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Part V

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Office of Conservation and Solar Energy

Federal Energy Management and Planning Programs; Methodology and Procedures for Life Cycle Cost Analyses (Average Fuel Costs)

DEPARTMENT OF ENERGY

Conservation and Solar Energy Office

10 CFR Part 436

[Docket No. CAS-RM-79-107]

Federal Energy Management and Planning Programs; Methodology and Procedures for Life Cycle Cost Analyses (Average Fuel Costs)

AGENCY: Department of Energy.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Department of Energy proposes to amend Subpart A of Part 436, which contains the methodology and procedures for use in conducting life cycle cost analyses of possible investments in the various Federal Energy Management Programs. The analysis involves an examination of the estimated cost effects of replacing existing Federal building systems with energy saving alternatives, and the energy-related cost effects of alternate building designs for a new Federal building. DOE proposes to update the methodology's energy price projections, modify the discount rate and the study period, and to make minor technical correction.

DATES: Written comments must be received on or before December 8, 1980, 4:30 e.d.t., in order to ensure their consideration. A public hearing will be held on November 6, 1980, at 9:30 a.m., e.d.t. at the address indicated below. Requests to speak at the hearing must be received by 4:30 p.m., e.d.t., on October 23, 1980, and speakers will be notified by October 27, 1980.

ADDRESSES: Written comments should be mailed to: Carol Snipes, Office of Hearings and Dockets, Department of Energy, Mail Stop 6B-025, 1000 Independence Avenue, SW., Washington, D.C. 20585, (202) 252-9319, [DKT. No. CAS-RM-79-107]

Public hearing: The public hearing will be held at: Room 2105, 2000 M Street, NW., Washington, D.C. 20461.

FOR FURTHER INFORMATION CONTACT:

Jack Vitullo, Department of Energy, 1000 Independence Avenue, SW., Washington, D.C. 20585, (202) 252-9467;

Neal Strauss, Department of Energy, 1000 Independence Avenue, SW., Washington, D.C. 20585, (202) 252-9519.

SUPPLEMENTARY INFORMATION:

I. Introduction

On January 23, 1980, the Department of Energy (DOE) published a final Life-Cycle Cost rule (LCC rule) (45 FR 5620), which established the methodology and procedures for computing the life-cycle costs of investments to conserve energy or to increase the use of renewable energy resources in existing and new Federal buildings. The LCC rule was published pursuant to Section 381(a)(2) of the Energy Policy and Conservation Act as amended, 42 U.S.C. 6361(a)(2), Section 10 of Executive Order 11912, as amended by Executive Order 12003, 42 FR 37523 (July 20, 1977) and Title V, Part 3, of the National Energy Conservation Policy Act (NECPA), 92 Stat. 3275. The purpose of the LCC rule is to establish an approach to evaluate the economic consequences of investments designed to result in the conservation of energy and in the increased used of renewable energy resources.

The LCC rule is a theoretical framework for analyzing possible investments in various Federal energy management programs. The use of the results of the LCC analysis in making an investment decision is governed by specific program rules or requirements stated elsewhere. For example, under the guidelines for the agency planning program for conserving building energy use, each Federal agency is required to plan retrofit decisions on the basis of the results of the LCC analysis. By way of contrast, under the program rules for the Solar in Federal Building Demonstration Program, the result of the LCC analysis is only one factor in evaluating a proposed solar demonstration project.

The methodology required by the LCC rule involves a systematic analysis of all the significant costs associated with energy investments. The methodology relates the intitial costs of an energy investment to the future costs associated with that investment, and it provides for standardized assumptions for establishing the relevant costs. One relevant cost, obviously, is the cost of energy over the time period covered by a life cycle cost analysis.

Although DOE provided energy market price projections in the LCC rule, DOE stated that it was considering proposing marginal energy prices. (The marginal cost of a particular commodity is the incremental cost of supplying the next unit.) DOE also stated that it was considering an adjustment to these marginal prices to reflect the "external" benefits to the Nation of reducing oil imports, such as an improved balance of payments situation and enhanced national security as well as the environmental and health benefits of reduced pollution. In the period since the LCC rule was published, DOE has worked to develop adjusted marginal energy price projections. However, this work has proven to be more difficult than originally anticipated and it is not yet ready for proposal. While DOE continues to work toward marginal energy price projections, the final version of the average price projections proposed today will enable the FEMP program to go forward with the most current price projections available during the interim.

On June 30, 1980, the Energy Security Act, P.L. 96-294, was signed into law. Section 405 of the Act amended Section 545 of the NECPA to require the LCC methodology to be based on "marginal fuel costs," a 7 percent real discount rate, and a maximum 25 year "study period." Due to the complexities in developing marginal prices, DOE has scheduled issuance of an Advance Notice of Proposed Rulemaking on marginal prices in early October 1980. However, the other requirements of Section 405 of the Energy Security Act are implemented in this Notice of Proposed Rulemaking (NOPR).

Thus, one purpose of today's NOPR is to update our average price projections, in light of recent data, for use in fiscal year 1981. A second purpose of today's proposal is to make a minor correction and clarification in one section of the LCC rule, and to update the LCC methodology to conform to the new requirements of the Energy Security Act as they apply to the discount rate and the study period.

II. The Proposed Prices

The prices for 1980 in this NOPR were developed from market prices projected for the year 1980 as reported in "Short-Term Energy Outlook," DOE/EIA-0202/2, February 1980. Since that document provides only national forecasts, DOE has computed regional 1980 prices from the 1980 national averages by assuming the same proportional relationships of regional prices to national prices that were estimated for 1985 based on a March 1980 EIA forecast developed using the Mid-Term Energy Forecasting System (MEFS)[1].

For 1985 and beyond, the proposed national prices and national escalation rates were derived exclusively from MEFS, as reported in the EIA Analysis Report entitled "Mid-Term Energy Supply and Demand 1985-1995," AR/IA/80-17. The regional price projections contained in this NOPR are based on the

[1] As explained in the preamble to the final LCC rule, the 1980 regional projections in that final rule were derived, except for liquid gas, by applying actual 1977 regional proportional relationships to projected 1980 national average price projections. In addition, in this NOPR, the liquid gas projections have been deleted, because liquid gas use by the Federal Government is insignificant, and because our data base on liquid gas is so limited.

regional relationships used to derive EIA's national forecasts.

MEFS is an integrated computer model of the domestic energy system with explicit representation at the regional level of (1) the supplies of and demand for petroleum products, natural gas and coal; (2) the cost of petroleum refining, electricity generation, and transportation; and (3) the price sensitivity of energy demands. In forecasting future energy supply, demand and prices, MEFS simulates the interplay between a number of different variables, such as economic growth, world oil prices and the discovery of additional domestic energy resources. Because of the uncertainty of such forecasts, EIA provides a range of forecasts based on different assumptions about world oil prices.

The projected energy prices used in this proposed rule represent the results of a forecast based on a pessimistic assumption regarding long-term world and domestic energy supplies. This pessimistic assumption results in energy price projections that are high in the range of forecasts developed by EIA. Other assumptions give markedly different prices, as indicated in the following table.

International Oil Price

[Mid-1980 dollars] [1]

	Low	Medium	High
1985	29.50	35.00	42.75
1990	29.50	40.50	48.25
1995	29.50	45.00	61.50

[1] The final LCC rule price projections were expressed in "levelized" 1980 dollars, which were based on an estimate of the average value of all 1980 dollars. However, our present estimation of the levelized value of 1980 dollars is greater than our final LCC rule estimation by a factor of 1.011. To reflect this difference between the two estimates, the 1980 dollars of this NOPR will be designated "mid-1980 dollars."

Some of the key variables of the EIA high price forecast are:

1. Real (inflation adjusted) annual growth rate for the Gross National Product (GNP) will average about 2.2 percent per year from 1980 to 1985, 2.9 from 1985 to 1990, and 2.2 from 1990 to 1995.

2. The world oil price per barrel increases to $42.75 in 1985, to $48.25 in 1990 to $61.50 in 1995 (in Mid-1980 dollars).

3. The provisions of the National Energy Act are fully implemented.

4. Domestic oil prices are gradually decontrolled by September 30, 1981.

5. There is no oil pipeline from the West Coast to eastern portions of the U.S.

6. A gas pipeline from Alaska would be in place in 1990.

7. Proved reserves are those reported in the American Petroleum Institute/ American Gas Association report entitled "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States as of December 31, 1978."

8. Capacity expansions of electric utilities in 1985 and 1990 is limited to announced utility plans. Expansion in 1995 is based on economic considerations.

9. Nuclear projects currently deferred indefinitely will not be reactivated and completed to be brought on line by January 1, 1995, and the nuclear industry has no new orders over the next 4 years.

Each of these assumptions has changed from the comparable assumptions upon which the prices were based in the LCC rule of January, 1980. A more detailed description of the assumptions underlying the price forecasts is contained in the EIA Analysis Report. That document also contains the results of the low and mid price cases. The Analysis Report, the Short-Term Energy Outlook, an EIA memorandum on the derivation of regional prices, and other documents relevant to this NOPR will be available in the Department of Energy Freedom of Information Room, Room 5B–180, 1000 Independence Avenue, S.W., Washington, D.C., 20585, (202) 252–5968.

Experience with the energy projections published in the final rule last January, as well as criticism from various commentators, has focused attention on possible shortcomings in the EIA projections. While perfection cannot be expected when an attempt is made to predict the future, it is essential to assess these shortcomings and determine as a matter of policy whether the price projections nevertheless should be used in a particular program. To facilitate public comment on this issue DOE notes that the significance of the following assumptions underlying the projections will have to be assessed prior to issuance of final amendments to the rules.

First, the MEFS does not fully represent the interregion transmission ("wheeling") of electricity. In most regions, MEFS assumes that the costs of electricity generation are borne exclusively by the consumers within the region in which the electricity is generated. This assumption ignores the fact that electricity is often wheeled from one region to another, and thus the costs of electric power generated in one region are partially paid by consumers in another region. The result of this assumption is that the electricity price projections for some regions are probably too low, while those for other regions are probably too high. However, national average prices are virtually unaffected.

Second, even though the well-head price of new natural gas production is due to be deregulated beginning in 1985, the projected prices for natural gas are lower than projected prices for oil. This forecast results from an overall projection of low demand for natural gas. This projection results from a variety of assumptions. Specifically, MEFS forecasts that the number of consumers switching from other fuels to natural gas will be limited because MEFS assumes that (1) new utilities and industrial major fuel burning installation boilers will not be able to switch due to statutory constraints, and (2) limited numbers of residences will switch to gas due to the size of the capital outlays involved in a natural gas hookup. Further, the MEFS reflects a slow economic growth projection. This economic projection, combined with the expected impact of the incremental pricing of natural gas mandated by the Natural Gas Policy Act of 1978, contributes to the MEFS projection of low demand growth for natural gas in industry. Finally, MEFS projects greater efficiency of natural gas consumption among current natural gas consumers. DOE requests comment on these assumptions and the resultant natural gas price projections.

Finally, DOE requests comment on the appropriateness of the prices projected for each region. DOE is especially interested in comments on the negative or near flat real escalation rates which are indicated in Tables C-6 through C-8, and on a comparison of the estimated 1980 regional prices to actual prices in each region.

III. Use of the Prices

The energy market price projections in this proposed rule are intended for use in fiscal year 1981, which begins on October 1, 1980. Life cycle cost calculations made prior to that date should utilize the current average energy price projections contained in the Appendices to the final LCC rule. These calculations will not have to be redone.

IV. Other Changes

A. As noted earlier, on June 30, 1980, the President signed the Energy Security Act. Pub. L. 96–294. Section 405 of the Act amended the life cycle costing provisions of Title V, Part 3, of the NECPA to require conservation investment decisions in Federal buildings to be based on a methodology "using the sum of all capital and operating expenses associated with the energy system of the building involved over the expected useful life of such system or during the period of 25 years, whichever is shorter, and using marginal

fuel costs as determined by the Secretary, and a discount rate of 7 per centum per year." To begin the process of conforming the existing life cycle costing rule to the new provisions of law, DOE today proposes technical amendments to § 436.14 (d) and (e) and Appendices A and B to Subpart A of 10 CFR Part 436.

The proposed amendment to § 436.14(d) will require the study period to be (1) for a building system retrofit, the lesser of 25 years or the expected life of the retrofit (§ 436.14(d)(1)); and for a design for a building, the lesser of 25 years or the expected life of the building (§ 436.14(d)(3)). However, in project design or sizing decisions where choices are mutually exclusive (e.g., where selecting one design and/or size of an alternative building system means not selecting other designs and/or sizes), it is important that all the choices be evaluated for the same study period. To reflect the new provisions of the law, the proposed amendments will require that for determining the total life cycle costs or net savings of mutually exclusive alternatives, the study period should be: (1) The expected life of the alternative with the longest life, not to exceed 25 years (with adjustments for replacements and salvage values for the other alternatives); or (2) the lowest common multiple of all of the expected lives of the alternatives, not in excess of 25 years (with appropriate replacements and salvage values) for each alternative.

The amendment to § 436.14(e) deals with the situation in which the expected life of a building system exceeds the expected life of the building (if owned) or the term of the lease for the building (if rented). The proposed amendment makes clear that the expected life of the building system shall not be deemed to exceed the period of Federal use of the building.

The amendments to Appendices A and B to Subpart A of 10 CFR Part 436 will substitute revised tables of single and uniform present worth factors which reflect the new average price projections and the new statutory reduction of the real discount rate for the FEMP program from 10 to 7 percent. Further, the table of contents and § 436.14 (a) and (b) are proposed to be amended to reflect the new discount rate.

B. Since the publication of the final LCC rule, several persons have suggested that § 436.14(g) could be clarified by stating precisely when relevant operating costs begin to accrue. As published, § 436.14(g) states that energy and non-fuel operation and maintenance costs begin accruing at the end of the base year. DOE has decided to accept these suggestions and accordingly proposes to include in that paragraph a requirement that these operating costs begin to accrue on the first day of the base year.

C. The formula for finding the present value [P] of an annually recurring uniform amount, set forth as a note to Appendix A–1, was misstated. Consequently, DOE proposes to insert the correct formula with the amended appendix.

V. Review

A. NEPA Review

It has been determined the promulgation of these amendments to Subpart A of 10 CFR Part 436 *per se* does not constitute a major Federal action significantly affecting the quality of the human environment pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, 42 U.S.C. 4321 *et seq.* A similar determination was made with respect to the LCC rule published in January 1980.

B. EPA Review

The DOE provided a draft of today's proposed amendments to the Administrator of the Environmental Protection Agency for written comments concerning impacts on the quality of the environment, pursuant to section 7(a) of the Federal Energy Administration Act, as amended, 15 U.S.C. 766(a). The Administrator had no comments.

C. Other Review

Section 545 of NECPA and Executive Order 12003 requires the Secretary of DOE to obtain the concurrence of the Director of the Office of Management and Budget (OMB), and to consult with the Director of the National Bureau of Standards, the Secretary of Defense, the Secretary of Housing and Urban Development, the Administrator of Veteran's Affairs, and the Administrator of the General Services Administration in the establishment of a life cycle methodology. Accordingly, DOE has obtained the concurrence of OMB and has consulted with the listed agencies in the development of this NOPR.

VI. Determinations Under Executive Order 12044

Today's proposed rule has been reviewed under Executive Order 12044, 43 FR 12661, and is deemed to be "significant" because of the widespread impact on the Executive Branch. The proposed rule is not considered to be a major rulemaking because the rule is not expected to have the kinds of gross effects which call for a regulatory analysis. Accordingly, a comment period of 60 days is provided.

VII. Public Comment and Hearing

A. Written Comments

Interested persons are invited to comment on the projected prices described herein. Comments should be submitted to Carol A. Snipes, Office of Hearings and Dockets, Mail Stop 6B–025, 1000 Independence Avenue, NW., Washington, D.C. 20585, and should be identified on the outside of the envelope and on the documents submitted with the designation "LCC Methodology Amendments" [Docket No. CAS–RM–79–107]. Fifteen copies should be submitted by December 8, 1980, in order to ensure consideration.

Any information or data considered to be confidential must be so identified in writing. DOE reserves the right to determine the confidential status of information or data and treat it accordingly.

B. Request Procedures

The times and places of the public hearing is indicated in the dates and addresses section of this preamble. DOE invites any person who has an interest in the proposed rulemaking issued today, or who is a representative of a group or class of persons that has an interest in today's proposed rulemaking, to make a written request for an opportunity to make an oral presentation. Such a request should be directed to Carol A. Snipes, Office of Hearings and Dockets, Department of Energy, Mail Stop 6B–025, 1000 Independence Avenue, NW., Washington, D.C. 20585, (202) 252–9319 and must be received before 5:30 p.m., e.d.t., October 23, 1980.

A request may be hand delivered to this address, between the hours of 9 a.m. and 5:30 p.m., Monday through Friday. A request should be labeled both on the document and on the envelope: "LCC Methodology Amendments [Docket No. CAS–RM–79–107]. The person making the request should (1) briefly describe the interest concerned; (2) if appropriate, state why she or he is a proper representative of a group or class of persons that has such an interest; and (3) give a concise summary of the proposed oral presentation and a telephone number where he or she may be contacted through the day before the hearing. Persons selected to appear will be so notified by DOE by October 27, 1980.

C. Conduct of Hearings

DOE reserves the right to select the persons to be heard at this hearing, to

schedule their respective presentations, and to establish the procedures governing the conduct of the hearing. The length of each presentation may be limited, based on the number of persons requesting to be heard.

A DOE official will be designated to preside at the hearing. This will not be a judicial or evidentiary type hearing. Questions may be asked only by those conducting the hearing, and there will be no cross-examination of the persons presenting statements. Any decision made by DOE with respect to the subject matter of the hearing will be based on all information available to DOE. At the conclusion of all initial oral statements, each person who has made an oral statement will be given the opportunity, if he or she so desires, to make a rebuttal statement. The rebuttal statements will be given in the order in which the initial statements were made and will be subject to time limitations.

Any person who wishes to have a question asked of a speaker at the hearing may submit the question, in writing, to the presiding officer. The presiding officer will determine whether the question is relevant, and whether the time limitations permit it be to presented for answer.

Any further procedural rules needed for the proper conduct of the hearing will be announced by the presiding officer.

A transcript of the hearing will be made, and the entire record of the hearing, including the transcript, will be retained by DOE and made available for inspection at the DOE Freedom of Information Office, Room 5B–180, Forrestal Building, 1000 Independence Avenue, SW., Washington, D.C. 20585, between the hours of 8 a.m. and 4:00 p.m., Monday through Friday. Any person may purchase a copy of the transcript from the reporter.

In consideration of the foregoing, Subpart A of Part 436 of Chapter X of the Code of Federal Regulations is proposed to be amended as set forth below.

(Energy Policy and Conservation Act, as amended, (42 U.S.C. 6361(a)(2)); Executive Order 11912, as amended by Executive Order 12003, 43 FR 37523 (July 20, 1977); National Energy Conservation Policy Act, as amended, Title V, Part 3, Pub. L. 95–619; Department of Energy Organization Act (42 U.S.C. 7254))

Issued in Washington, D.C., on October 1, 1980.

Kelly C. Sandy III,

Executive Director, Office of Conservation and Solar Energy.

Provisions of Subpart A of 10 CFR Part 436 are proposed to be amended as follows:

Appendix A [Amended]

1. In the table of contents for Appendix A, delete the numeral "10" and insert in lieu thereof the numeral "7."

§ 436.14 [Amended]

2. In § 436.14 (a) and (b), delete the numeral "10" and insert in lieu thereof the numeral "7."

3. Delete paragraphs (d) and (e) of § 436/14, and insert in lieu thereof the following:

* * * * *

(d)(1) For evaluating and ranking alternative retrofits for an existing Federal building, the study period is the expected life of the retrofit, or 25 years, whicever is shorter.

(2) For determining the total life cycle costs or net savings of mutually exclusive alternatives for a given building system (e.g., alternative designs for a particular system or sizes of a new or retrofit building system), a uniform study period for all alternatives shall be used which is equal to—

(i) The estimated life of the mutually exclusive alternative having the longest life, not to exceed 25 years, with appropriate replacements and salvage values for each of the other alternatives; or

(ii) The lowest common multiple of the expected lives of the alternatives, not to exceed 25 years, with appropriate replacements and salvage values for each alternative.

(3) For evaluating alternative designs for a new Federal building, the study period is the expected life of the building or 25 years, whichever is shorter.

(e) The expected life of any building system is the period of service without major renewal or overhaul, as estimated by a qualified engineer or architect, as appropriate, or any other reliable source. The period of service of a building system shall not be deemed to exceed the expected life of an owned building, or the effective remaining term of a leased building (taking into account renewal options likely to be exercised).

* * * * *

4. Delete paragraph (g) of § 436.14 and insert in lieu thereof the following:

* * * * *

(g) That energy costs and non-fuel operation and maintenance costs begin to accrue at the beginning of the base year.

* * * * *

5. Delete Appendices A, B, and C and insert in lieu thereof the following:

Appendix A To Subpart A of Part 436

Table A–1.—*SPW Factors Based on a 7-pct Discount Rate, for Funding the Present Value of Future Nonfuel, Nonrecurring Costs*

Study period	Factor
1	0.93
2	0.87
3	0.82
4	0.78
5	0.71
6	0.67
7	0.62
8	0.58
9	0.54
10	0.51
11	0.48
12	0.44
13	0.41
14	0.39
15	0.36
16	0.34
17	0.32
18	0.30
19	0.28
20	0.26
21	0.24
22	0.23
23	0.21
24	0.20
25	0.18
26	0.17
27	0.18
28	0.15
29	0.14
30	0.13

The formula for finding the present value (P) of a future amount (F) is the following:

$P=F/(1+d)^n$

where d = the discount rate, and n = the year in which F occurs.

Table A–2.—*UPW Factors Based on a 7-pct Discount Rate, for Funding the Present Value of Future Nonfuel, Recurring Costs*

Study period	Factor
1	0.94
2	1.81
3	2.62
4	3.39
5	4.10
6	4.77
7	5.39
8	5.97
9	6.52
10	7.02
11	7.50
12	7.94
13	8.36
14	8.75
15	9.11
16	9.45
17	9.76
18	10.06
19	10.34
20	10.59
21	10.84
22	11.06
23	11.27
24	11.47
25	11.65
26	11.83
27	11.99
28	12.14
29	12.28
30	12.41

The formula for finding the present value (P) of an annually recurring uniform amount (A) is the following:

$P=A(1+d)^n1\div d(1+d)^n$

where d = the discount rate, and n = the number of compounding periods over which A occurs.

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TABLE B-1--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 1
(MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, CONNECTICUT, RHODE ISLAND)
STUDY PERIOD 1 IS MID 1980 TO MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 93	0.91	0.93	0.94	0.98	0.91	0.93	0.94	0.98	0 93	1.00
2	1.74	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.98
4	3.17	3.31	3.43	3 31	3.17	3.31	3.43	3.78	3.17	3.31	3.43	3.78	3 31	3.97
5	3.78	3.99	4.17	3 99	3.79	3.98	4.17	4.67	3.79	3.99	4.17	4.67	3 99	4.95
6	4.35	4.62	4.85	4 62	4.35	4.62	4.85	5.51	4.35	4.63	4.86	5.51	4 62	5.85
7	4.86	5.22	5.49	5 21	4.86	5.23	5.49	6.28	4.86	5.23	5.51	6.31	5 21	6.69
8	5.33	5.78	6.09	5 75	5.33	5.80	6.09	7.01	5.33	5.80	6.12	7.05	5 76	7.46
9	5.75	6.31	6.65	6.26	5.75	6.34	6.66	7.69	5.75	6.34	6.69	7.75	6 27	8.17
10	6.13	6.81	7.17	6.74	6.13	6.85	7.18	8.32	6.13	6.85	7.23	8.41	6 75	8.83
11	6.46	7.27	7.67	7 19	6.46	7.32	7.68	8.92	6.46	7.33	7.74	9.04	7 20	9.41
12	6.76	7.69	8.14	7 62	6.76	7.76	8.15	9.49	6.74	7.79	8.23	9.63	7 63	9.91
13	7.01	8.09	8.58	8 02	7.01	8.17	8.59	10.03	6.99	8.23	8.68	10.20	8 04	10.35
14	7.24	8.45	8.99	8 40	7.24	8.55	9.01	10.54	7.21	8.65	9.12	10.73	8 42	10.74
15	7.44	8.79	9.39	8 77	7.44	8.90	9.41	11.03	7.40	9.05	9.53	11.24	8 79	11.09
16	7.61	9.11	9.76	9 11	7.61	9.22	9.79	11.49	7.56	9.42	9.91	11.72	9 14	11.39
17	7.76	9.40	10.11	9 44	7.76	9.53	10.15	11.94	7.70	9.78	10.28	12.18	9 46	11.65
18	7.89	9.67	10.45	9 74	7.89	9.81	10.48	12.35	7.83	10.13	10.63	12.62	9 78	11.88
19	8.01	9.92	10.76	10 04	8.01	10.07	10.80	12.75	7.93	10.45	10.96	13.03	10 07	12.08
20	8.11	10.15	11.06	10 31	8.11	10.32	11.11	13.13	8.03	10.76	11.27	13.42	10 35	12.26
21	8.20	10.36	11.34	10 57	8.20	10.54	11.39	13.49	8.11	11.06	11.56	13.80	10 6	12.42
22	8.28	10.56	11.61	10 82	8.28	10.75	11.66	13.83	8.18	11.34	11.84	14.15	10 87	12.55
23	8.35	10.74	11.86	11.06	8.35	10.95	11.92	14.15	8.24	11.61	12.10	14.49	11.11	12.67
24	8.41	10.92	12.09	11.28	8.41	11.13	12.16	14.46	8.29	11.86	12.35	14.80	11 34	12.78
25	8.46	11.07	12.32	11 49	8.46	11.29	12.39	14.75	8.34	12.11	12.59	15.11	11 55	12.87
26	8.51	11.22	12.53	11 69	8.51	11.45	12.61	15.02	8.38	12.34	12.81	15.39	11 76	12.95
27	8.55	11.36	12.73	11 88	8.55	11.60	12.81	15.29	8.41	12.56	13.02	15.67	11 95	13.02
28	8.59	11.48	12.92	12 06	8.58	11.73	13.01	15.54	8.44	12.77	13.22	15.93	12 13	13.08
29	8.62	11.60	13.10	12 23	8.61	11.86	13.19	15.77	8.47	12.97	13.41	16.17	12 31	13.14
30	8.65	11.71	13.27	12 39	8.64	11.97	13.36	16.00	8.49	13.16	13.59	16.41	12 47	13.19

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d= the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-2--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 2
(NEW YORK, NEW JERSEY, PUERTO RICO, VIRGIN ISLANDS)
STUDY PERIOD 1 IS MID 1980 to MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 93	0.91	0.93	0.94	0.98	0.91	0.93	0.94	0.98	0 93	1.00
2	1.73	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.73	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.97
4	3.17	3.31	3.43	3 31	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3.31	3.96
5	3.79	3.98	4.17	3 99	3.79	3.98	4.17	4.67	3.79	3.98	4.17	4.67	3 98	4.93
6	4.35	4.62	4.85	4 62	4.35	4.62	4.85	5.51	4.35	4.63	4.85	5.51	4 61	5.84
7	4.86	5.21	5.49	5.20	4.86	5.21	5.50	6.28	4.85	5.24	5.50	6.28	5 20	6.67
8	5.31	5.76	6.09	5 75	5.31	5.77	6.10	7.01	5.30	5.82	6.10	7.01	5.75	7.44
9	5.73	6.28	6.65	6 26	5.73	6.30	6.66	7.69	5.71	6.37	6.66	7.68	6.26	8.16
10	6.10	6.76	7.18	6 74	6.10	6.79	7.18	8.32	6.08	6.89	7.18	8.31	6 74	8.82
11	6.44	7.21	7.67	7 19	6.44	7.25	7.68	8.92	6.41	7.39	7.68	8.91	7 19	9.42
12	6.74	7.62	8.14	7 61	6.74	7.67	8.15	9.49	6.71	7.86	8.15	9.48	7 62	9.98
13	7.02	8.00	8.58	8 01	7.02	8.06	8.59	10.03	6.98	8.31	8.60	10.02	8 02	10.49
14	7.27	8.35	9.00	8 40	7.27	8.43	9.01	10.54	7.22	8.74	9.02	10.53	8 41	10.96
15	7.50	8.68	9.39	8 76	7.49	8.76	9.41	11.03	7.44	9.15	9.42	11.01	8 77	11.39
16	7.70	8.98	9.76	9 10	7.70	9.07	9.79	11.49	7.64	9.53	9.79	11.47	9 12	11.78
17	7.89	9.25	10.11	9 42	7.89	9.36	10.15	11.93	7.82	9.90	10.15	11.91	9 44	12.14
18	8.06	9.51	10.45	9 73	8.05	9.63	10.48	12.35	7.98	10.25	10.49	12.32	9 75	12.48
19	8.21	9.75	10.76	10 02	8.21	9.88	10.80	12.74	8.13	10.59	10.81	12.71	10 05	12.78
20	8.35	9.97	11.06	10 30	8.34	10.11	11.10	13.12	8.26	10.90	11.11	13.08	10 32	13.06
21	8.47	10.17	11.34	10 56	8.47	10.32	11.39	13.47	8.38	11.20	11.40	13.44	10 59	13.32
22	8.59	10.36	11.60	10 80	8.58	10.52	11.66	13.81	8.48	11.49	11.67	13.77	10 84	13.56
23	8.69	10.53	11.85	11 04	8.68	10.70	11.92	14.13	8.58	11.76	11.92	14.09	11 08	13.77
24	8.78	10.69	12.09	11 26	8.77	10.87	12.16	14.44	8.67	12.02	12.17	14.39	11 30	13.97
25	8.87	10.84	12.31	11 47	8.86	11.03	12.39	14.73	8.75	12.26	12.40	14.68	11 51	14.16
26	8.94	10.98	12.53	11 67	8.93	11.17	12.61	15.00	8.82	12.50	12.61	14.95	11 71	14.33
27	9.01	11.10	12.73	11 85	9.00	11.31	12.81	15.26	8.88	12.72	12.82	15.20	11 91	14.48
28	9.07	11.22	12.91	12 03	9.06	11.43	13.00	15.51	8.94	12.93	13.01	15.45	12 09	14.62
29	9.13	11.33	13.09	12 20	9.12	11.55	13.19	15.74	9.00	13.13	13.20	15.68	12 26	14.75
30	9.18	11.43	13.26	12 36	9.17	11.66	13.36	15.97	9.04	13.32	13.37	15.90	12 42	14.87

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-3--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 3
PENNSYLVANIA, MARYLAND, WEST VIRGINIA, VIRGINIA, DISTRICT OF COLUMBIA, DELAWARE)
STUDY PERIOD 1 IS MID 1980 to MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Neturel Gas	Distillate	Resi-duel	Liquid Gas	Coal
	0.91	0.93	0.94	0 93	0.91	0.92	0.94	0.98	0.91	0.93	0.94	0.98	0 93	1.00
1	0.91	0.93	0.94	0 93	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
2	1.74	1.78	1.82	1 78	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.98
3	2.49	2.57	2.65	2 57	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3 31	3.97
4	3.17	3.31	3.43	3 31	3.79	3.98	4.17	4.67	3.79	3.99	4.17	4.67	3 99	4.95
5	3.79	3.98	4.17	3 98	4.36	4.62	4.85	5.50	4.36	4.66	4.85	5.51	4 62	5.86
6	4.36	4.62	4.85	4 61	4.88	5.22	5.49	6.28	4.89	5.32	5.49	6.28	5 21	6.71
7	4.88	5.21	5.49	5 20	5.36	5.79	6.09	7.00	5.37	5.98	6.09	7.01	5 75	7.49
8	5.36	5.77	6.09	5 75	5.80	6.32	6.66	7.67	5.81	6.63	6.65	7.68	6 26	8.22
9	5.80	6.30	6.65	6 26	6.20	6.82	7.18	8.30	6.22	7.27	7.18	8.31	6 74	8.89
10	6.20	6.79	7.17	6 73	6.57	7.28	7.68	8.90	6.59	7.86	7.67	8.91	7 19	9.51
11	6.56	7.24	7.66	7 17	6.90	7.71	8.15	9.46	6.93	8.38	8.14	9.47	7 61	10.08
12	6.89	7.66	8.12	7 60	7.20	8.11	8.59	10.00	7.23	8.85	8.59	10.01	8 02	10.60
13	7.19	8.05	8.56	8 00	7.47	8.48	9.01	10.50	7.50	9.27	9.01	10.52	8 40	11.08
14	7.46	8.41	8.98	8 38	7.71	8.82	9.41	10.98	7.75	9.65	9.40	11.00	8 76	11.52
15	7.71	8.74	9.37	8 73	7.93	9.14	9.79	11.44	7.97	10.00	9.78	11.46	9 10	11.93
16	7.93	9.04	9.74	9 07	8.14	9.43	10.14	11.87	8.18	10.31	10.13	11.89	9 43	12.30
17	8.13	9.32	10.09	9 39	8.32	9.70	10.48	12.28	8.36	10.59	10.47	12.30	9 74	12.65
18	8.31	9.58	10.42	9 69	8.48	9.95	10.80	12.66	8.52	10.84	10.78	12.69	10 03	12.96
19	8.48	9.82	10.73	9 98	8.63	10.18	11.10	13.03	8.67	11.06	11.08	13.06	10 30	13.25
20	8.63	10.04	11.02	10 25	8.77	10.39	11.38	13.38	8.81	11.27	11.37	13.41	10 56	13.52
21	8.77	10.25	11.30	10 51	8.89	10.59	11.65	13.71	8.93	11.45	11.63	13.74	10 81	13.76
22	8.89	10.43	11.56	10 75	9.00	10.78	11.91	14.02	9.04	11.61	11.89	14.05	11 04	13.99
23	9.00	10.61	11.81	10 98	9.10	10.94	12.15	14.32	9.14	11.76	12.13	14.35	11 27	14.20
24	9.10	10.77	12.04	11 19	9.19	11.10	12.38	14.60	9.23	11.90	12.35	14.63	11 48	14.39
25	9.19	10.92	12.27	11 40	9.28	11.25	12.60	14.87	9.32	12.02	12.57	14.90	11 67	14.56
26	9.27	11.05	12.47	11 59	9.35	11.38	12.80	15.12	9.39	12.12	12.77	15.16	11 86	14.72
27	9.35	11.18	12.67	11 78	9.42	11.51	12.99	15.36	9.46	12.22	12.96	15.40	12 04	14.87
28	9.42	11.30	12.86	11 95	9.48	11.62	13.18	15.58	9.52	12.31	13.14	15.62	12 21	15.01
29	9.48	11.41	13.03	12 11	9.54	11.73	13.35	15.80	9.57	12.39	13.31	15.84	12 37	15.13
30	9.53	11.51	13.20	12 27										

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d= the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-4--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 4

(KENTUCKY, TENNESSEE, NORTH CAROLINA, SOUTH CAROLINA, MISSISSIPPI, ALABAMA, GEORGIA, FLORIDA, CANAL ZONE)
STUDY PERIOD 1 IS MID 1980 to MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0.92	0.91	0.92	0.94	0.98	0.91	0.93	0.94	0.98	0 93	1.00
2	1.74	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2.57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.98
4	3.17	3.30	3.43	3.30	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3 31	3.96
5	3.79	3.98	4.17	3 98	3.79	3.98	4.17	4.67	3.79	3.98	4.17	4.67	3 98	4.94
6	4.36	4.61	4.85	4 61	4.36	4.61	4.85	5.51	4.37	4.65	4.85	5.51	4 61	5.85
7	4.89	5.20	5.49	5 20	4.89	5.20	5.49	6.28	4.90	5.32	5.50	6.28	5 20	6.69
8	5.38	5.74	6.09	5 74	5.38	5.75	6.09	7.01	5.40	5.97	6.09	7.01	5 75	7.46
9	5.84	6.25	6.65	6 25	5.84	6.27	6.65	7.69	5.86	6.62	6.66	7.69	6 26	8.18
10	6.26	6.73	7.17	6 72	6.25	6.75	7.18	8.32	6.29	7.26	7.18	8.32	6.73	8.84
11	6.64	7.16	7.66	7 17	6.64	7.20	7.68	8.93	6.68	7.87	7.68	8.93	7 18	9.45
12	6.99	7.56	8.12	7 59	6.99	7.61	8.15	9.50	7.04	8.43	8.14	9.50	7 61	10.01
13	7.31	7.93	8.56	7 99	7.31	7.98	8.59	10.04	7.37	8.97	8.59	10.04	8 01	10.51
14	7.60	8.26	8.98	8 37	7.60	8.33	9.01	10.56	7.67	9.47	9.01	10.56	8 39	10.98
15	7.87	8.57	9.37	8 73	7.86	8.65	9.41	11.05	7.95	9.94	9.40	11.05	8 76	11.41
16	8.11	8.85	9.74	9 06	8.11	8.94	9.78	11.51	8.20	10.38	9.78	11.52	9 10	11.80
17	8.33	9.11	10.08	9 38	8.33	9.21	10.14	11.96	8.43	10.80	10.13	11.96	9 42	12.16
18	8.54	9.35	10.41	9 69	8.53	9.45	10.48	12.38	8.64	11.19	10.47	12.38	9 73	12.49
19	8.72	9.57	10.72	9 97	8.72	9.68	10.80	12.77	8.83	11.56	10.79	12.78	10 02	12.79
20	8.89	9.78	11.02	10 24	8.89	9.89	11.10	13.15	9.01	11.91	11.09	13.16	10 30	13.07
21	9.05	9.96	11.29	10 50	9.04	10.08	11.38	13.51	9.17	12.23	11.37	13.53	10 56	13.32
22	9.19	10.13	11.55	10 74	9.18	10.26	11.65	13.86	9.32	12.54	11.64	13.87	10 80	13.55
23	9.32	10.29	11.80	10 97	9.31	10.42	11.91	14.18	9.45	12.82	11.89	14.20	11.04	13.76
24	9.44	10.43	12.03	11 19	9.43	10.57	12.15	14.49	9.58	13.09	12.13	14.51	11 26	13.96
25	9.54	10.56	12.25	11 39	9.54	10.71	12.38	14.79	9.69	13.35	12.36	14.80	11 47	14.14
26	9.64	10.68	12.46	11 58	9.63	10.84	12.59	15.06	9.79	13.59	12.57	15.08	11 67	14.30
27	9.73	10.79	12.66	11 77	9.72	10.95	12.80	15.33	9.89	13.81	12.77	15.35	11 86	14.45
28	9.81	10.90	12.84	11 94	9.81	11.06	12.99	15.58	9.97	14.02	12.97	15.60	12 03	14.59
29	9.89	10.99	13.02	12 10	9.88	11.16	13.17	15.82	10.05	14.22	13.15	15.84	12 20	14.71
30	9.96	11.08	13.18	12 26	9.95	11.25	13.35	16.05	10.12	14.41	13.32	16.07	12 36	14.83

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-5--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 5
(MINNESOTA, WISCONSIN, MICHIGAN, ILLINOIS, INDIANA, OHIO)
STUDY PERIOD 1 IS MID 1980 TO MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 93	0.91	0.92	0.94	0.98	0.91	0.93	0.94	0.98	0 93	1.00
2	1.74	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.97
4	3.17	3.30	3.43	3 31	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3 31	3.95
5	3.79	3.98	4.17	3 98	3.79	3.98	4.17	4.68	3.79	3.98	4.17	4.67	3.99	4.93
6	4.36	4.61	4.85	4 61	4.36	4.62	4.85	5.51	4.36	4.64	4.85	5.51	4 62	5.83
7	4.88	5.21	5.49	5 20	4.88	5.21	5.50	6.29	4.89	5.28	5.50	6.29	5 21	6.67
8	5.36	5.76	6.09	5 75	5.36	5.77	6.10	7.02	5.38	5.91	6.10	7.01	5 75	7.44
9	5.81	6.28	6.65	6 26	5.81	6.29	6.66	7.70	5.83	6.51	6.66	7.69	6 27	8.15
10	6.21	6.76	7.18	6 73	6.21	6.78	7.19	8.33	6.24	7.10	7.19	8.33	6.74	8.81
11	6.58	7.21	7.68	7 18	6.58	7.23	7.69	8.93	6.62	7.66	7.69	8.93	7 19	9.42
12	6.91	7.61	8.15	7 61	6.92	7.65	8.16	9.50	6.96	8.19	8.16	9.50	7 62	9.97
13	7.22	7.99	8.59	8 01	7.22	8.03	8.61	10.05	7.27	8.68	8.61	10.05	8 03	10.48
14	7.49	8.33	9.01	8 39	7.50	8.38	9.04	10.57	7.55	9.15	9.04	10.57	8 41	10.95
15	7.74	8.65	9.41	8 75	7.75	8.70	9.44	11.06	7.81	9.60	9.44	11.06	8 77	11.38
16	7.97	8.93	9.79	9 10	7.97	9.00	9.82	11.53	8.04	10.02	9.82	11.53	9 12	11.77
17	8.18	9.20	10.15	9 42	8.18	9.27	10.18	11.97	8.25	10.41	10.18	11.97	9 45	12.13
18	8.37	9.44	10.49	9 73	8.37	9.52	10.52	12.39	8.44	10.79	10.52	12.39	9 76	12.47
19	8.54	9.67	10.81	10 02	8.54	9.75	10.85	12.80	8.61	11.14	10.85	12.80	10 05	12.77
20	8.69	9.87	11.11	10 29	8.69	9.96	11.15	13.18	8.77	11.47	11.15	13.18	10 33	13.05
21	8.83	10.06	11.39	10 56	8.83	10.16	11.45	13.54	8.91	11.79	11.45	13.54	10 59	13.31
22	8.96	10.23	11.67	10 80	8.96	10.33	11.72	13.88	9.04	12.09	11.72	13.89	10 84	13.55
23	9.07	10.39	11.92	11 04	9.08	10.50	11.98	14.21	9.16	12.37	11.98	14.22	11 08	13.76
24	9.18	10.54	12.17	11 26	9.18	10.65	12.23	14.52	9.26	12.64	12.23	14.53	11 30	13.96
25	9.27	10.67	12.40	11 47	9.28	10.79	12.46	14.82	9.36	12.89	12.46	14.82	11 52	14.14
26	9.36	10.80	12.61	11 67	9.36	10.92	12.68	15.10	9.45	13.12	12.68	15.11	11 72	14.31
27	9.44	10.91	12.82	11 85	9.44	11.03	12.89	15.37	9.53	13.35	12.89	15.38	11 91	14.46
28	9.51	11.01	13.01	12 03	9.51	11.14	13.09	15.62	9.60	13.56	13.09	15.63	12 09	14.61
29	9.57	11.11	13.20	12 20	9.58	11.24	13.28	15.87	9.66	13.76	13.28	15.87	12.26	14.73
30	9.63	11.19	13.37	12 36	9.64	11.33	13.46	16.10	9.72	13.95	13.46	16.10	12 43	14.85

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d= the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-6--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICES ESCALATION[a]
DOE REGION 6
(TEXAS, NEW MEXICO, OKLAHOMA, ARKANSAS, LOUISIANA)
STUDY PERIOD 1 IS MID 1980

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 93	0.91	0.92	0.94	0.98	0.91	0.93	0.94	0.98	0 93	1.00
2	1.74	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.98
4	3.17	3.30	3.43	3 31	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3.31	3.97
5	3.79	3.98	4.17	3 98	3.79	3.98	4.17	4.67	3.79	3.99	4.17	4.67	3 99	4.95
6	4.36	4.63	4.85	4 61	4.36	4.63	4.85	5.50	4.36	4.64	4.85	5.51	4 62	5.85
7	4.89	5.24	5.49	5 20	4.89	5.25	5.49	6.28	4.90	5.27	5.50	6.28	5 21	6.69
8	5.38	5.82	6.09	5 75	5.38	5.84	6.10	7.01	5.39	5.87	6.10	7.01	5 75	7.46
9	5.83	6.37	6.65	6 26	5.83	6.41	6.66	7.69	5.85	6.46	6.66	7.69	6.27	8.17
10	6.24	6.90	7.17	6 73	6.25	6.95	7.18	8.32	6.28	7.02	7.18	8.32	6 74	8.83
11	6.62	7.38	7.67	7 18	6.63	7.46	7.68	8.92	6.66	7.54	7.68	8.93	7 19	9.43
12	6.96	7.84	8.14	7 61	6.97	7.93	8.15	9.49	7.01	8.03	8.15	9.50	7 62	9.98
13	7.27	8.26	8.58	8 01	7.29	8.37	8.60	10.04	7.33	8.49	8.60	10.04	8 03	10.48
14	7.55	8.66	9.00	8 40	7.57	8.78	9.02	10.55	7.62	8.92	9.02	10.56	8 41	10.94
15	7.81	9.02	9.39	8 76	7.82	9.17	9.42	11.05	7.88	9.32	9.42	11.05	8 78	11.36
16	8.04	9.36	9.77	9 10	8.06	9.53	9.80	11.51	8.11	9.70	9.80	11.52	9 12	11.74
17	8.25	9.68	10.12	9 43	8.27	9.86	10.16	11.96	8.33	10.05	10.16	11.96	9 45	12.09
18	8.44	9.97	10.45	9 73	8.46	10.18	10.49	12.38	8.52	10.38	10.50	12.39	9.76	12.41
19	8.61	10.25	10.77	10 02	8.63	10.47	10.82	12.78	8.70	10.69	10.82	12.79	10 06	12.71
20	8.77	10.50	11.07	10 30	8.79	10.74	11.12	13.16	8.85	10.97	11.13	13.17	10 34	12.97
21	8.91	10.74	11.35	10 56	8.93	10.99	11.41	13.52	9.00	11.24	11.41	13.53	10 60	13.22
22	9.04	10.96	11.62	10 81	9.06	11.23	11.68	13.87	9.13	11.49	11.69	13.88	10 85	13.44
23	9.15	11.16	11.87	11.04	9.17	11.45	11.94	14.20	9.25	11.73	11.94	14.21	11 09	13.65
24	9.26	11.36	12.11	11.27	9.28	11.66	12.18	14.51	9.35	11.95	12.19	14.52	11 32	13.84
25	9.35	11.53	12.34	11.48	9.37	11.85	12.41	14.80	9.45	12.15	12.42	14.81	11 53	14.01
26	9.44	11.70	12.55	11.68	9.46	12.03	12.63	15.09	9.54	12.35	12.64	15.10	11.73	14.16
27	9.52	11.85	12.75	11.86	9.54	12.20	12.84	15.35	9.62	12.53	12.84	15.36	11 93	14.31
28	9.59	11.99	12.94	12 04	9.61	12.36	13.03	15.61	9.69	12.70	13.04	15.62	12 11	14.44
29	9.65	12.13	13.12	12 21	9.68	12.50	13.22	15.85	9.75	12.85	13.23	15.86	12 28	14.56
30	9.71	12.25	13.29	12 37	9.74	12.64	13.39	16.08	9.81	13.00	13.40	16.09	12 45	14.67

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-7--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 7
(KANSAS, MISSOURI, IOWA, NEBRASKA)
STUDY PERIOD 1 IS MID 1980 TO MID 1981

	Residential Sector				Commercial Sector				Industrial Sector					
Study Period	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Resi-dual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 92	0.91	0.92	0.94	0.98	0.91	0.92	0.94	0.98	0 92	1.00
2	1.73	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.97
4	3.17	3.30	3.43	3 30	3.17	3.30	3.43	3.78	3.17	3.30	3.43	3.78	3 30	3.95
5	3.79	3.98	4.17	3.98	3.79	3.98	4.17	4.68	3.79	3.98	4.17	4.67	3 98	4.93
6	4.35	4.62	4.85	4 61	4.35	4.67	4.86	5.51	4.35	4.67	4.86	5.51	4 61	5.84
7	4.86	5.22	5.50	5 20	4.86	5.22	5.50	6.29	4.85	5.37	5.50	6.29	5 20	6.67
8	5.31	5.78	6.10	5 75	5.31	5.79	6.10	7.02	5.31	6.08	6.10	7.01	5 75	7.45
9	5.73	6.31	6.66	6 26	5.73	6.33	6.67	7.69	5.72	6.80	6.67	7.69	6 26	8.16
10	6.10	6.81	7.18	6.73	6.10	6.84	7.19	8.33	6.09	7.53	7.20	8.33	6 73	8.82
11	6.44	7.27	7.68	7 18	6.44	7.30	7.70	8.93	6.43	8.26	7.70	8.93	7 18	9.43
12	6.75	7.69	8.15	7 61	6.75	7.74	8.17	9.50	6.73	8.99	8.17	9.50	7 61	9.99
13	7.03	8.08	8.60	8 01	7.03	8.13	8.62	10.05	7.01	9.71	8.62	10.04	8 02	10.49
14	7.29	8.43	9.02	8 39	7.28	8.50	9.05	10.56	7.26	10.43	9.05	10.56	8 40	10.96
15	7.52	8.76	9.42	8 75	7.52	8.84	9.45	11.05	7.49	11.15	9.45	11.05	8 76	11.39
16	7.73	9.06	9.80	9 10	7.73	9.15	9.83	11.52	7.70	11.87	9.83	11.52	9 11	11.78
17	7.92	9.34	10.16	9 42	7.92	9.43	10.19	11.96	7.89	12.58	10.20	11.96	9 44	12.14
18	8.09	9.60	10.50	9 73	8.09	9.70	10.54	12.39	8.06	13.29	10.54	12.38	9 75	12.47
19	8.25	9.83	10.82	10.02	8.25	9.94	10.86	12.79	8.22	14.00	10.86	12.78	10 04	12.77
20	8.40	10.05	11.13	10 30	8.39	10.17	11.17	13.17	8.36	14.71	11.17	13.16	10 32	13.04
21	8.53	10.25	11.41	10 56	8.52	10.37	11.46	13.53	8.49	15.41	11.46	13.52	10 58	13.29
22	8.65	10.43	11.69	10 81	8.64	10.56	11.74	13.87	8.61	16.11	11.74	13.87	10 83	13.52
23	8.75	10.60	11.94	11 04	8.75	10.74	12.00	14.20	8.72	16.81	12.00	14.19	11 07	13.74
24	8.85	10.76	12.19	11.27	8.85	10.90	12.25	14.51	8.81	17.50	12.25	14.51	11 30	13.93
25	8.94	10.90	12.42	11.48	8.94	11.05	12.48	14.81	8.90	18.20	12.49	14.80	11 51	14.11
26	9.02	11.03	12.64	11 68	9.02	11.19	12.71	15.09	8.98	18.89	12.71	15.08	11 71	14.27
27	9.10	11.16	12.84	11 87	9.09	11.32	12.92	15.35	9.05	19.57	12.92	15.35	11 90	14.42
28	9.16	11.27	13.04	12.05	9.16	11.43	13.12	15.61	9.12	20.26	13.12	15.60	12 08	14.56
29	9.22	11.37	13.23	12 21	9.22	11.54	13.31	15.85	9.18	20.94	13.31	15.84	12 26	14.68
30	9.28	11.46	13.40	12 38	9.27	11.64	13.49	16.07	9.23	21.62	13.49	16.07	12 42	14.80

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-8--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 8
(MONTANA, NORTH DAKOTA, SOUTH DAKOTA, WYOMING, UTAH, COLORADO)
STUDY PERIOD 1 IS MID 1980 to MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 92	0.91	0.92	0.94	0.98	0.91	0.93	0.94	0.98	0 93	0.99
2	1.74	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.98
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2 57	2.96
4	3.17	3.30	3.43	3 30	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3 31	3.94
5	3.79	3.98	4.17	3.98	3.79	3.98	4.17	4.67	3.79	3.99	4.17	4.67	3 99	4.91
6	4.34	4.62	4.85	4.61	4.34	4.62	4.85	5.50	4.33	4.63	4.85	5.51	4 62	5.79
7	4.82	5.23	5.49	5 20	4.82	5.23	5.49	6.28	4.80	5.25	5.49	6.28	5 21	6.59
8	5.25	5.80	6.09	5 74	5.24	5.81	6.09	7.01	5.22	5.84	6.09	7.01	5 76	7.31
9	5.63	6.34	6.65	6 25	5.62	6.35	6.66	7.68	5.57	6.40	6.65	7.69	6 27	7.98
10	5.97	6.85	7.18	6.73	5.95	6.87	7.18	8.31	5.89	6.94	7.18	8.32	6 75	8.58
11	6.26	7.32	7.67	7 18	6.24	7.35	7.68	8.92	6.16	7.44	7.68	8.92	7 20	9.13
12	6.53	7.77	8.14	7 60	6.50	7.80	8.15	9.49	6.40	7.91	8.15	9.50	7 62	9.63
13	6.76	8.18	8.58	8.00	6.73	8.22	8.60	10.03	6.61	8.35	8.59	10.04	8 03	10.09
14	6.97	8.56	9.00	8 38	6.94	8.61	9.02	10.55	6.79	8.76	9.01	10.56	8 41	10.51
15	7.15	8.92	9.40	8 74	7.12	8.97	9.42	11.04	6.95	9.14	9.41	11.05	8 78	10.90
16	7.32	9.25	9.77	9 08	7.27	9.31	9.80	11.50	7.09	9.50	9.79	11.52	9 12	11.25
17	7.46	9.56	10.13	9.40	7.41	9.62	10.16	11.95	7.21	9.84	10.15	11.97	9 45	11.57
18	7.59	9.84	10.46	9 71	7.54	9.92	10.50	12.37	7.32	10.15	10.49	12.39	9 76	11.87
19	7.70	10.11	10.78	10 00	7.65	10.19	10.82	12.77	7.41	10.44	10.81	12.80	10 05	12.14
20	7.80	10.36	11.08	10 27	7.75	10.45	11.13	13.16	7.49	10.72	11.12	13.18	10 33	12.38
21	7.89	10.59	11.37	10 53	7.83	10.68	11.42	13.52	7.56	10.97	11.40	13.55	10 59	12.61
22	7.97	10.81	11.63	10 78	7.91	10.91	11.69	13.86	7.62	11.21	11.68	13.89	10 84	12.82
23	8.04	11.01	11.89	11 01	7.97	11.11	11.95	14.19	7.68	11.43	11.94	14.23	11 07	13.00
24	8.10	11.19	12.13	11.23	8.03	11.30	12.19	14.51	7.73	11.64	12.18	14.54	11 30	13.18
25	8.16	11.37	12.36	11.44	8.09	11.48	12.43	14.80	7.77	11.84	12.41	14.84	11 51	13.34
26	8.21	11.53	12.57	11 63	8.13	11.65	12.65	15.09	7.80	12.02	12.63	15.12	11 71	13.48
27	8.25	11.68	12.78	11 82	8.17	11.81	12.86	15.35	7.83	12.19	12.84	15.39	11.90	13.61
28	8.29	11.82	12.97	12 00	8.21	11.95	13.05	15.61	7.86	12.35	13.04	15.65	12 08	13.73
29	8.32	11.95	13.15	12.16	8.24	12.09	13.24	15.85	7.89	12.50	13.22	15.90	12 25	13.84
30	8.35	12.07	13.32	12.32	8.27	12.21	13.42	16.08	7.91	12.64	13.40	16.13	12.41	13.94

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-9--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]

DOE REGION 9

(CALIFORNIA, NEVADA, ARIZONA, HAWAII, TRUST TERRITORY OF THE PACIFIC ISLANDS, AMERICAN SAMOA, GUAM)

STUDY PERIOD 1 IS MID 1980 to MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
1	0.91	0.93	0.94	0 93	0.91	0.93	0.94	0.93	0.91	0.93	0.94	0.98	0 93	1.00
2	1.74	1.78	1.82	1 78	1.74	1.78	1.82	1.93	1.74	1.78	1.82	1.93	1 78	1.99
3	2.49	2.57	2.65	2 57	2.49	2.57	2.65	2,87	2.49	2.57	2.65	2.87	2 57	2.98
4	3.17	3.31	3.43	3 31	3.17	3.30	3.43	3.78	3.17	3.31	3.43	3.78	3 31	3.96
5	3.79	3.98	4.17	3 99	3.79	3.98	4.17	4.67	3.79	3.99	4.17	4.67	3 99	4.94
6	4.36	4.61	4.85	4 62	4.36	4.61	4.85	5.50	4.36	4.62	4.85	5.50	4 62	5.84
7	4.87	5.19	5.49	5 21	4.87	5.19	5.50	6.28	4.87	5.22	5.50	6.28	5 21	6.68
8	5.35	5.72	6.10	5 75	5.35	5.72	6.10	7.01	5.35	5.78	6.10	7.01	5 75	7.44
9	5.78	6.21	6.66	6 26	5.78	6.22	6.67	7.69	5.78	6.31	6.67	7.70	6 27	8.15
10	6.17	6.66	7.18	6 74	6.17	6.67	7.20	8.33	6.18	6.80	7.20	8.33	6 74	8.80
11	6.52	7.07	7.68	7 19	6.52	7.09	7.70	8.93	6.53	7.26	7.70	8.94	7 19	9.40
12	6.83	7.45	8.16	7 62	6.83	7.47	8.18	9.51	6.84	7.67	8.18	9.52	7 62	9.95
13	7.11	7.79	8.60	8 02	7.11	7.82	8.63	10.06	7.11	8.06	8.63	10.07	8 03	10.45
14	7.35	8.10	9.03	8 40	7.35	8.13	9.06	10.58	7.35	8.41	9.06	10.59	8 41	10.91
15	7.57	8.39	9.43	8 76	7.57	8.42	9.46	11.08	7.57	8.73	9.46	11.09	8 78	11.34
16	7.76	8.65	9.81	9 11	7.77	8.68	9.85	11.55	7.75	9.02	9.85	11.56	9 12	11.72
17	7.94	8.88	10.16	9.43	7.94	8.92	10.21	12.00	7.92	9.29	10.21	12.02	9 45	12.08
18	8.09	9.10	10.50	9 74	8.09	9.14	10.56	12.43	8.07	9.54	10.56	12.44	9 76	12.41
19	8.22	9.29	10.83	10 03	8.23	9.34	10.88	12.84	8.20	9.77	10.88	12.85	10 06	12.71
20	8.34	9.47	11.13	10.31	8.35	9.52	11.19	13.22	8.31	9.98	11.19	13.24	10 34	12.99
21	8.45	9.64	11.42	10 57	8.46	9.68	11.49	13.59	8.42	10.17	11.49	13.61	10 60	13.24
22	8.54	9.78	11.69	10 82	8.56	9.83	11.77	13.94	8.51	10.35	11.77	13.96	10 85	13.47
23	8.63	9.92	11.95	11 05	8.64	9.97	12.03	14.28	8.58	10.51	12.03	14.30	11 09	13.68
24	8.70	10.04	12.19	11.27	8.72	10.10	12.28	14.60	8.66	10.66	12.28	14.62	11 32	13:88
25	8.77	10.16	12.42	11.48	8.78	10.21	12.52	14.90	8.72	10.79	12.52	14.92	11.53	14.06
26	8.83	10.26	12.64	11.68	8.84	10.32	12.75	15.19	8.77	10.92	12.75	15.21	11.74	14.22
27	8.88	10.35	12.85	11 87	8.90	10.41	12.96	15.46	8.82	11.03	12.96	15.48	11 93	14.38
28	8.92	10.44	13.05	12.05	8.94	10.50	13.16	15.72	8.86	11.14	13.16	15.75	12 11	14.51
29	8.97	10.51	13.23	12.22	8.99	10·58	13.35	15.97	8.90	11.23	13.35	15.99	12 28	14.64
30	9.00	10.59	13.41	12.38	9.02	10.65	13.54	16.21	8.93	11.32	13.54	16.23	12 45	14.76

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-10--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
DOE REGION 10
(WASHINGTON, OREGON, IDAHO, ALASKA)
STUDY PERIOD 1 IS MID 1980 to MID 1981

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Residual	Liquid Gas	Coal
	0.91	0.93	0.94	0.93	0.91	0.93	0.94	0.95	0.91	0.93	0.94	0.95	0.93	1.00
1	1.74	1.78	1.82	1.78	1.74	1.78	1.82	1.93	1.73	1.78	1.82	1.93	1.78	1.99
2	2.49	2.57	2.65	2.57	2.49	2.57	2.65	2.82	2.48	2.57	2.65	2.82	2.57	2.98
3	3.17	3.31	3.43	3.31	3.17	3.31	3.43	3.78	3.17	3.31	3.43	3.78	3.31	3.96
4	3.79	3.98	4.17	3.99	3.79	3.98	4.17	4.68	3.79	3.99	4.17	4.68	3.99	4.94
5	4.37	4.62	4.85	4.62	4.38	4.63	4.85	5.51	4.39	4.64	4.85	5.51	4.62	5.85
6	4.93	5.23	5.49	5.21	4.93	5.24	5.50	6.30	4.99	5.27	5.50	6.29	5.21	6.70
7	5.45	5.80	6.10	5.75	5.45	5.82	6.10	7.03	5.52	5.88	6.10	7.02	5.75	7.49
8	5.94	6.34	6.66	6.26	5.95	6.37	6.67	7.72	6.15	6.47	6.67	7.71	6.27	8.23
9	6.41	6.85	7.18	6.74	6.43	6.90	7.20	8.36	6.71	7.04	7.20	8.35	6.74	8.91
10	6.84	7.30	7.68	7.19	6.85	7.36	7.70	8.93	7.23	7.58	7.70	8.95	7.19	9.52
11	7.23	7.69	8.16	7.62	7.24	7.76	8.18	9.55	7.71	8.09	8.18	9.53	7.62	10.05
12	7.59	8.04	8.60	8.02	7.61	8.11	8.63	10.11	8.16	8.57	8.63	10.03	8.03	10.52
13	7.92	8.35	9.03	8.40	7.94	8.42	9.06	10.63	8.58	9.02	9.06	10.61	8.41	10.94
14	8.23	8.62	9.43	8.76	8.25	8.69	9.46	11.14	8.96	9.45	9.46	11.11	8.78	11.31
15	8.51	8.85	9.81	9.11	8.53	8.93	9.85	11.62	9.32	9.86	9.85	11.58	9.12	11.63
16	8.77	9.08	10.16	9.43	8.79	9.14	10.21	12.08	9.65	10.24	10.21	12.04	9.45	11.92
17	9.00	9.25	10.50	9.74	9.03	9.32	10.56	12.51	9.95	10.61	10.56	12.47	9.76	12.17
18	9.22	9.41	10.83	10.03	9.25	9.48	10.88	12.93	10.24	10.95	10.88	12.88	10.06	12.39
19	9.42	9.55	11.13	10.31	9.46	9.62	11.19	13.32	10.50	11.27	11.19	13.27	10.34	12.59
20	9.60	9.68	11.42	10.57	9.63	9.74	11.49	13.70	10.75	11.58	11.49	13.64	10.60	12.77
21	9.77	9.79	11.69	10.82	9.80	9.85	11.77	14.06	10.97	11.87	11.77	13.99	10.85	12.92
22	9.93	9.89	11.95	11.05	9.96	9.95	12.03	14.40	11.18	12.14	12.03	14.33	11.09	13.06
23	10.07	9.98	12.19	11.27	10.11	10.03	12.28	14.73	11.38	12.40	12.28	14.65	11.32	13.18
24	10.20	10.05	12.42	11.48	10.24	10.10	12.52	15.04	11.56	12.65	12.52	14.96	11.53	13.28
25	10.32	10.12	12.64	11.68	10.36	10.17	12.75	15.34	11.72	12.88	12.75	15.25	11.74	13.38
26	10.43	10.18	12.85	11.87	10.47	10.22	12.96	15.62	11.88	13.10	12.96	15.52	11.93	13.46
27	10.54	10.23	13.05	12.05	10.57	10.27	13.16	15.89	12.02	13.31	13.16	15.79	12.11	13.53
28	10.63	10.28	13.23	12.22	10.67	10.31	13.35	16.15	12.16	13.50	13.35	16.04	12.28	13.60
29	10.71	10.32	13.41	12.38	10.76	10.35	13.54	16.39	12.28	13.69	13.54	16.27	12.45	13.65
30														

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1}\left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\sum_{j=1}^{n_2}\left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+e_2}{1+d}\right)^{n_2}\sum_{j=1}^{n_3}\left(\frac{1+a_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1}\left(\frac{1+a_2}{1+d}\right)^{n_2}\cdots\left(\frac{1+a_{k-1}}{1+d}\right)^{n_{k-1}}\sum_{j=1}^{n_k}\left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d = the discount rate; and $\sum_{j=1}^{n}\left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE B-11--UPW* DISCOUNT FACTORS ADJUSTED FOR ENERGY PRICE ESCALATION[a]
UNITED STATES AVERAGE
STUDY PERIOD 1 IS MID 1980

Study Period	Residential Sector				Commercial Sector				Industrial Sector					
	Electricity	Natural Gas	Distillate	Liquid Gas	Electricity	Natural Gas	Distillate	Residual	Electricity	Natural Gas	Distillate	Resi-dual	Liquid Gas	Coal
1	0.91	0.93	0.94	0.93	0.91	0.92	0.94	0.95	0.91	0.93	0.94	0.95	0.92	1.00
2	1.74	1.78	1.82	1.78	1.74	1.78	1.82	1.93	1.73	1.78	1.82	1.93	1.78	1.99
3	2.49	2.57	2.65	2.57	2.49	2.57	2.65	2.87	2.49	2.57	2.65	2.87	2.57	2.98
4	3.17	3.31	3.43	3.31	3.17	3.30	3.43	3.78	3.17	3.30	3.43	3.78	3.30	3.96
5	3.79	3.98	4.17	3.98	3.79	3.98	4.17	4.67	3.79	3.98	4.17	4.67	3.98	4.94
6	4.36	4.62	4.85	4.61	4.36	4.62	4.85	5.51	4.36	4.64	4.85	5.51	4.61	5.84
7	4.88	5.21	5.49	5.20	4.88	5.22	5.50	6.28	4.89	5.28	5.49	6.28	5.20	6.69
8	5.36	5.76	6.09	5.75	5.35	5.28	6.10	7.01	5.32	5.89	6.10	7.01	5.75	7.45
9	5.80	6.28	6.65	6.26	5.79	6.31	6.66	7.68	5.82	6.49	6.66	7.69	6.26	8.17
10	6.20	6.73	7.18	6.73	6.19	6.81	7.19	8.31	6.23	7.07	7.18	8.32	6.73	8.83
11	6.56	7.22	7.67	7.18	6.55	7.27	7.68	8.91	6.60	7.62	7.68	8.92	7.18	9.43
12	6.89	7.63	8.14	7.61	6.88	7.69	8.16	9.48	6.94	8.13	8.15	9.49	7.61	9.99
13	7.18	8.01	8.58	8.01	7.17	8.09	8.60	10.02	7.24	8.61	8.60	10.04	8.01	10.49
14	7.45	8.36	9.00	8.39	7.44	8.45	9.02	10.53	7.52	9.06	9.02	10.55	8.39	10.95
15	7.70	8.68	9.40	8.75	7.68	8.78	9.42	11.02	7.77	9.49	9.42	11.04	8.76	11.39
16	7.91	8.97	9.77	9.09	7.90	9.08	9.80	11.48	7.99	9.88	9.80	11.51	9.10	11.76
17	8.11	9.24	10.13	9.42	8.09	9.35	10.16	11.92	8.20	10.26	10.16	11.95	9.43	12.12
18	8.29	9.49	10.46	9.72	8.27	9.63	10.50	12.34	8.38	10.61	10.50	12.38	9.74	12.44
19	8.45	9.72	10.78	10.01	8.43	9.87	10.82	12.73	8.55	10.94	10.82	12.78	10.03	12.74
20	8.60	9.94	11.08	10.29	8.58	10.09	11.12	13.11	8.70	11.25	11.12	13.16	10.31	13.01
21	8.73	10.13	11.36	10.55	8.71	10.29	11.41	13.46	8.84	11.55	11.41	13.52	10.57	13.25
22	8.85	10.31	11.63	10.80	8.83	10.48	11.68	13.80	8.97	11.82	11.68	13.86	10.82	13.45
23	8.96	10.48	11.88	11.03	8.93	10.65	11.94	14.12	9.08	12.08	11.94	14.19	11.06	13.69
24	9.06	10.63	12.12	11.25	9.03	10.81	12.18	14.42	9.18	12.32	12.18	14.50	11.28	13.88
25	9.15	10.77	12.34	11.46	9.12	10.96	12.41	14.71	9.27	12.55	12.41	14.80	11.49	14.05
26	9.23	10.90	12.56	11.66	9.20	11.09	12.63	14.99	9.36	12.76	12.63	15.08	11.69	14.21
27	9.30	11.02	12.76	11.84	9.27	11.22	12.83	15.25	9.43	12.96	12.84	15.34	11.88	14.35
28	9.36	11.13	12.95	12.02	9.33	11.33	13.03	15.50	9.50	13.15	13.04	15.60	12.06	14.49
29	9.42	11.23	13.13	12.19	9.39	11.44	13.21	15.73	9.56	13.33	13.22	15.84	12.24	14.61
30	9.48	11.32	13.30	12.35	9.44	11.54	13.39	15.95	9.62	13.50	13.40	16.07	12.40	14.72

a. These "modified" uniform present worth discount (UPW*) factors are based on a 10% discount rate and include the EIA projected real escalation rates in energy prices developed from the Mid-Term Energy Forecasting System (MEFS), for the periods mid 1980-1985, mid 1985-1990, and mid 1990-1995 and beyond. The formula for calculating these UPW* factors is the following: For 1 to k escalation periods,

$$UPW^* = \sum_{j=1}^{n_1} \left(\frac{1+e_1}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1} \sum_{j=1}^{n_2} \left(\frac{1+e_2}{1+d}\right)^j + \left(\frac{1+e_1}{1+d}\right)^{n_1} \left(\frac{1+e_2}{1+d}\right)^{n_2} \sum_{j=1}^{n_3} \left(\frac{1+e_3}{1+d}\right)^j + \cdots + \left(\frac{1+e_1}{1+d}\right)^{n_1} \left(\frac{1+e_2}{1+d}\right)^{n_2} \cdots \left(\frac{1+e_{k-1}}{1+d}\right)^{n_{k-1}} \sum_{j=1}^{n_k} \left(\frac{1+e_k}{1+d}\right)^j$$

where n_k = the length of the period for a given escalation rate in a given period, and the subscript k indicates the escalation period;

d= the discount rate; and $\sum_{j=1}^{n} \left(\frac{1+e}{1+d}\right)^j = \left(\frac{1+e}{d-e}\right)\left(1-\left(\frac{1+e}{1+d}\right)^n\right)$

TABLE C-1--BASE YEAR ENERGY PRICES
(MID 1980 PRICES PER MILLION BTU IN MID 1980 DOLLARS)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	26.56	25.15	18.85	14.22	17.30	18.54	18.79	18.85	20.09	7.29[a]	17.58
Natural Gas	4.86[a]	4.44[a]	3.95[a]	3.46[a]	3.55[a]	3.69[a]	3.50	3.62	4.34	4.58[a]	3.83[a]
Distillate	7.19	7.27	7.46	7.53	6.98	7.20	6.92	7.04	6.84	6.84	7.21
Liquid Gas	9.71	9.84	10.19	10.20	9.77	9.75	9.70	9.93	9.76	9.76	9.87
COMMERCIAL SECTOR											
Electricity	26.20	23.96	18.41	14.60	16.83	17.68	17.77	17.46	21.25	7.06	18.06
Natural Gas	4.12[a]	3.77[a]	3.43[a]	2.90[a]	3.18[a]	3.10	3.05	3.37	3.76	3.92[a]	3.33[a]
Distillate	6.94	7.01	7.05	7.06	6.78	6.94	6.73	6.80	6.55	6.55	6.91
Residual	4.96	5.03	5.29	4.96	4.97	4.97	5.00	4.88	4.73	4.57	4.99
INDUSTRIAL SECTOR											
Electricity	21.66	15.85	13.72	10.87	12.16	14.02	14.23	13.05	17.06	3.31	12.61
Natural Gas	5.81	5.77	4.77	3.90	4.16	2.76	3.24	2.83	5.43	4.89	3.58
Distillate	6.75	6.99	7.15	7.14	6.78	6.92	6.72	6.84	6.55	6.55	6.93
Residual	4.79	5.12	5.22	4.93	4.95	4.96	4.98	4.83	4.72	4.68	4.96
Liquid Gas	9.44	9.55	9.77	9.79	9.57	9.50	9.53	9.66	9.49	9.49	9.62
Coal	1.83[b]	1.63[b]	1.42[b]	1.59[b]	1.29[b]	1.49[b]	1.15[b]	0.90[b]	1.89	1.55[b]	1.46[b]

Prices are developed from average U.S. prices projected for the year 1980 as reported in "Short-Term Energy Outlook," DOE/EIA-0202/2, February 1980. Regional breakdown of 1980 prices are based on the proportional relationship of regional prices to U.S. average prices estimated by the DoE Mid-Term Energy Forecasting System (MEFS) for the year 1985. Simple arithmetic averaging of the regional prices shown will not yield the exact U.S. average prices shown due to energy consumption weighting reflected in the U.S. average prices.

[a] The reduction in the 1980 U.S. average price of natural gas relative to that published in the January 23, 1980 Federal Register reflects a downward revision in the EIA short-term natural gas price forecast.

[b] The reduction in the 1980 U.S. average price of coal relative to that published in the January 23, 1980 Federal Register reflects the current softness in the spot market for coal.

TABLE C-2--BASE YEAR ENERGY PRICES[a]
(MID 1980 PRICES PER UNIT OF ENERGY PURCHASED IN MID 1980 DOLLARS)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity (kWh.)	0.091	0.086	0.064	0.049	0.059	0.064	0.064	0.064	0.069	0.025	0.060
Natural Gas (cu. ft.)	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004
Distillate (gal.)	0.997	1.009	1.035	1.044	0.968	0.999	0.960	0.926	0.949	0.949	1.000
Liquid Gas (gal.)	0.927	0.940	0.973	0.974	0.933	0.931	0.926	0.948	0.932	0.932	0.943
COMMERCIAL SECTOR											
Electricity (kWh.)	0.089	0.082	0.063	0.050	0.057	0.060	0.061	0.060	0.073	0.024	0.062
Natural Gas (cu. ft.)	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.003
Distillate (gal.)	0.963	0.977	0.978	0.979	0.940	0.963	0.933	0.943	0.908	0.908	0.958
Residual (gal.)	0.747	0.753	0.792	0.742	0.744	0.744	0.748	0.730	0.708	0.684	0.747
INDUSTRIAL SECTOR											
Electricity (kWh.)	0.074	0.054	0.047	0.037	0.041	0.048	0.049	0.045	0.058	0.011	0.043
Natural Gas (cu. ft.	0.006	0.006	0.005	0.004	0.004	0.003	0.003	0.003	0.006	0.005	0.004
Distillate (gal.)	0.936	0.969	0.992	0.990	0.940	0.960	0.932	0.949	0.908	0.908	0.961
Residual (gal.)	0.717	0.766	0.781	0.738	0.741	0.745	0.745	0.723	0.707	0.701	0.742
Liquid Gas (gal.)	0.902	0.912	0.933	0.935	0.914	0.907	0.910	0.923	0.906	0.906	0.919
Coal (ton)	41.175	36.675	31.950	35.775	29.025	33.525	25.875	20.250	42.525	34.875	32.850

[a]Note that prices in Tables C-1 and C-2 are equivalent prices stated in different units of energy. Table C-1 prices are per million Btu (MBtu); Table C-2 prices are per unit of energy typically sold, e.g., kWh of electricity and cubic feet of natural gas.

Prices in Table C-2 were derived from the prices in Table C-1 by multiplying the price per MBtu times the ratio of the Btu content per sales unit of energy to 1 MBtu. The conversions from price per MBtu to price per sales unit are based on the following assumed equivalencies: 3,412 Btu per kWh of electricity, 1,030 Btu per cubic ft. of natural gas, 138,690 Btu per gallon of distillate, 149,690 Btu per gallon of residual, 95,500 Btu per gallon of liquid gas, 22,500,000 Btu per short ton of coal. For example, price per KWh of electricity = price per MBtu x $\frac{3,412}{1,000,000}$; hence in DOE Region 1, the price per KWh of residential electricity = $26.56 x $\frac{3,412}{1,000,000}$ = 0.091

TABLE C-3--PROJECTED MID 1985 ENERGY PRICES
(Mid 1985 Prices Per Million Btu in Mid 1980 Dollars[1])

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	26.54	25.12	18.84	14.21	17.29	18.82	18.77	18.84	20.08	7.28	17.56
Natural Gas	5.31	4.85	4.31	3.77	3.87	4.03	3.82	3.95	4.74	5.00	4.18
Distillate	8.49	8.59	8.81	8.90	8.24	8.50	8.17	8.32	8.07	8.07	8.51
Liquid Gas	10.61	10.75	11.12	11.12	10.66	10.64	10.58	10.83	10.66	10.66	10.77
COMMERCIAL SECTOR											
Electricity	26.19	23.94	18.40	14.59	16.82	17.67	17.76	17.44	21.24	7.05	18.05
Natural Gas	4.50	4.11	3.74	3.16	3.47	3.38	3.32	3.67	4.10	4.28	3.63
Distillate	8.19	8.28	8.33	8.34	8.01	8.19	7.95	8.03	7.73	7.73	8.16
Residual	7.13	7.23	7.60	7.13	7.15	7.14	7.20	7.01	6.79	6.58	7.17
INDUSTRIAL SECTOR											
Electricity	21.64	15.83	13.71	10.86	12.15	14.01	14.22	13.04	17.05	3.30	12.59
Natural Gas	6.35	6.30	5.21	4.26	4.54	3.02	3.53	3.09	5.93	5.34	3.91
Distillate	7.98	8.26	8.45	8.44	8.01	8.17	7.94	8.07	7.73	7.73	8.18
Residual	6.89	7.36	7.50	7.09	7.12	7.13	7.16	6.94	6.78	6.74	7.13
Liquid Gas	10.32	10.42	10.67	10.68	10.45	10.38	10.39	10.56	10.37	10.37	10.49
Coal	2.90	2.57	2.25	2.51	2.03	2.36	1.81	1.40	2.98	2.45	2.30

Prices based on DOE Mid-Term Energy Forecasting System (MEFS) Projection Series "A" (High Case).

TABLE C-4--PROJECTED MID 1990 ENERGY PRICES
(MID 1990 PRICES PER MILLION BTU IN MID 1980 DOLLARS)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	26.37	24.36	19.63	15.47	18.21	20.31	18.22	16.40	20.55	8.80	18.32
Natural Gas	6.25	5.55	5.04	4.25	4.45	5.02	4.52	4.79	5.09	6.04	4.83
Distillate	9.75	9.86	10.08	10.17	9.51	9.77	9.45	9.55	9.35	9.35	9.80
Liquid Gas	11.98	12.11	12.49	12.49	12.02	12.01	11.95	12.70	12.03	12.03	12.14
COMMERCIAL SECTOR											
Electricity	25.93	23.18	19.23	15.85	17.74	19.15	17.21	15.01	21.70	8.57	18.71
Natural Gas	5.44	4.82	4.46	3.63	4.05	4.37	4.02	4.52	4.45	5.33	4.31
Distillate	9.46	9.54	9.60	9.61	9.28	9.47	9.23	9.27	9.01	9.01	9.43
Residual	8.13	8.25	8.61	8.15	8.17	8.16	8.22	8.00	7.81	7 60	8.16
INDUSTRIAL SECTOR											
Electricity	21.39	15.07	14.55	12.11	13.08	15.49	13.67	10.61	17.52	4.83	13.45
Natural Gas	7.66	7.83	7.98	6.49	6.36	4.02	6.15	3.94	6.97	7.22	5.39
Distillate	9.46	9.52	9.72	9.71	9.28	9.45	9.21	9.31	9.01	9.01	9.46
Residual	8.19	8.37	8.52	8.11	8.14	8.15	8.18	7.93	7.81	7.76	8.14
Liquid Gas	11.68	11.79	12.03	12.06	11.81	11.74	11.76	11.94	11.73	11.73	11.85
Coal (ton)	3.12	2.79	2.48	2.73	2.20	2.53	1.97	1.40	3.19	2,75	2.50

Prices based on DOE Mid-Term Energy Forecasting System (MEFS) Projection Series "A" (High Case).

TABLE C-5--PROJECTED MID 1995 ENERGY PRICES
(MID 1995 PRICES PER MILLION BTU IN MID 1980 PRICES)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	21.93	23.86	19.32	15.84	15.89	20.04	18.20	14.47	18.24	9.29	17.80
Natural Gas	6.88	6.03	5.44	4.46	4.67	5.64	4.80	5.39	5.16	5.17	5.13
Distillate	11.85	11.97	12.20	12.29	11.63	11.83	11.56	11.66	11.44	11.44	11.92
Liquid Gas	14.71	14.85	15.23	15.23	14.75	14.74	14.68	14.93	14.77	14.77	14.89
COMMERCIAL SECTOR											
Electricity	21.59	22.67	18.88	16.24	17.62	18.89	17.19	13.09	19.41	9.06	18.17
Natural Gas	6.06	5.30	4.88	3.85	4.28	4.98	4.30	5.11	4.52	4.44	4.62
Distillate	11.55	11.66	11.72	11.73	11.40	11.58	11.34	11.38	11.10	11.10	11.53
Residual	10.11	10.24	10.61	10.16	10.21	10.20	10.26	10.02	9.82	9.62	10.14
INDUSTRIAL SECTOR											
Electricity	17.04	14.57	14.18	12.49	12.96	15.23	13.65	8.69	15.22	5.32	13.16
Natural Gas	9.64	9.81	7.60	7.68	7.71	4.63	9.73	4.53	7.30	8.78	6.35
Distillate	11.55	11.64	11.84	11.83	11.40	11.56	11.33	11.42	11.10	11.10	11.57
Residual	10.18	10.36	10.51	10.11	10.18	10.19	10.21	9.95	9.82	9.76	10.17
Liquid Gas	14.43	14.52	14.77	14.79	14.56	14.48	14.49	14.67	14.47	14.47	14.59
Coal	2.61	2.93	2.62	2.84	2.31	2.61	2.05	1.45	3.35	2.38	2.58

Prices based on DOE Mid-Term Energy Forecasting System (MEFS) Projection Series "A" (High Case)

TABLE C-6--ENERGY PRICE ESCALATION RATES MID 1980-1985[a]
(PERCENTAGE CHANGE COMPOUNDED ANNUALLY)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	-0.02	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02
Natural Gas	1.78	1.78	1.77	1.75	1.75	1.76	1.75	1.76	1.77	1.78	1.76
Distillate	3.38	3.39	3.38	3.39	3.37	3.38	3.38	3.39	3.37	3.37	3.38
Liquid Gas	1 78	1 79	1 77	1 75	1 76	1 76	1 74	1 75	1 79	1 79	1 77
COMMERCIAL SECTOR											
Electricity	-0.01	-0.02	-0.01	-0.01	-0.02	-0.01	-0.01	-0.02	-0.01	-0.02	-0.02
Natural Gas	1.77	1.76	1.75	1.73	1.74	1.74	1.73	1.75	1.76	1.76	1.75
Distillate	3.38	3.39	3.38	3.38	3.39	3.38	3.40	3.38	3.38	3.38	3.39
Residual	7.53	7.52	7.52	7.53	7.55	7.52	7.55	7.51	7.50	7.57	7.53
INDUSTRIAL SECTOR											
Electricity	-0.01	-0.03	-0.01	-0.02	-0.01	-0.02	-0.02	-0.01	-0.01	-0.05	-0.03
Natural Gas	1.80	1.76	1.78	1.76	1.77	1.79	1.74	1.80	1.79	1.79	1.75
Distillate	3.39	3.40	3.39	3.39	3.39	3.38	3.40	3.37	3.38	3.38	3.38
Residual	7.54	7.53	7.53	7.53	7.54	7.53	7.54	7.53	7.51	7.55	7.53
Liquid Gas	1 80	1 76	1 79	1 76	1 78	1 78	1 74	1 81	1 78	1 78	1 74
Coal	9.62	9.51	9.63	9.58	9.49	9.62	9.50	9.30	9.56	9.56	9.55

Derived from DOE 1980 and 1985 Price Forecasts shown in Tables C-1 and C-3.

TABLE C-7--ENERGY PRICE ESCALATION RATES MID 1985-1990[a]
(PERCENTAGE CHANGE COMPOUNDED ANNUALLY)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	-0.20	-0.61	0.87	1.72	1.04	1.55	-0.59	-2.73	0.47	3.85	0.85
Natural Gas	3.33	2.74	3.15	2.38	2.84	4.53	3.43	3.95	1.44	3.86	2.92
Distillate	2.81	2.80	2.74	2.71	2.91	2.83	2.94	2.82	2.97	2.97	2.85
Liquid Gas	2.46	2.41	2.35	2.35	2.43	2.45	2.47	2.41	2.45	2.45	2.43
COMMERCIAL SECTOR											
Electricity	-0.19	-0.64	0.89	1.67	1.07	1.62	-0.63	-2.96	0.43	3.97	0.73
Natural Gas	3.88	3.20	3.60	2.82	3.15	5.26	3.85	4.22	1.66	4.50	3.49
Distillate	2.91	2.88	2.89	2.88	2.99	2.93	3.01	2.91	3.09	3.09	2.94
Residual	2.66	2.68	2.52	2.71	2.70	2.71	2.69	2.67	2.84	1.39	2.61
INDUSTRIAL SECTOR											
Electricity	-0.23	-0.98	1.19	2.20	1.47	2.03	-0.78	-4.05	0.55	7.89	1.32
Natural Gas	3.81	4.46	8.89	8.82	6.98	5.88	11.74	4.95	3.26	6.20	6.64
Distillate	3.47	2.88	2.85	2.85	2.99	2.94	3.07	2.90	3.09	3.09	2.93
Residual	3.53	2.60	2.58	2.73	2.71	2.71	2.70	2.69	2.87	2.86	2.68
Liquid Gas	2.51	2.50	2.43	2.44	2.48	2.49	2.51	2.47	2.50	2.50	2.47
Coal	1.47	1.65	1.97	1.69	1.67	1.45	1.76	0.00	1.36	2.39	1.66

[a]Derived from DOE Mid-Term Energy Price Forecasts shown in Tables C-3 and C-4.

TABLE C-8--ENERGY PRICE ESCALATION RATES MID 1990-1995 AND BEYOND[a]
(PERCENTAGE CHANGE COMPOUNDED ANNUALLY)

DOE Region and Fuel Type	DOE 1	DOE 2	DOE 3	DOE 4	DOE 5	DOE 6	DOE 7	DOE 8	DOE 9	DOE 10	U.S. AVERAGE
RESIDENTIAL SECTOR											
Electricity	-3.55	-0.42	-0.36	0.42	-0.13	-0.26	-0.02	-2.47	-2.35	1.10	-0.57
Natural Gas	1.92	1.68	1.56	1.01	0.97	2.33	1.23	2.36	0.26	-3.09	1.24
Distillate	3.97	3.95	3.89	3.86	4.10	4.00	4.13	4.06	4.13	4.13	4.01
Liquid Gas	4.19	4.17	4.03	4.03	4.18	4.18	4.20	4.12	4.18	4.18	4.16
COMMERCIAL SECTOR											
Electricity	-3.60	-0.44	-0.37	0.48	-0.14	-0.28	-0.03	-2.70	-2.21	1.13	-0.59
Natural Gas	2.16	1.93	1.80	1.18	1.11	2.67	1.38	2.49	0.29	-3.58	1.39
Distillate	4.08	4.09	4.07	4.06	4.20	4.12	4.22	4.18	4.27	4.27	4.09
Residual	4.47	4.41	4.26	4.50	4.56	4.56	4.54	4.60	4.68	4 82	4.43
INDUSTRIAL SECTOR											
Electricity	-4.45	-0.68	-0.50	0.63	-0.19	-0.34	-0.03	-3.91	-2.78	1.97	-0.43
Natural Gas	4.72	4.60	-0.95	3.41	3.92	2.89	9.60	2.84	0.93	3.99	3.35
Distillate	4.08	4.10	4.02	4.02	4.20	4.13	4.22	4.16	4.27	4.27	4.12
Residual	4.43	4.35	4.28	4.52	4.58	4.57	4.53	4.64	4.68	4.71	4.55
Liquid Gas	4.31	4.25	4.18	4.17	4.26	4.29	4.27	4.21	4.29	4.29	4.25
Coal	-3.47	1.00	1.12	0.79	0.98	0.60	0.77	0.62	0.94	-2.87	0.61

[a]Derived from DOE Mid-Term Energy Price Forecasts shown in Tables C-4 and C-5, and assumed to extend up to 15 years beyond mid 1995.

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