would allow a solar energy or renewable resource customer to take

advantage of a special rate structure or require that he be placed on such a rate structure should be explained. Although requiring such rate structure explanations is not mandated by the National Energy Conservation Policy Act (NECPA), it is compatible with the NECPA requirement to provide certain types of information about suggested residential conservation and renewable resource measures.

K. Procedures for Termination of Electric Service Standard.

Section 113(b)(4) of PURPA establishes the termination of service standard which requires that electric utilities may not terminate electric service to any electric consumer except pursuant to procedures described in section 115(g). Section 115(g) specifies that no electric service to an electric consumer may be terminated without reasonable prior notice. Also, under certain circumstances, electric service may not be terminated during any period when termination of service to an electric consumer would be especially dangerous to health.

Since specific attention to solar energy and renewable resource technologies is not necessary when considering this standard, PURPA Guideline No. 1, Procedures for Termination of Electric Service and Gas Service (44 FR 77110, December 28, 1979) is applicable.

L. Advertising Standard.

Section 113(b)(5) of PURPA established the advertising standard which requires that an electric utility may not recover from any person other than the shareholders (or other owners)

of such utility any direct or indirect expenditure by such utility for promotional or political advertising. Among those advertising expenses identified in PURPA as appropriate for inclusion in electricity bills are advertising which informs electric consumers how they can conserve energy or reduce peak demand for electric energy, and advertising which promotes the use of energy efficient appliances, equipment or services.

In considering this standard specific attention should be given to the implications for solar energy and renewable resources of the Residential Conservation Service Program established by NECPA. This program, which is mandatory for all utilities whose annual retail sales of electricity exceed 750 million kilowatt-hours, requires that covered utilities provide certain types of information about suggested residential energy conservation and renewable resource measures to all residential customers. The suggested measures may include solar domestic hot water systems, active solar space heating systems, combined active solar space heating and solar domestic hot water system and passive solar space heating and cooling systems, depending on the service territory and the customer's residential building type.

The information provided to consumers must include the following:

1. a list of the suggested measures;

2. a reasonable estimate of the savings in energy costs which are likely to result from installation of each suggested measure in a typical residence;

3. an offer by the utility to assist the residential customer by arranging for a loan or by arranging for the installation of suggested measures;

4. the offer of a list of contractors, suppliers and lenders who provide services in the utility's service territory and meet certain minimum requirements.