

THE BENEFIT/COST ANALYSIS  
OF TIME-OF-DAY RATES (BENCOST) PROGRAM

USER'S MANUAL

by

J. Shih  
Institute Researcher in Engineering

Y. M. Chen  
Graduate Research Associate

S. Nakamura  
Professor of Nuclear Engineering

THE NATIONAL REGULATORY RESEARCH INSTITUTE  
2130 Neil Avenue  
Columbus, Ohio 43210

prepared for the  
West Virginia Public Service Commission

December 1981

This report was prepared by The National Regulatory Research Institute under a contract with the West Virginia Public Service Commission. The views and opinions of the authors do not necessarily state or reflect the views, opinions, or policies of the West Virginia Public Service Commission or The National Regulatory Research Institute.



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## INTRODUCTION

The objectives of the BENCOSt program are to calculate (1) the revenue excesses or deficiencies caused by the implementation of time-of-day rates [1], (2) additional customer charges or credits due to implementing time-of-day rates, and (3) net benefits of time-of-day rates. The user supplies the number of seasons, customer response coefficients, peak and off-peak prices, MWH sales, estimated metering costs, marginal capacity costs, and on/off peak energy cost differences as basic inputs. The BENCOSt program produces three tables listing revenue excesses or deficiencies, monthly customer charges or credits, and net benefits of time-of-day rates accordingly for each season.

The users are referred to reference 1 for the theory behind this program and for the important discussions of the limitations of this theory.



## DESCRIPTION OF THE PROGRAM

The BENCOST program is based on the assumption that peak electric users will respond to the implementation of the time-of-day rates by shifting their uses of electricity from peak periods to off-peak periods. It also assumes that the maximum generating capacity of the company remains the same after the shifting. Then the utility can benefit from the reductions in energy and capacity costs due to the implementation of the time-of-day rates.

The BENCOST program has a built-in constraint corresponding to the limitations discussed in reference 1. If the peak customer response causes new peak periods, the program execution will be terminated, and an error message of this peak chasing situation will be issued. In response to this message, the user can either lengthen the duration of the peak period or reduce the peak price differential and rerun the program.

The three objectives are achieved by separate subroutines presented below.

### Subroutine TOD1

Subroutine TOD1 calculates the revenue excesses (or deficiencies) due to the time-of-day rates. The revenue excess or deficiency is defined by

$$\text{Excess or deficiency} = (\text{TOD revenue}) - (\text{revenue rate})$$

where "TOD revenue" is the revenue based on the marginal or embedded cost time-of-day rates and "revenue rate" is the revenue based on the current company rates.

In order to calculate the TOD revenue, peak and off-peak customer responses must be obtained first by



Peak(off-peak) customer response =  
(customer response coefficient) x (peak(off-peak) price change)  
x (estimated peak(off-peak) sales)

Then, the TOD revenue is calculated by

TOD revenue =  
(peak price) x (estimated peak sales + peak customer response)  
+ (off-peak price) x (estimated off-peak sales + off-peak response)

A table of revenue excesses or deficiencies is printed by this subroutine as illustrated on page 11. The first column in the table shows voltage levels considered in the case study. The second column contains abbreviated names of rate schedules, and the third column lists the customer response coefficient. The average company price, the peak price, and off-peak price are shown in the next three columns, respectively. Percentage changes in price of peak and off-peak periods are presented in the seventh and eighth column, respectively. Columns nine and ten contain peak and off-peak customer responses calculated according to the second equation in this section. Estimated total sales, peak sales, and off-peak sales are calculated and listed in columns eleven to thirteen. Column fourteen shows the TOD revenue as calculated by the equation described above. The company revenue is reported in column fifteen as specified by the input. The last column presents revenue excesses or deficiencies obtained from the first equation in this section.

#### Subroutine TOD2

Subroutine TOD2 calculates monthly customer charges before adding the special TOD metering and is based on the revenue excesses or de-



ficiencies obtained in subroutine TOD1. A monthly customer charge without metering is calculated by

Monthly charge before metering =

$$(\text{revenue excess or deficiency}) / (\text{average number of customers} \times \text{Months})$$

where "Months" is the duration of the season.

The monthly customer charge with the TOD metering is the sum of the monthly customer charge without metering and the monthly customer charge for this metering.

The voltage level average of monthly customer charges with metering is derived by a weighted average of monthly customer charges with metering. The weight for a class is the ratio of the average number of customers in that class to the total number of customers in that voltage level.

A table of monthly customer charges is printed out at the end of this subroutine as illustrated on page 12. The first three columns show the voltage level, the rate schedule, and the average number of customers, respectively. The revenue excesses or deficiencies obtained from subroutine TOD1 are reported in the fourth column. In the fifth and sixth columns, the monthly customer charges or credits without and with special TOD metering are presented. The voltage level average of the monthly customer charges with metering is shown in the last column. The average value of the monthly customer charges with metering for all customer classes is shown in the last line of the table.

#### Subroutine TOD3

This subroutine performs a cost-benefit analysis for the time-of-day rates. Net benefit is calculated by

$$\text{Net benefit} = (\text{capacity benefit}) + (\text{energy savings benefit})$$

$$- (\text{estimated metering costs})$$



where the capacity benefit and the energy savings benefit are both obtained from the peak customer response calculated in subroutine TOD1. The capacity benefit is calculated by

$$\begin{aligned}\text{Capacity benefit} &= (\text{marginal capacity cost}) \\ &\quad \times (\text{peak customer response})\end{aligned}$$

The energy savings benefit is calculated by

$$\begin{aligned}\text{Energy savings benefit} &= (\text{on/off peak energy cost difference}) \\ &\quad \times (\text{peak customer response})\end{aligned}$$

A table of net benefits is printed out by this subroutine as illustrated on page 13. The marginal capacity cost in \$/MWH (input) is shown in the third column. The peak customer response, which is obtained from subroutine TOD1, is shown in the fourth column. The capacity benefit, the energy savings benefit, and the net benefit are presented in the next three columns, respectively. The last column shows the benefit/cost ratio, which is obtained by dividing the sum of the capacity benefit and the energy savings benefit by the estimated metering cost shown in the eighth column.



## INPUT DATA

The input variables to be supplied by the user are listed in table 1. Table 2 lists a set of sample inputs. The inputs consist of seven kinds of cards. Cards 1 through 3 respectively contain the name of the company analyzed, the case number, and the number of seasons. If there are seasonal rates, enter the number of seasons used for costing within the test year. If there are no seasonal rates, enter 1. Maximum number of seasons allowed in the BENCOSt program is 3. Card 4 contains the duration of the season in months, the duration of the peak period in hours, and the duration of the off-peak period in hours. Card 5 contains the number of customer classes. Cards 6 and 7 are repeated NM (number of customer classes) times. In cards 4 through 7, the position and length of numbers are arbitrary, but the numbers must be separated by one or more blank spaces. In cards 4, 6, and 7, the data must follow the order in Table 1. Cards 4 through 7 are repeated NSEN (number of seasons) times to supply inputs for each season.



Table 1  
List of Input Variables

Card	Variable	Definition	Format
1	INAME	Name of the company	14A1
2	NCASE	Case number	A6
3	NSEN	Number of seasons	I
4	MONTHS	Duration of seasons (months)	I
	NTPK	Duration of peak period (hours)	I
	NTOFPK	Duration of off-peak period (hours)	I
5	NM	Number of customer classes	I
6	IV	Voltage level	I
	IRSCHE	Rate schedule	A2
	ICAT	Voltage level aggregate identifier	I
	ACP	Average company price	F
	P1	Peak price	F
	P2	Off-peak price	F
	CMC	Marginal capacity costs	F
	ECD	On/off peak energy cost difference	F
	MET	Estimated metering cost	I
	COE	Customer response coefficient	F
	DELT	Monthly customer charges of metering	F
7	MSALE	Seasonal MWH sales	I
	PEAK	Estimated ratio of peak sales to total sales	F
	MREV	Revenue rate	I
	NCUST	Number of customers in each class	I



TABLE 2  
LIST OF A SAMPLE INPUT SET

---

POTOMAC EDISON

79-230

1

12 3132 5652

12

1	PP	1	2.925	3.979	1.480	16.86	8.13	160	-.2	3.4
2	C	2	4.727	4.522	1.684	8.31	10.07	40	-.2	3.4
2	DL	2	3.614	4.522	1.684	18.31	10.07	400	-.2	3.4
2	PH	2	3.261	4.522	1.684	18.31	10.07	120	-.2	3.4
3	R	3	5.530	4.664	1.736	18.73	10.56	810680	-.2	3.4
3	RW	3	4.827	4.664	1.736	18.73	10.56	835080	-.2	3.4
3	RA	3	4.049	4.664	1.736	18.73	10.56	540760	-.2	3.4
3	CW	4	5.395	4.664	1.736	18.73	10.56	259280	-.2	3.4
3	CA	4	4.265	4.664	1.736	18.73	10.56	22440	-.2	3.4
3	CA	4	3.541	4.664	1.736	18.73	10.56	7320	-.2	3.4
3	PL	4	4.115	4.664	1.736	18.73	10.56	4040	-.2	3.4
3	PH	4	3.551	4.664	1.736	18.73	10.56	4040	-.2	3.4
204430 .67000 5980291 4										
127	.	66929	5998	1						
31017	.	66999	1121042	10						
23987	.	66999	782206	3						
96911	.	67000	5358894	20267						
190202	.	67000	9181313	20877						
255567	.	67000	10347118	13519						
85311	.	67000	4602271	6482						
46896	.	67000	2000260	561						
40307	.	67000	1427111	183						
75505	.	67000	3107401	101						
110496	.	67000	3923910	101						

---



REFERENCE

- (1) Czamanski, D. Z., and Biggs, G. T. "A Method for Computing the Main Benefits and Costs of Time-of-Use Rates for Colorado Electric Utilities", Section III of Electric Utility Time-of-Use and Interrup-  
tible Ratemaking and Power Pooling Issues in Colorado, NRRI 81-4,  
Columbus, Ohio: The National Regulatory Research Institute, August 1981.



## APPENDIX A

### SAMPLE OUTPUT

This appendix contains sample output of the BENCOST program. The sample output includes three tables. The first table is a table of revenue excesses or deficiencies. The second table is a table of monthly customer charges or credits. The third table is a table of net benefits of time-of-day rates.



POTOMAC EDISON COMPANY  
CASE NO. 79-230  
SEASON NO. 1

REVENUE EXCESS OR DEFICIENCY

V	RATE SCHD	COE (C/KWH)	ACP	PRICE			PRICE CHANGE			RESPONSE			ESTIMATED SALES				TOD REVENUE (\\$)	COMPANY REVENUE (\\$)	EXCESS (\\$)
				PEAK (C/KWH)	OFF-P PEAK (%)	OFF-P (%)	PEAK (MWH)	OFF-P (MWH)	SALE (MWH)	PEAK (MWH)	OFF-P (MWH)	REVENUE (\\$)							
1	PP	-0.2	2.925	3.979	1.480	36.03	-49.40	-9871	6665	204430	136968	67462	5980291	6154266	173975				
2	C	-0.2	4.724	4.522	1.684	-4.28	-64.35	0	5	127	84	43	5998	4606	-1392				
2	DL	-0.2	3.614	4.522	1.684	25.12	-53.40	-1044	1093	31017	20781	10236	1121042	1083286	-37756				
2	PH	-0.2	3.261	4.522	1.684	38.67	-48.36	-1242	765	23987	16071	7916	782206	816754	34548				
3	R	-0.2	5.530	4.664	1.736	-15.66	-68.61	2033	4388	96911	64930	31981	5358894	3754518	-1604376				
3	RW	-0.2	4.827	4.664	1.736	-3.38	-64.04	860	8038	190202	127435	62767	9181313	7212851	-1968462				
3	RA	-0.2	4.049	4.664	1.736	15.19	-57.13	-5201	9635	255567	171229	84338	10347118	9374915	-972203				
3	CW	-0.2	5.395	4.664	1.736	-13.55	-67.82	1548	3818	85311	57158	28153	4602271	3293063	-1309208				
3	CA	-0.2	4.265	4.664	1.736	9.36	-59.30	-587	1835	46896	31420	15476	2000260	1738569	-261691				
3	GA	-0.2	3.541	4.664	1.736	31.71	-50.97	-1712	1356	40307	27006	13301	1427111	1434156	7045				
3	PL	-0.2	4.115	4.664	1.736	13.34	-57.81	-1349	2881	75505	50588	24917	3107401	2779078	-328323				
3	PH	-0.2	3.551	4.664	1.736	31.34	-51.11	-4640	3727	110496	74032	36464	3923910	3934157	10247				

COE : CUSTOMER RESPONSE COEFFICIENT

TOD : REVENUE BASED ON MARGINAL OR EMBEDDED COST TIME-OF-DAY RATES

EXCESS : NEGATIVE EXCESS IS EQUAL TO DEFICIENCY



POTOMAC EDISON COMPANY  
CASE NO. 79-230  
SEASON NO. 1

CUSTOMER CHARGE/CREDIT

VOLTAGE LEVEL	RATE SCHEDULE	AVERAGE NUMBER OF CUSTOMERS	EXCESS (DEFICIENCY)	MONTHLY CUSTOMER CREDIT (OR CHARGE)		VOLTAGE LEVEL AVERAGE OF (4)
				(1)	(2)	
				(3)	(4)	(5)
				\$	\$	\$
1	PP	4	173975	3624.00	3627.40	3627.40
2	C	1	-1392	-116.00	-112.60	
2	DL	10	-37756	-314.00	-310.60	
2	PH	3	34548	959.00	962.40	-23.67
3	R	20267	-1604376	-6.00	-2.60	
3	RW	20877	-1968462	-7.00	-3.60	
3	RA	13519	-972203	-5.00	-1.60	-2.73
3	CW	6482	-1309208	-16.00	-12.60	
3	CA	561	-261691	-38.00	-34.60	
3	CA	183	7045	3.00	6.40	
3	PL	101	-328323	-270.00	-266.60	
3	PH	101	10247	8.00	11.40	-16.92

AVERAGE OF MONTHLY CUSTOMER  
CHARGE WITH METERING FOR  
ALL CUSTOMER CLASSES : -4.20

EXCESS : NEGATIVE EXCESS IS EQUAL TO DEFICIENCY  
CREDIT : NEGATIVE CREDIT IS EQUAL TO CHARGE



POTOMAC EDISON COMPANY  
CASE NO. 79-230  
SEASON NO. 1

NET BENEFITS OF TOD RATES

VOLTAGE LEVEL	RATE SCHEDULE	MARGINAL CAPACITY COSTS (\$/MWH)	PEAK CUSTOMER RESPONSE (MWH)	CAPACITY BENEFIT (COSTS) (\$)	ON/OFF ENERGY COST DIFFERENCE (\$/MWH)	PEAK ENERGY COST (\$)	ENERGY SAVINGS BENEFITS (\$)	ESTIMATED METERING COSTS (\$)	NET BENEFITS (\$)	BENEFIT/COST RATIO
13	1 PP	16.86	-9871	166425.	8.13	80251.	160	246516	1541.726	
	2 C	18.31	0	0.	10.07	0.	40	-40	0.0	
	2 DL	18.31	-1044	19116.	10.07	10513.	400	29228	74.072	
	2 PH	18.31	-1242	22741.	10.07	12507.	120	35127	293.733	
	3 R	18.73	2033	-38078.	10.56	-21468.	810680	-870226	-0.073	
	3 RW	18.73	860	-16108.	10.56	-9082.	835080	-860269	-0.030	
	3 RA	18.73	-5201	97415.	10.56	54923.	540760	-388422	0.282	
	3 CW	18.73	1548	-28994.	10.56	-16347.	259280	-304620	-0.175	
	3 CA	18.73	-587	10995.	10.56	6199.	22440	-5246	0.766	
	3 CA	18.73	-1712	32066.	10.56	18079.	7320	42824	6.850	
	3 PL	18.73	-1349	25267.	10.56	14245.	4040	35472	9.780	
	3 PH	18.73	-4640	86907.	10.56	48998.	4040	131865	33.640	

BENEFIT : NEGATIVE BENEFIT IS EQUAL TO COST



## APPENDIX B

### FORTRAN LISTING

This appendix contains the Fortran listing of the BENCOST source program.



BENCOST PROGRAM  
( BENEFIT/COST ANALYSIS OF TOD RATES )

THIS PROGRAM CALCULATES (1) REVENUE EXCESS OR DEFICIENCY, (2) MONTHLY CUSTOMER CHARGE OR CREDIT, (3) NET BENEFITS OF TIME-OF-DAY RATES. THESE THREE OBJECTIVES ARE ACHIEVED BY SUBROUTINES TOD1, TOD2, AND TOD3 RESPECTIVELY.

DEFINITION OF VARIABLES :

I NAME	-	NAME OF THE COMPANY
N CASE	-	CASE NUMBER
N SEN	-	NUMBER OF SEASONS
M ONTH	-	DURATION OF THE SEASON
N TPK	-	DURATION OF PEAK PERIOD
N TOFPK	-	DURATION OF OFF-PEAK PERIOD
N M	-	NUMBER OF CUSTOMER CLASSES
I V	-	VOLTAGE LEVEL
I RSCH E	-	RATE SCHEDULE
I CAT	-	VOLTAGE LEVEL AGGREGATE IDENTIFIER
A CP	-	AVERAGE COMPANY PRICE
P 1	-	PEAK PRICE
P 2	-	OFF-PEAK PRICE
C MC	-	MARGINAL CAPACITY COST
E CD	-	ON/OFF PEAK ENERGY COST DIFFERENCE
M ET	-	ESTIMATED METERING COST
C OE	-	CUSTOMER RESPONSE COEFFICIENT
D ELT	-	MONTHLY CUSTOMER CHARGES OF METERING
M SALE	-	SEASONAL MWH SALES
P EAK	-	ESTIMATED PEAK TO TOTAL SALES RATIO
M REV	-	REVENUE BASED ON CURRENT COMPANY RATES
N CUST	-	NUMBER OF CUSTOMERS IN EACH CLASS

COMMON /ONE/ NM, IV(15), ICAT(15), IRSCH E(15,2), NCUST(15), I NAME(14),  
+ COE(15), N CASE(6), IARAY(80), IP, DELT

COMMON /TWO/ ACP(15), P1(15), P2(15), MWRP(15), MWRO(15), MSALE(15),  
+ ECD(15), CMC(15), MET(15), PEAK(15), MSAL1(15),  
+ MSAL2(15), MREV(15), MTREV(15), MED(15)

COMMON /THRE/ NSEN, MONTH, NTPK, NTOFPK, IFLAG, NITE

READ(5,700) (I NAME(I), I=1,14)  
READ(5,710) (N CASE(I), I=1,6)

700 FORMAT(14A1)  
710 FORMAT(6A1)  
IP=99  
IFLAG=-1

READ INPUT DATA FROM UNIT 5

CALL GETI(NSEN)



```

C          LOOP FOR SEASON          00000690
C          DO 100 N=1,NSEN          00000700
C          NITE=N                  00000710
C          CALL GETI(MONTH)        00000720
C          CALL GETI(NTPK)         00000730
C          CALL GETI(NTOPFK)       00000740
C          CALL GETI(NM)          00000750
C          DO 60 I=1,NM          00000760
C          CALL GETI(IV(I))        00000770
C          IRSCH(I,1) = IARAY(3)   00000780
C          IRSCH(I,2) = IARAY(4)   00000790
C          IP = 5                 00000800
C          CALL GETI(ICAT(I))      00000810
C          CALL GETX(ACP(I))       00000820
C          CALL GETX(P1(I))        00000830
C          CALL GETX(P2(I))        00000840
C          CALL GETX(CMC(I))       00000850
C          CALL GETX(ECD(I))       00000860
C          CALL GETI(MET(I))        00000870
C          CALL GETX(COE(I))        00000880
C          CALL GETX(DELT)         00000890
C          60 CONTINUE              00000900
C          DO 70 I=1,NM          00000910
C          CALL GETI(MSALE(I))     00000920
C          CALL GETX(PEAK(I))      00000930
C          CALL GETI(MREV(I))       00000940
C          CALL GETI(NCUST(I))     00000950
C          70 CONTINUE              00000960
C          CALL TOD1                00000970
C          CHECK FOR PEAK CHASING CONSTRAINT 00000980
C          IF(IFLAG.GT.0) GO TO 900 00000990
C          CALL TOD2                00001000
C          CALL TOD3                00001010
C          100 CONTINUE              00001020
C          900 STOP                 00001030
C          END                      00001040
C*****SUBROUTINE TOD1***** 00001050
C          COMMON /ONE/ NM, IV(15), ICAT(15), IRSCH(15,2), NCUST(15), INAME(14), 00001060
C          + COE(15), NCASE(6), IARAY(80), IP, DELT 00001070
C          COMMON /TWO/ ACP(15), P1(15), P2(15), MWRP(15), MWRO(15), MSALE(15), 00001080
C          + ECD(15), CMC(15), MET(15), PEAK(15), MSAL1(15), 00001090
C          + MSAL2(15), MREV(15), MTREV(15), MED(15) 00001100
C          COMMON /THRE/ NSEN, MONTH, NTPK, NTOPFK, IFLAG, NITE 00001110
C          DIMENSION PC1(15), PC2(15) 00001120
C          WRITE(6,100) (INAME(I), I=1,14), (NCASE(I), I=1,6), NITE 00001130
C          100 FORMAT ('1', //////////////, 42X, 14A1, ' COMPANY'// 00001140
C          *46X, 'CASE NO. ', 6A1// 00001150
C          *46X, 'SEASON NO. ', I1// 00001160
C          *39X, 'REVENUE EXCESS OR DEFICIENCY'///) 00001170

```



```

        WRITE(6,2000)
2000 FORMAT(108(1H-))
        WRITE(6,110)
110 FORMAT(67X, 'ESTIMATED'/
*5X, 'RATE', 16X, 'PRICE', 5X, 'PRICE CHANGE', 3X, 'RESPONSE' ,
*11X, 'SALES', 9X, 'TOD', 4X, 'COMPANY'/
*3X, 'V SCHD COE ACP PEAK OFF-P PEAK OFF-P PEAK OFF-P' ,
*2X, 'SALE PEAK OFF-P REVENUE REVENUE EXCESS')
        WRITE(6,120)
120 FORMAT(13X, '(C/KWH) (C/KWH) (%) (%)', 4X, '(MWH)', 1X,
+'(MWH)', 2X, '(MWH)', 1X, '(MWH)', 3X, '(MWH)', 3X, '(S)', ,
*6X, '(S)', 6X, '(S)')
        WRITE(6,2000)
        DO 1000 I=1,NM
C
C
C
C
C PERCENT PRICE CHANGE
C
C
C
C
C PC1(I)=(P1(I)-ACP(I))/ACP(I)*100.0
PC2(I)=(P2(I)-ACP(I))/ACP(I)*100.0
C
C
C CUSTOMER RESPONSES
C
C
C
C
C MSAL1(I)=MSALE(I)*PEAK(I)
IY1=(COE(I)*PC1(I)/100.0)*MSAL1(I)
MSAL2(I)=MSALE(I)-MSAL1(I)
IY2=(COE(I)*PC2(I)/100.0)*MSAL2(I)
C1=MSAL1(I)/NTPK
C2=MSAL2(I)/NTOPK
D1=IY1/NTPK
D2=IY2/NTOPK
C1=C1+D1
C2=C2+D2
C
C
C
C
C PEAK CHASING CHECK
C
C
C
C
C IF(C1.LT.C2) GO TO 5000
MWRP(I)=IY1
MWRO(I)=IY2
C
C
C TOD REVENUE CALCULATION
C
C
C
C
C MTREV(I)=(P1(I)*(MSAL1(I)+IY1)+P2(I)*(MSAL2(I)+IY2))*10
MED(I)=MTREV(I)-MREV(I)
IX=IV(I)
IF(I.EQ.1) GO TO 1001
IF(IX.EQ.IXB) GO TO 1001
WRITE(6,240) IV(I), (IRSCHE(I,N), N=1,2), COE(I), ACP(I), P1(I), P2(I),
*PC1(I), PC2(I), MWRP(I), MWRO(I), MSALE(I), MSAL1(I),
*MSAL2(I), MREV(I), MTREV(I), MED(I)
240 FORMAT('/', '0', 2X, I1, 2X, 2A1, F5.1, F6.3, F6.3, 1X, F6.3, F6.2,
*F7.2, I7, I6, I7, I7, I7, I9, I9, I9)
IXB=IX
GO TO 1000
1001 IXB=IX
WRITE(6,230) IV(I), (IRSCHE(I,N), N=1,2), COE(I), ACP(I), P1(I), P2(I),
*PC1(I), PC2(I), MWRP(I), MWRO(I), MSALE(I), MSAL1(I),
*MSAL2(I), MREV(I), MTREV(I), MED(I)
230 FORMAT('0', 2X, I1, 2X, 2A1, F5.1, F6.3, F6.3, 1X, F6.3, F6.2,
*F7.2, I7, I6, I7, I7, I7, I9, I9, I9)
1000 CONTINUE

```



```

        WRITE(6,2000)                                     00002050
        WRITE(6,2100)                                     00002060
2100  FORMAT('//5X,'COE : CUSTOMER RESPONSE COEFFICIENT'/
+5X,'TOD : REVENUE BASED ON MARGINAL OR EMBEDDED COST TIME-OF-DAY',00002070
+5X,'RATES'/
+5X,'EXCESS : NEGATIVE EXCESS IS EQUAL TO DEFICIENCY') 00002080
      GO TO 6000                                         00002090
5000  IFLAG=10                                         00002100
      WRITE(6,2200) ((IRSCHE(I,N),N=1,2)                00002110
2200  FORMAT('//,1X,'*** EXECUTION TERMINATED ***'//    00002120
*5X,'PEAK CHASING OCCURRED IN SCHEDULE : ',2A1/       00002130
*5X,'RERUN WITH ADJUSTMENT EITHER ON PERIOD DURATION'/
*5X,'OR PRICE DIFFERENTIAL'///)                         00002140
      00002150
      00002160
      00002170
6000  RETURN                                           00002180
      END                                              00002190
C*****SUBROUTINE TOD2                                00002200
C      SUBROUTINE TOD2                                00002210
C      COMMON /ONE/ NM, IV(15), ICAT(15), IRSCHE(15,2), NCUST(15), INAME(14), 00002220
C      +          COE(15), NCASE(6), IARAY(80), IP, DELT   00002230
C
C      COMMON /TWO/ ACP(15), P1(15), P2(15), MWRP(15), MWRO(15), MSALE(15), 00002240
C      +          ECD(15), CMC(15), MET(15), PEAK(15), NSAL1(15), 00002250
C      +          NSAL2(15), MREV(15), MTREV(15), MED(15)   00002260
C
C      COMMON /THRE/ NSEN, MONTH, NTPK, NTOFPK, IFLAG, NITE 00002270
C
C      DIMENSION CC1(15),CC2(15),ITOT(15)                 00002280
C      DOUBLE PRECISION VA(15), Z                         00002290
C      WRITE(6,20) (INAME(I),I=1,14),(NCASE(I),I=1,6),NITE 00002300
20   FORMAT ('1',/////////,24X,14A1,' COMPANY'/
*28X,'CASE NO. ',6A1/                                 00002310
*28X,'SEASON NO. ',11//                               00002320
*24X,'CUSTOMER CHARGE/CREDIT'///)                     00002330
      WRITE(6,1000)                                       00002340
1000  FORMAT(82(1H-))
      WRITE(6,30)                                         00002350
30   FORMAT ('0', 43X, 'MONTHLY CUSTOMER'/
*22X, 'AVERAGE', 15X, 'CREDIT OR (CHARGE)' ,/
*2X, 'VOLTAGE RATE', 5X, 'NUMBER OF EXCESS ', 3X,'WITHOUT', 00002360
*5X, 'WITH', 5X,'VOLTAGE LEVEL'/
*3X, 'LEVEL SCHEDULE CUSTOMERS (DEFICIENCY) METERING METERING',00002370
*2X, 'AGGREGATE OF (4)',/
*24X, '(1)', 8X, '(2)', 8X, '(3)', 7X, '(4)', 8X, '(5)'/
*35X, '(S)', 8X, '(S)', 7X, '(S)', 8X, '(S)' )      00002380
      WRITE(6,1000)                                       00002390
      DO 25 K=1,NM
      L= ICAT(K)
C
C      CUSTOMER CHARGES WITHOUT METERING               00002400
C
C      CC1(K)=MED(K)/(NCUST(K)*MONTH)                  00002410
C
C      CUSTOMER CHARGES WITH METERING                  00002420
C
C      CC2(K)=CC1(K)+DELT                            00002430
C      ITOT(L)=ITOT(L)+NCUST(K)                        00002440
C      VA(L)=VA(L)+DBLE(CC2(K))*DFLOAT(NCUST(K))     00002450
25   CONTINUE                                         00002460
C
C      LMAX= ICAT(NM)                                  00002470
C

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C          VOLTAGE LEVEL AGGREGATE          00002730
C          DO 35 L=1,LMAX                  00002740
C          VA(L)=VA(L)/DFLOAT( ITOT(L) )  00002750
C          35 CONTINUE                      00002760
C          DO 36 L=1,LMAX                  00002770
C          ICU= ICU+ ITOT(L)              00002780
C          Z=Z+VA(L)*DFLOAT( ITOT(L) )    00002790
C          36 CONTINUE                      00002800
C          ICU=0                         00002810
C          Z=0.0D00                      00002820
C          DO 36 L=1,LMAX                  00002830
C          ICU= ICU+ ITOT(L)              00002840
C          Z=Z+VA(L)*DFLOAT( ITOT(L) )    00002850
C          36 CONTINUE                      00002860
C          Z=Z/DFLOAT( ICU )              00002870
C          DO 40 K=1,NM                  00002880
C          IX= ICAT(K)                  00002890
C          IF(K.EQ.1) GO TO 50            00002900
C          IF(IX.NE.IXB) GO TO 60        00002910
C          J=K-1                        00002920
C          WRITE(6,200) IV(J),(IRSCHE(J,N),N=1,2),NCUST(J),MED(J),CC1(J),
C          +CC2(J)                      00002930
C          200 FORMAT(5X,I1,7X,2A1,8X,I5,6X,I8,2X,F8.2,2X,F8.2)
C          GO TO 40                      00002940
C          60 J=K-1                      00002950
C          JJ= ICAT(J)                  00002960
C          WRITE(6,210) IV(J),(IRSCHE(J,N),N=1,2),NCUST(J),MED(J),CC1(J),
C          +CC2(J),VA(JJ)                00002970
C          210 FORMAT(5X,I1,7X,2A1,8X,I5,6X,I8,2X,F8.2,2X,F8.2,4X,F8.2)
C          IXB= ICAT(K)                00002980
C          GO TO 40                      00002990
C          50 IXB= IX                     00003000
C          40 CONTINUE                    00003010
C          K=NM                         00003020
C          WRITE(6,210) IV(K),(IRSCHE(K,N),N=1,2),NCUST(K),MED(K),CC1(K),
C          +CC2(K),VA(LMAX)             00003030
C          WRITE(6,1000)                 00003040
C          50 IXB= IX                     00003050
C          40 CONTINUE                    00003060
C          50 IXB= IX                     00003070
C          40 CONTINUE                    00003080
C          K=NM                         00003090
C          WRITE(6,210) IV(K),(IRSCHE(K,N),N=1,2),NCUST(K),MED(K),CC1(K),
C          +CC2(K),VA(LMAX)             00003100
C          WRITE(6,1000)                 00003110
C          50 IXB= IX                     00003120
C          40 CONTINUE                    00003130
C          K=NM                         00003140
C          WRITE(6,210) IV(K),(IRSCHE(K,N),N=1,2),NCUST(K),MED(K),CC1(K),
C          +CC2(K),VA(LMAX)             00003150
C          WRITE(6,1000)                 00003160
C          50 IXB= IX                     00003170
C          40 CONTINUE                    00003180
C          220 FORMAT(/36X,'AVERAGE OF MONTHLY CUSTOMER'/
C          *36X,'CHARGE WITH METERING FOR'/
C          *36X,'ALL CUSTOMER CLASSES',7X,':',2X,F8.2)
C          WRITE(6,1000)                 00003190
C          220 FORMAT(/,4X,'EXCESS : NEGATIVE EXCESS IS EQUAL TO DEFICIENCY'/
C          *4X,'CREDIT : NEGATIVE CREDIT IS EQUAL TO CHARGE'/)
C          230 FORMAT(/,4X,'EXCESS : NEGATIVE EXCESS IS EQUAL TO DEFICIENCY'/
C          *4X,'CREDIT : NEGATIVE CREDIT IS EQUAL TO CHARGE'/) 00003200
C          RETURN                        00003210
C          END                           00003220
C          ****SUBROUTINE TOD3****      00003230
C          ****SUBROUTINE TOD3****      00003240
C          ****SUBROUTINE TOD3****      00003250
C          ****SUBROUTINE TOD3****      00003260
C          ****SUBROUTINE TOD3****      00003270
C          ****SUBROUTINE TOD3****      00003280
C          ****SUBROUTINE TOD3****      00003290
C          ****SUBROUTINE TOD3****      00003300
C          ****SUBROUTINE TOD3****      00003310
C          ****SUBROUTINE TOD3****      00003320
C          COMMON /ONE/ NM,IV(15),ICAT(15),IRSCHE(15,2),NCUST(15),INAME(14),
C          + COE(15),NCASE(6),IARAY(80),IP,DELT 00003330
C          COMMON /TWO/ ACP(15),P1(15),P2(15),MWRP(15),MWRO(15),MSALE(15),
C          + ECD(15),CMC(15),MET(15),PEAK(15),MSAL1(15), 00003340
C          + MSAL2(15),MREV(15),MTREV(15),MED(15)   00003350
C          COMMON /TWO/ ACP(15),P1(15),P2(15),MWRP(15),MWRO(15),MSALE(15),
C          + ECD(15),CMC(15),MET(15),PEAK(15),MSAL1(15), 00003360
C          + MSAL2(15),MREV(15),MTREV(15),MED(15)   00003370
C          COMMON /TWO/ ACP(15),P1(15),P2(15),MWRP(15),MWRO(15),MSALE(15),
C          + ECD(15),CMC(15),MET(15),PEAK(15),MSAL1(15), 00003380
C          + MSAL2(15),MREV(15),MTREV(15),MED(15)   00003390
C          COMMON /TWO/ ACP(15),P1(15),P2(15),MWRP(15),MWRO(15),MSALE(15),
C          + ECD(15),CMC(15),MET(15),PEAK(15),MSAL1(15), 00003400
C          + MSAL2(15),MREV(15),MTREV(15),MED(15)

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COMMON /THRE/ NSEN, MONTH, NTPK, NTOFPK, IFLAG, NITE          00003410
C
C
DIMENSION NB(15)                                         00003420
DOUBLE PRECISION ESB(15), CB(15)                         00003430
WRITE(6,800) (INAME(I), I=1,14), (NCASE(I), I=1,6), NITE   00003440
800 FORMAT('1', //////////////, 35X, 14A1, ' COMPANY'/
*39X, 'CASE NO. ', 6A1/                                     00003450
*39X, 'SEASON NO. ', 11//                                    00003460
*34X, 'NET BENEFITS OF TOD RATES'///                      00003470
WRITE(6,1000)                                              00003480
1000 FORMAT(115(1H-))
WRITE(6,810)                                              00003490
810 FORMAT(21X, 'MARGINAL', 4X, 'PEAK      CAPACITY ON/OFF PEAK',
*3X, 'ENERGY ESTIMATED'/
*2X, 'VOLTAGE RATE CAPACITY CUSTOMER BENEFIT ENERGY',
*1X, 'COST SAVINGS METERING NET BENEFIT/COST',
*3X, 'LEVEL SCHEDULE COSTS RESPONSE (COSTS) DIFFERENCE',
*3X, 'BENEFITS COSTS BENEFITS RATIO'/
*21X, '($/MWH) (MWH) ($)', 7X, '($/MWH) ($)', 7X,
*'(S) ($)'                                                 00003500
WRITE(6,1000)                                              00003510
DO 3000 I=1,NM                                           00003520
C
C
CAPACITY & ENERGY SAVINGS BENEFITS                     00003530
C
C
CB(I)=DBLE(CMC(I))*DFLOAT(MWRP(I))*(-1.0)           00003540
ESB(I)=DBLE(ECD(I))*DFLOAT(MWRP(I))*(-1.0)           00003550
NB(I)=CB(I)+ESB(I)-MET(I)                            00003560
C
C
BENEFIT/COST RATIO                                     00003570
C
C
R=(CB(I)+ESB(I))/MET(I)                                00003580
IX=IV(I)
IF(I.EQ.1) GO TO 2000                                  00003590
IF(IX.EQ.IXB) GO TO 2000                               00003600
WRITE(6,930) IV(I), (IRSCHE(I,N),N=1,2), CMC(I), MWRP(I), CB(I), ECD(I),
+ESB(I), MET(I), NB(I), R                               00003610
930  FORMAT ('/, '0', 4X, I1, 8X, 2A1, 6X, F5.2, 5X, I6, 3X, F8.0, 5X,
* F5.2, 6X, F7.0, 4X, I7, 2X, I8, 5X, F10.3)        00003620
IXB=IX
GO TO 3000
2000 IXB=IX
WRITE(6,920) IV(I), (IRSCHE(I,N),N=1,2), CMC(I), MWRP(I), CB(I), ECD(I),
+ESB(I), MET(I), NB(I), R                               00003630
920  FORMAT ('0', 4X, I1, 8X, 2A1, 6X, F5.2, 5X, I6, 3X, F8.0, 5X,
* F5.2, 6X, F7.0, 4X, I7, 2X, I8, 5X, F10.3)        00003640
3000 CONTINUE
WRITE(6,1000)                                          00003650
C
C
WRITE(6,1100)                                          00003660
1100 FORMAT('//,4X, 'BENEFIT : NEGATIVE BENEFIT IS EQUAL TO COST'//)
RETURN
END
C
SUBROUTINE GETI(IVALU)                                 00003670
C
C
COMMON /ONE/ NM, IV(15), ICAT(15), IRSCHE(15,2), NCUST(15), INAME(14),
+ COE(15), NCASE(6), IARAY(80), IP, DELT              00003680
COMMON /TWO/ ACP(15), P1(15), P2(15), MWRP(15), MWRO(15), MSALE(15),
+ ECD(15), CMC(15), MET(15), PEAK(15), MSAL1(15),
+ MSAL2(15), MREV(15), MTREV(15), MED(15)            00003690

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C COMMON /THRE/ NSEN, MONTH, NTPK, NTOFPK, IFLAG, NITE          00004090
C DIMENSION NUMB(10)                                         00004100
C DATA NUMB/'0','1','2','3','4','5','6','7','8','9'           00004110
C DATA MBLNK//,MCOMA//,MDASH//,MPLUS//                   00004120
C DATA MC/'C'                                                 00004130
C IF( IP=80)30,30,10                                         00004140
10 READ(5,20)IARAY                                         00004150
20 FORMAT(80A1)                                             00004160
IF( IARAY(1).EQ.MC)GO TO 10                                00004170
IP=1                                                       00004180
30 NECSW=+1                                                 00004190
IVALU=0                                                   00004200
DO 150 IPOS= IP,80                                         00004210
ICHAR= IARAY( IPOS)                                         00004220
IF( ICHAR-MBLNK) 110,150,110                               00004230
110 IF( ICHAR-MCOMA) 120,150,120                           00004240
120 IF( ICHAR-MPLUS) 130,150,130                           00004250
130 IF( ICHAR-MDASH) 175,140,175                           00004260
140 NECSW=-1                                               00004270
150 CONTINUE                                              00004280
GO TO 10                                                 00004290
175 DO 200 N= 1,10                                         00004300
IF( ICHAR-NUMB(N))200,250,200                           00004310
200 CONTINUE                                              00004320
GO TO 300                                                00004330
250 IVALU= IVALU*10+N-1                                 00004340
IPOS= IPOS+1                                             00004350
IF( IPOS=80)260,260,300                                 00004360
260 ICHAR= IARAY( IPOS)                                 00004370
GO TO 175                                                00004380
300 IVALU=NECSW*IVALU                                  00004390
IP= IPOS                                              00004400
RETURN                                                 00004410
END                                                       00004420
00004430
C
C -----
C SUBROUTINE GETX( VALUE)
C -----
C
C COMMON /ONE/ NM, IV( 15), ICAT( 15), IRSCHE( 15,2), NCUST( 15), INAME( 14), 00004520
C + COE( 15), NCASE( 6), IARAY(80), IP, DELT               00004530
C COMMON /TWO/ ACP( 15), P1( 15), P2( 15), MWRP( 15), MWRO( 15), MSALE( 15), 00004540
C + ECD( 15), CMC( 15), MET( 15), PEAK( 15), MSAL1( 15), 00004550
C + MSAL2( 15), MREV( 15), MTREV( 15), MED( 15)        00004560
C COMMON /THRE/ NSEN, MONTH, NTPK, NTOFPK, IFLAG, NITE          00004570
C
C DIMENSION NUMB( 10)                                         00004580
C DATA NUMB/'0','1','2','3','4','5','6','7','8','9'           00004590
C DATA MBLNK//,MCOMA//,MDASH//,MPLUS//                   00004600
C DATA MDECM//,ME/'E'/'                                     00004610
C DATA MC/'C'                                                 00004620
C IF( IP=80)30,30,10                                         00004630
10 READ(5,20)IARAY                                         00004640
20 FORMAT(80A1)                                             00004650
IF( IARAY(1).EQ.MC)GO TO 10                                00004660
IP=1                                                       00004670
30 NECEX=+1                                                 00004680
NECEX=+1                                                 00004690
NDEC=0                                                   00004700
NEXP=0                                                   00004710
NPNT=0                                                   00004720
VALUE=0                                                   00004730
DO 150 IPOS= IP,80                                         00004740
ICHAR= IARAY( IPOS)                                         00004750
00004760

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110	IF( ICHAR-MBLNK) 110, 150, 110	00004770
110	IF( ICHAR-MCOMA) 120, 150, 120	00004780
120	IF( ICHAR-MPLUS) 130, 150, 130	00004790
130	IF( ICHAR-MDASH) 175, 140, 175	00004800
140	NEGSW=-1	00004810
150	CONTINUE	00004820
	GO TO 10	00004830
C		00004840
175	IF( NPNT) 190, 190, 200	00004850
190	IF( ICHAR-MDECMD 200, 195, 200	00004860
195	NPNT= 1	00004870
	GO TO 350	00004880
200	IF( ICHAR-ME) 300, 205, 300	00004890
C		00004900
205	IF( IARAY( IPOS+1)-MDASH) 208, 206, 208	00004910
206	NEGEX=-1	00004920
	IPOS= IPOS+1	00004930
208	IPOS= IPOS+1	00004940
	IF( IPOS-80) 210, 210, 400	00004950
210	ICHAR= IARAY( IPOS)	00004960
	DO 220 N= 1, 10	00004970
	IF( ICHAR-NUMB(N)) 220, 230, 220	00004980
220	CONTINUE	00004990
	GO TO 400	00005000
230	NEXP=NEXP*10+(N-1)	00005010
	GO TO 208	00005020
C		00005030
300	DO 310 N= 1, 10	00005040
	IF( ICHAR-NUMB(N)) 310, 320, 310	00005050
310	CONTINUE	00005060
	GO TO 400	00005070
320	VALUE= VALUE*10.+ (N-1)	00005080
	IF( NPNT) 350, 350, 330	00005090
330	NDEC=NDEC+1	00005100
350	IPOS= IPOS+1	00005110
	IF( IPOS-80) 370, 370, 400	00005120
370	ICHAR= IARAY( IPOS)	00005130
	GO TO 175	00005140
400	NEXP=NEXP*NEGEX	00005150
	VALUE= NEGSW*VALUE*( 10.**NEXP)/( 10.**NDEC)	00005160
	IP= IPOS	00005170
	RETURN	00005180
	END	00005190

