

Screen 038

	A1	0									
	Open	A	B	C	D	E	F	G	H	I	
1	0	TODTOE	TODTOE	RPOON							
2	1985	35561	17592								
3	1986	36765	175695461								
4	1987	41965	36765	197978437							
5	1988	47559	41965	210195360							
6	1989	53868	47559	229372937							
7	1990	55430	53868	248400000							
8	1991	50662	55430	254547135							
9	1992	47853	50662	272159789							
10	1993	48141	47853	288675283							
11	1994	44641	48141	303686983							
12	1995	45082	44641	317459191							
13											
14											
15		LOG	LOG	LOG							
16	1985	4.5510	TODTOE	LOG	4.2453						
17	1986	4.5654	4.5510	4.2448							
18	1987	4.6229	4.5654	4.2966							
19	1988	4.6772	4.6229	4.3226							
20	1989	4.7313	4.6772	4.3605							
21	1990	4.7437	4.7313	4.3952							
22	1991	4.7047	4.7437	4.4058							
23	1992	4.6789	4.7047	4.4348							
24	1993	4.6825	4.6789	4.4604							
25	1994	4.6497	4.6825	4.4824							
26	1995	4.6540	4.6497	4.5017							

TCDTTOE

Screen 039

Microsoft Excel - REGE_Macro												
File Edit View Insert Format Tools Data Window Help												
E14												
	A	B	C	D	E	F	G	H				
1	0	TCDTOE	TCDTOE(-1)	WAGSKL/OPIM	TCDTOE	0	1985	1986	1			
2	1985	35561	TCDTOE	21	TCDTOE		35561	36765	4			
3	1986	36765	35561	22.1739	TCDTOE(-1)	TCDTOE	TCDTOE	35561	4			
4	1987	41965	36765	29.0223	WAGSKL/OPIM	21	21	35561	3C			
5	1988	47559	41965	35.9974				22				
6	1989	53868	47559	37.8547								
7	1990	55430	53868	35.2400								
8	1991	50662	55430	38.1308								
9	1992	47853	50662	40.4464								
10	1993	48141	47853	38.6885								
11	1994	44641	48141	38.9079								
12	1995	45082	44641	39.4839								
13												
14												
15		LOG	LOG	LOG								
16	1985	4.5510		1.3240								
17	1986	4.5654	4.5510	1.3458								
18	1987	4.6229	4.5654	1.4627								
19	1988	4.6772	4.6229	1.5563								
20	1989	4.7313	4.6772	1.5781								
21	1990	4.7437	4.7313	1.5470								
22	1991	4.7047	4.7437	1.5813								
23	1992	4.6799	4.7047	1.6069								
24	1993	4.6825	4.6799	1.5877								
25	1994	4.6497	4.6825	1.5900								
26	1995	4.6540	4.6497	1.5964								
= (A1+TCDTOE)/TCGAS / TCIDE / GCDEE / TCDOE / TCDOE / ICDTOE / ICDTOE												

TCDTOE2

Screen 040

```
Microsoft Excel - REGE Macro
File Edit View Insert Run Tools Window Help
[Icons] [Address Bar] [Formula Bar]

1
2 Macro3 Macro
3 Macro recorded 5/23/96 by consultants
4
5
6
7
8 Sub TCITOE ()
9
10 Border cut
11
12 Range("A29:Q351").Select
13 Selection.Borders(xlLeft).LineStyle = xlNone
14 Selection.Borders(xlRight).LineStyle = xlNone
15 Selection.Borders(xlTop).LineStyle = xlNone
16 Selection.Borders(xlBottom).LineStyle = xlNone
17 Selection.BorderAround LineStyle:=xlNone
18
19 Data Select
20
21 Range("E1:P4").Select
22 Selection.Copy
23 Range("A1").Select
24 Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, _
    SkipBlanks:=False, Transpose:=True
25
26 Reg start
27
28 [Icons] [Address Bar] [Formula Bar] [TCITOE] [PROE] [Print]
```

(15) PROA

(Refer to Screen 041)

This sheet contains the code representing computational processes used for regression analysis for execution as a macro command. Historical values transferred from the **Eng** sheet are read into the prescribed cells and this data is automatically copied vertically into cells on the same page. Finally, a single macro command is included for converting these values into natural logarithms. This is the sheet which contains the code for this macro command. Note that this macro program must be rewritten if the user wishes to change this file to create a regression analysis tool based on other methods or if the user wishes to change this file to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

(16) MacRecord

(Refer to Screen 042)

The **MacRecord** sheet is a screen containing the macro program code for calling up all files. In other words, in order to call up another file from the **REGE_Macro.XLS** file currently open, you first return to **Main_Menu.XLS** and then select any one of the files from the menu screen. This macro program must be rewritten if the user wishes to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

4.8 Conversion_Factor.XLS File

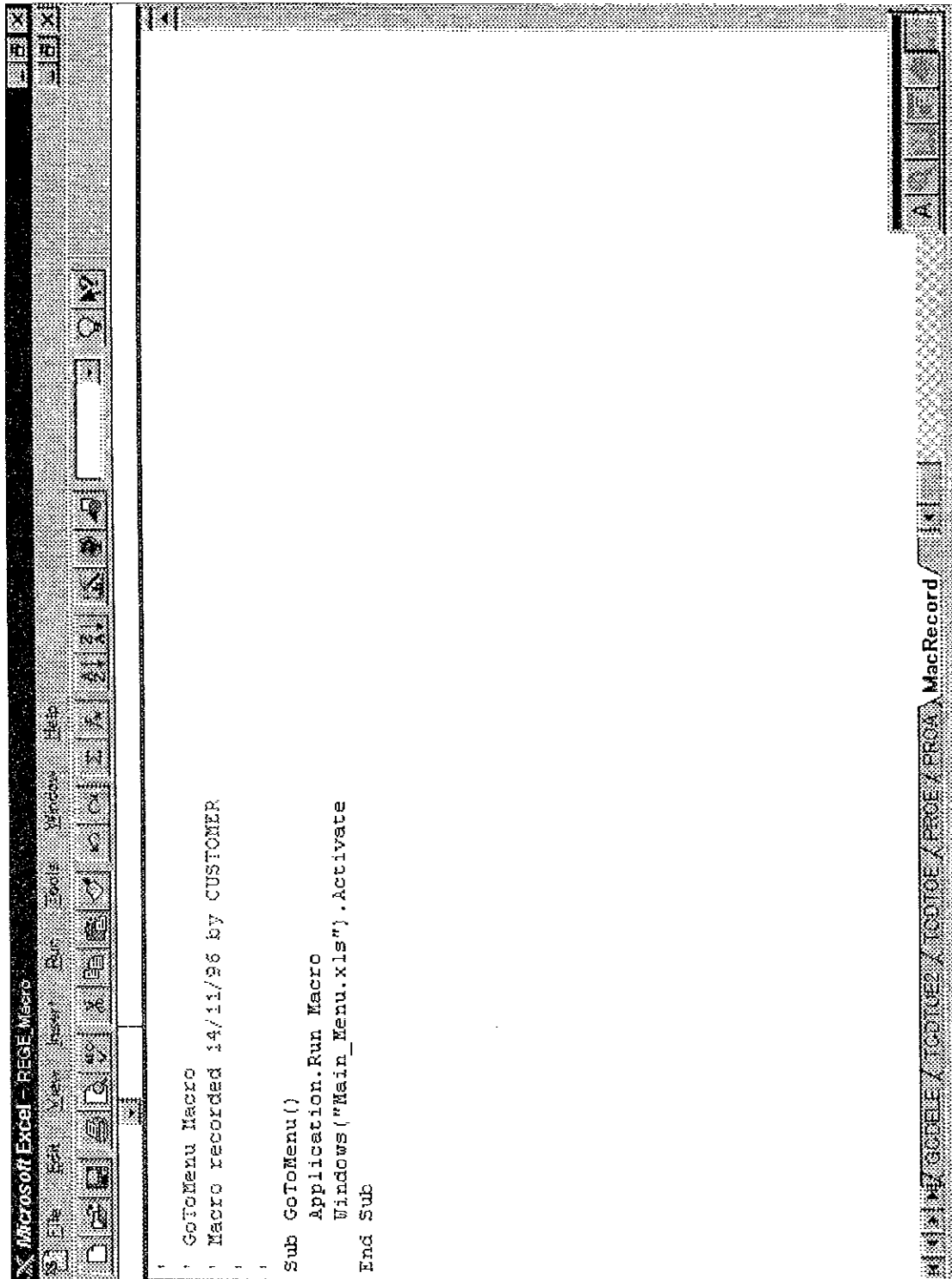
Conversion_Factors.XLS is a file which converts various different types of energy resources into TOE. In the implementation of this database TOE is assumed to be constant from the present time into the future.

Figure 4-7 shows the structure of these sheets.

Screen 041

```
Microsoft Excel - RESE Macro
File Edit View Insert Format Tools Window Help
[Toolbar icons]
Energy Demand Model (1) User ID : JICA
Sub ARTV ()
Border cut
Range("A29:Q351").Select
Selection.Borders(xlLeft).LineStyle = xlNone
Selection.Borders(xlRight).LineStyle = xlNone
Selection.Borders(xlTop).LineStyle = xlNone
Selection.Borders(xlBottom).LineStyle = xlNone
Selection.BorderAround LineStyle:=xlNone
Data Select
Range("E1:P4").Select
Selection.Copy
Range("A1").Select
Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone,
SkipBlanks:=False, Transpose:=True
Reg start
Range("A29:Z1000").Select
Selection.ClearContents
Selection.NumberFormat = "0.0000_";[RED](0.0000)
[Status bar: A1 | V | CTODIE / CODELE / TCDT0E2 / TDDTDE / PROE / PROA / USER / 14]
```

Screen 042



MacRecord

(1) ConversionFactor

(Refer to Screen 043)

This file is also created basically by transferring (copying) data included in **Energy_Case_01.XLS**. If any changes therefore occur in the values of energy conversion rates included in **Energy_Case_01.XLS** the system is set so that the numeric values in this file are automatically updated to reflect these changes.

(2) MacRecord

(Refer to Screen 044)

The **MacRecord** sheet is a screen containing the macro program code for calling up all files. In other words, in order to call up another file from the **Conversion_Factor.XLS** file currently open, you first return to **Main_Menu.XLS** and then select any one of the files from the menu screen. This macro program must be rewritten if the user wishes to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

4.9 Abbreviations_List.XLS File

Approximately 350 abbreviations are included in the energy database. These character strings are used within the database as character variables. This file was created because the number of these abbreviations is quite high and it would be practically impossible for a user of the database to memorize them all. This allows users searching for computational formulas for forecasting demand to easily look up the meaning of these abbreviations merely by accessing this file.

Print-outs of these abbreviations are listed and attached as an appendix in the last section of this operation manual so that the operators are able to refer instantly even during

Microsoft Excel - Conversion Factor

File Edit View Format Tools Data Window Help

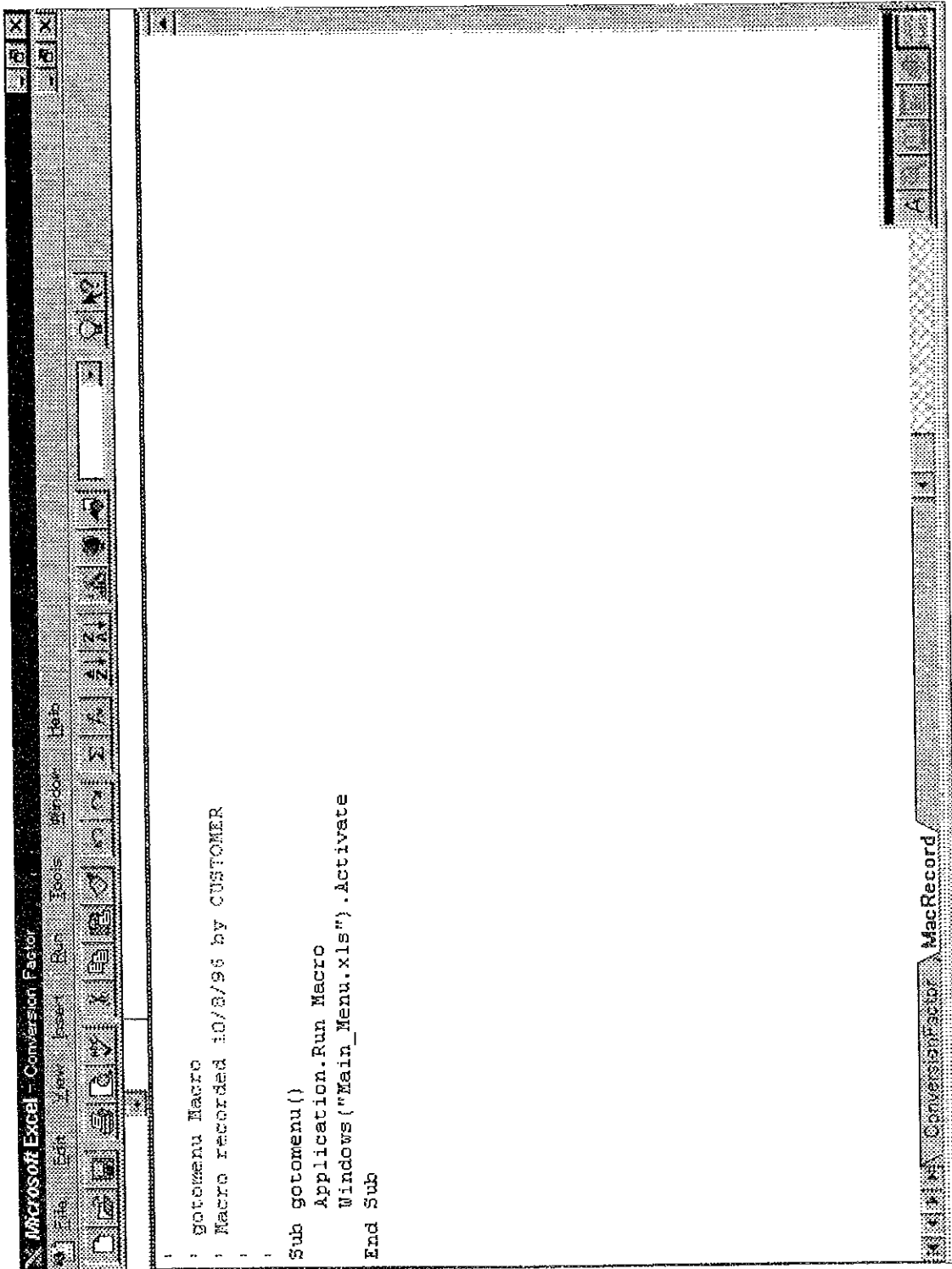
75%

Conversion Factor

Conversion Factors		
Gasoline (0.7440 Kg / L, 1.344 Kl / Ton, 10500 Kcal / Kg)	TOE / T	1.080
Diesel (0.8463 Kg / L, 1.1816 Kl / Ton, 10200 Kcal / Kg)	TOE / T	1.010
Kerosene (0.7973 Kg / L, 1.2542 Kl / Ton, 10343 Kcal / Kg)	TOE / T	1.040
Fuel oil (0.9516 Kg / L, 1.0508 Kl / Ton, 9627 Kcal / Kg)	TOE / T	0.960
LPG (10812 Kcal / Kg)	TOE / T	1.080
Jet Fuel	TOE / T	1.040
Coal (6151 Kcal / Kg)	TOE / T	0.620
Bagasse (1851 Kcal / Kg)	TOE / T	0.160
Fuel Wood	TOE / T	0.380
Charcoal	TOE / T	0.740
Electricity (860 Kcal / Kwh)	TOE / Mw	0.086
Hydro Electricity	TOE / Mw	0.220

ConversionFactor

Screen 044



MacRecord

operation of the database without changing screens in the monitor display of the systems.

Figure 4-8 shows the structure of these sheets.

(1) Abbrev.

(Refer to Screen 045)

This sheet contains the approximately 350 abbreviations mentioned above. Although this sheet is also formed by data transfer from **Energy_Case_01.XLS**, the user must add any new abbreviations to this file which may come to be used within **Energy_Case_01.XLS** in the future as this file is not automatically updated by direct links to **Energy_Case_01.XLS**. The user must find the alphabetical order location in the file for the new abbreviation and enter it and its associated meaning at that point.

(2) MacRecord

(Refer to Screen 046)

The **MacRecord** sheet is a screen containing the macro program code for calling up all files. In other words, in order to call up another file from the **Abbreviations_List.XLS** file currently open, you first return to **Main_Menu.XLS** and then select any one of the files from the menu screen. This macro program must be rewritten if the user wishes to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

4.10 Base_Case.XLS File

Figure 4-9 shows the structure of the sheets contained in the file.

The file **Base_Case.XLS** basically has the exact same file format and structure as the file

Microsoft Excel - Abbreviations List

File Edit View Insert Format Tools Data Window Help

ABBREVIATIONS IN THE DATABASE

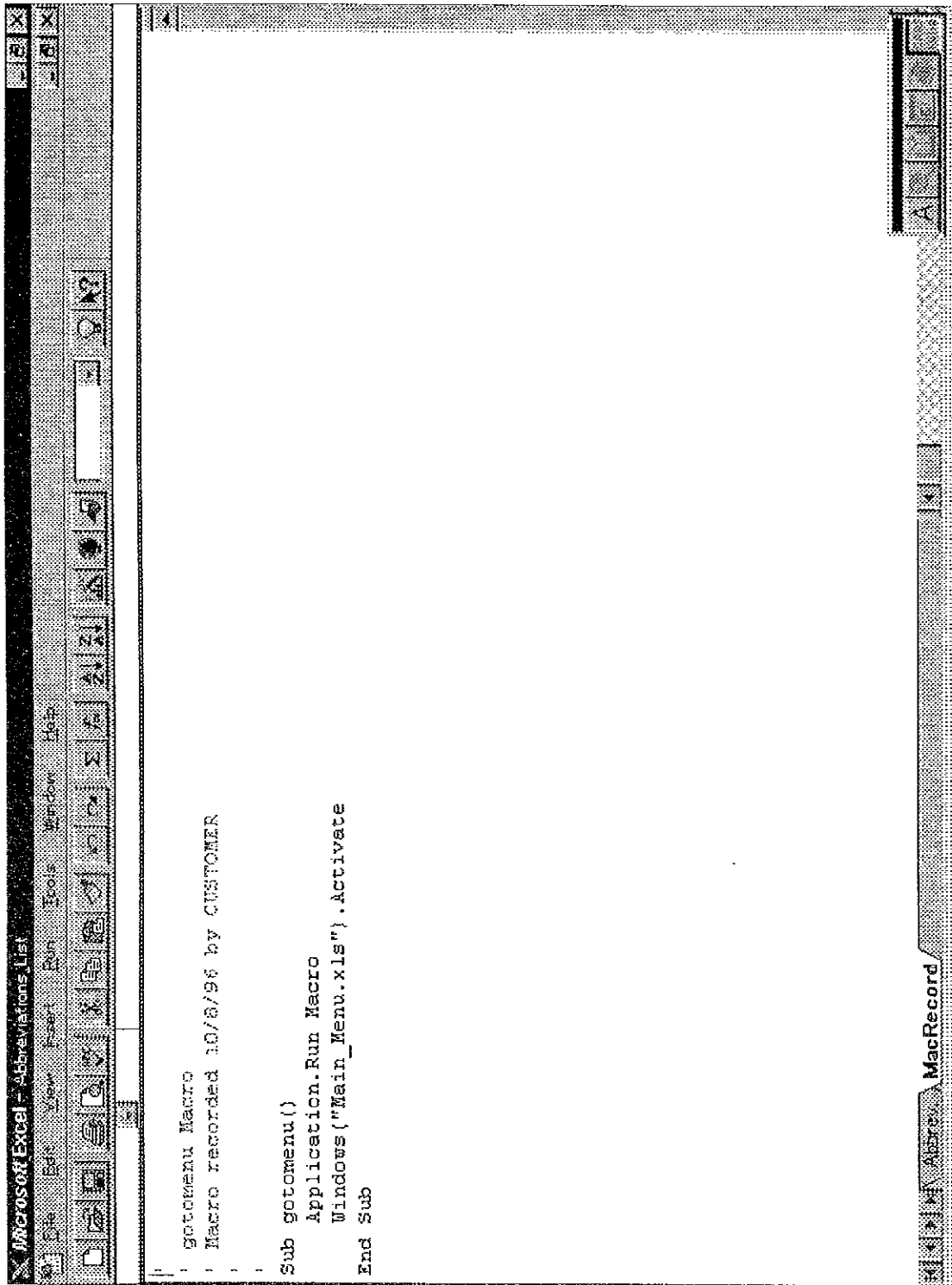
ABBREVIATIONS IN THE DATABASE

	A	B	D	E
1				
2				Calculator
3	A			
4	ARSEL	Electrical Home Appliances:	Electricity Consumption (PHY)	
5	ARCOK	Electrical Home Appliances:	Rice cooker(1set/family, 1000w, 0.5h)	
6	ARDREF	Electrical Home Appliances:	Prevailing Rate of Refrigerators (%)	
7	ARDTV	Electrical Home Appliances:	Prevailing Rate of TV (%)	
8	ARHEA	Electrical Home Appliances:	Water heaters(1set/family, 4000w, 1h)	
9	ARIRN	Electrical Home Appliances:	Iron(1set/family, 2000w, 0.5h)	
10	ARKTL	Electrical Home Appliances:	Kettle(1set/family, 2000w, 0.5h)	
11	ARLIT	Electrical Home Appliances:	Light (8set/family, 40w, 3.5h)	
12	ARREF	Electrical Home Appliances:	Refrigerators & Freezers (120w, 8h)	
13	ARTV	Electrical Home Appliances:	TV Licensed (140w, 6h)	
14	ARWAS	Electrical Home Appliances:	Washing Machines (1set/family, 150w, 0.5h)	
15	ATBUS	Transportation Equipment:	Bus (Registered)	
16	ATCAR	Transportation Equipment:	Car and Dual Purpose Car (Registered)	
17	ATCYC	Transportation Equipment:	Motor cycle and Auto Cycle (Registered)	
18	ATHVY	Transportation Equipment:	Tractor, Dumper and Heavy motor car (Registered)	
19	ATOTH	Transportation Equipment:	Others (Registered)	
20	ATTRU	Transportation Equipment:	Lorry, Truck, and Van (Registered)	
21	C			
22	CPIMRT	Price Index and Exchange Rate:	Consumer Price Index	
23	CPISA	Price Index and Exchange Rate:	Consumer Price Index of South Africa	
24	D			

Microsoft Word / MacRecord /

Abbrev.

Screen 046



MacRecord

Energy_Case_01.XLS. This file has been added for comparison against the file **Case_Simulation.XLS**, which will be described later. This file contains the control and comparison cases used when performing simulations. While **Base_Case.XLS** and **Energy_Case_01.XLS** are databases created by this survey group, the file **Case_Simulation.XLS** allows the user, the government of Mauritius, to enter its own future growth rates for macro-economic and energy demand forecast data. When this is done, both files can be brought on-screen side-by-side to allow the comparison of numerical data, mathematical formulas, and function commands which have been entered into each.

(1) EnergyModel

(Refer to Screen 047)

This sheet is configured exactly the same as **Energy_Case_01.XLS** and has the same file format. However, it does not include individual sheets such as **Subsector**, **Energyprices**, **GDP**, and **Home.App.** as does **Energy_Case_01.XLS**.

(2) MacRecord

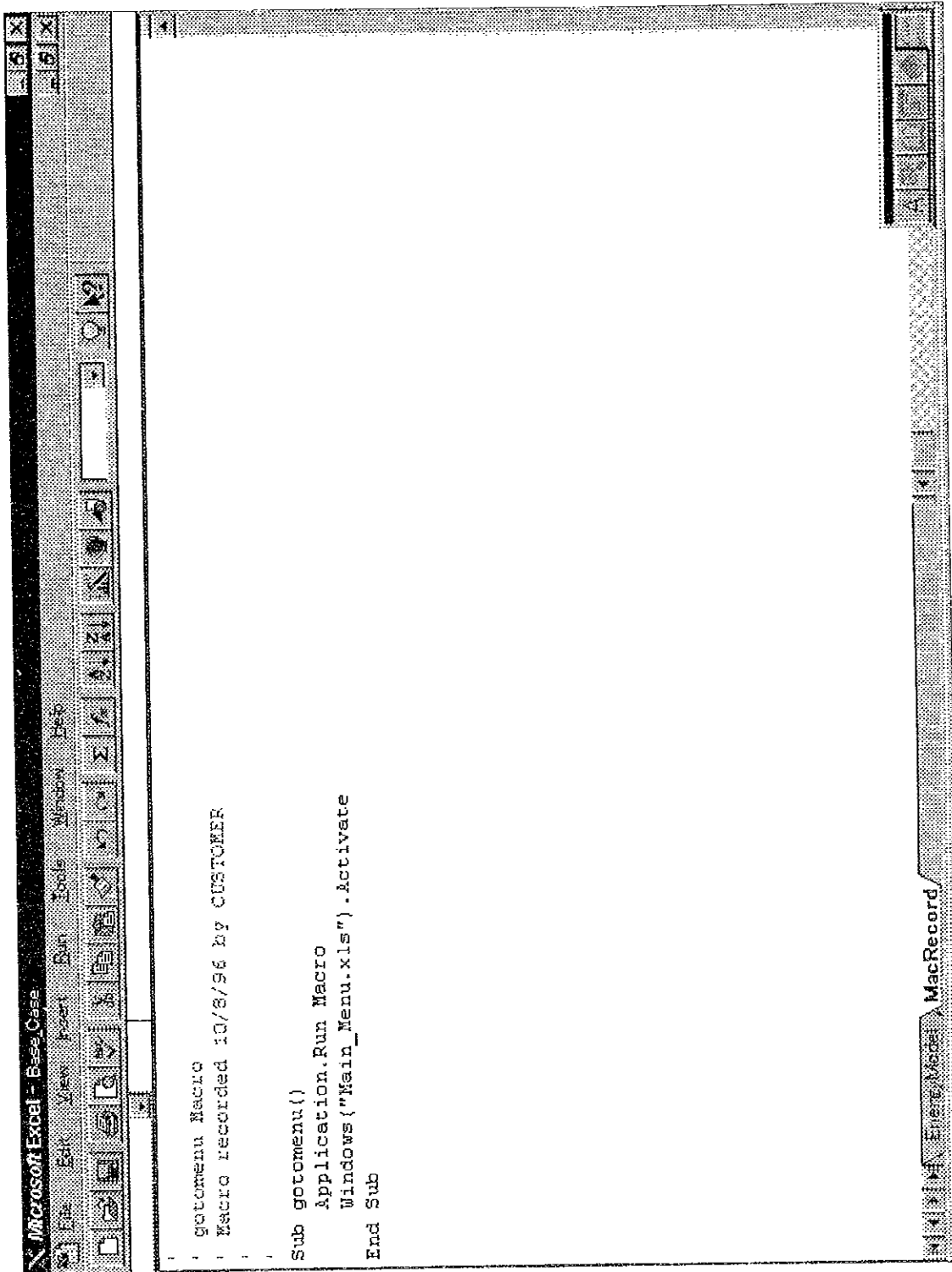
(Refer to Screen 048)

The **MacRecord** sheet is a screen containing the macro program code for calling up all files. In other words, in order to call up another file from the **Base_Case.XLS** file currently open, you first return to **Main_Menu.XLS** and then select any one of the files from the menu screen. This macro program must be rewritten if the user wishes to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

Screen 047

	A	B	C	D	E	F
1			Go To Menu			
2			Social statistics			
3	E		Population (Middle of Years)	1000 Persons	POP	
4	I		Independent Households	1000 families	HOH	
5						
6			Labor Forces			
7	E		Agriculture, Hunting, Forestry, Mining, and Quarrying	Person	LABPRI	
8	E		Manufacturing	Person	LABMAN	
9	E		Sugar	Person	LABSUG	
10	E		EPZ	Person	LABEPZ	
11	E		Domestic Manufacturing	Person	LABDOM	
12	E		Electricity, Gas, and Water	Person	LABELE	
13	E		Construction	Person	LABCON	
14	E		Wholesale, Retail, Restaurants, and Hotels	Person	LABCOM	
15	E		Transportation, Storage, and Communication	Person	LABTRA	
16	E		Banking, Insurance, Real Estate, Business service	Person	LABBAN	
17	E		Other service	Person	LABSER	
18	I		Total Labor Force	Person	LABTOT	
19	I		Labor Force in Population	%	LABSHA	
20						
21			GDP at current Price			
22	I		Agriculture, Hunting, Forestry, Mining, and Quarrying	Rs. Million	NVAPRI	

Energy Model



4.11 Check_Outcomes.XLS File

This file consists of a list of macro-economic indices and energy supply and demand indices derived from the file **Energy_Case_01.XLS**. This file lists the economic indices and energy supply and demand indices resulting from the various different activity conditions, or cases, represented by the three files Energy_Case_01.XLS, which may represent standard growth rates (standard case) for various major economic indices such as GDP, consumer price index and so on, **Energy_Case_02.XLS**, which may represent high growth rates (high case) for the same indices, and Energy_Case_03.XLS, which may represent relatively low growth rates (low case). This file is made up of the following sheets, each containing information for a different type of index.

Figure 4-10 shows the structure of the sheets contained in the file.

(1) gdp Sector growth

(Refer to Screen 049)

GDP growth rate between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by industry sector as shown below.

- Agriculture, Hunting, Forestry, Mining, and Quarrying
- Manufacturing
 - Sugar
 - EPZ
- Domestic Manufacturing
- Electricity, Gas, and Water
- Construction
- Wholesale, Retail, Restaurants, and Hotels
- Transportation, Storage, and Communication
- Banking, Insurance, Real Estate, Business service
- Other service
- Imputed Bank Service Charge

Microsoft Excel - Checking Outcome!										
File Edit View Format Tools Data Window Help										
Table 1. GDP Growth Rate by Sector (Base Case)										
	A	B	C	D	E	F				
		1995/1985	2000/1995	2010/2000	2025/2010	2025/1995				
1	Table 1. GDP Growth Rate by Sector (Base Case)									
2										
3	GDP at Constant Price (1990)									
4	Agriculture, Hunting, Forestry, Mining, and Quarrying	-0.1	4.0	4.0	4.0	4.0				
5	Manufacturing	8.1	5.2	5.5	7.8					
6	Sugar	-1.7	4.0	0.0	0.0					
7	EPZ	10.4	5.0	5.5	8.0					
8	Domestic Manufacturing	8.1	5.5	6.0	8.0					
9	Electricity, Gas, and Water	6.7	8.0	8.0	8.0					
10	Construction	9.0	5.0	5.0	5.0					
11	Wholesale, Retail, Restaurants, and Hotels	8.5	6.5	6.0	5.0					
12	Transportation, Storage, and Communication	7.6	6.5	6.5	6.0					
13	Banking, Insurance, Real Estate, Business service	7.0	6.5	6.5	6.0					
14	Other service	7.7	5.0	5.0	5.0					
15	Imputed Bank Service Charge	0.0	11.0	12.0	12.0					
16	GDP at Factor cost	6.5	5.4	5.3	5.2					
17	Net Indirect Taxes	3.7	5.0	5.0	5.0					
18	GDP at constant (1990)	6.1	5.4	5.3	5.1					
19										
20	GDP Growth Rate by Sector (High Case)									
21										
22	GDP at Constant Price (1990)									
23	Agriculture, Hunting, Forestry, Mining, and Quarrying	-0.1	4.0	4.0	4.0					
24	gdp sector growth / investment / Ratio to GDP / Trade Balance									

gdp sector growth

- GDP at Factor cost
- Net Indirect Taxes
- GDP at constant (1990)

(2) investment

(Refer to Screen 050)

Investment ratio between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by public and private sector including followings.

- Gross Domestic Fixed Capital Formation
 - Private Fixed Capital Formation
 - Govern. Fixed Capital Formation
- GDP at Current Price

(3) Ratio to GF

(Refer to Screen 051)

Government finance between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 including followings.

- Government Finance at Current Price
 - Revenue
 - Grants Received
 - Expenditure
 - Lending - Repayment
 - Deficit and Surplus
- Deficit Ratio to GDP

Microsoft Excel - Checking_Outcome1						
=C:\WINDOWS\77\77\Energy_Data_Base\Energy_Case_01.xls\Energy_Model\F\$102						
	A	B	C	D	E	F
1						
2						
3			1985	Ratio(%)	1995	Ratio(%)
4	Gross Domestic Fixed Capital Formation	Rs million	3,100	18.7	18,325	26.7
5	Private Fixed Capital Formation	Rs million	2,100	12.6	12,460	18.1
6	Govern. Fixed Capital Formation	Rs million	1,000	6.0	5,865	8.5
7						
8	GDP at Current Price	Rs million	16,618		68,760	125.
9						
10						
11						
12						
13			1985	Ratio(%)	1995	Ratio(%)
14	Gross Domestic Fixed Capital Formation	Rs million	3,100	18.7	18,325	26.7
15	Private Fixed Capital Formation	Rs million	2,100	12.6	12,460	18.1
16	Govern. Fixed Capital Formation	Rs million	1,000	6.0	5,865	8.5
17						
18	GDP at Current Price	Rs million	16,618		68,760	127.
19						
20						
21						
22						
23			1985	Ratio(%)	1995	Ratio(%)

Table 2. Investment Ratio by Public and Private Sector

Investment Ratio by Public and Private Sector (High)

Investment Ratio by Public and Private Sector (Low)

investment

Microsoft Excel - Checking Outcome1									
File Edit View Insert Format Tools Data Window Help									
C30									
A	B	C	D	E	F				
1	Table3. Government Finance (Base Case)								
2	Government Finance at Current Price	1985	1995	2000	2010				
3	Revenue	Rs million	3,593	14,295	25,599	55,270			
4	Grants Received	Rs million	166	240	300	300			
5	Expenditure	Rs million	4,229	15,868	28,281	59,320			
6	Lending - Repayment	Rs million	110	-380	-500	-800			
7	Deficit and Surplus	Rs million	-580	-953	-1,882	-2,940			
8									
9	Deficit Ratio to GDP	(%)	3.5	1.4	1.5	0.5			
10									
11	Government Finance (High Case)								
12	Government Finance at Current Price	1985	1995	2000	2010				
13	Revenue	Rs million	3,593	14,295	25,886	56,340			
14	Grants Received	Rs million	166	240	300	300			
15	Expenditure	Rs million	4,229	15,868	28,598	60,470			
16	Lending - Repayment	Rs million	110	-380	-500	-800			
17	Deficit and Surplus	Rs million	-580	-953	-1,912	-3,020			
18									
19	Deficit Ratio to GDP	(%)	3.5	1.4	1.5				
20									
21	Government Finance (Low Case)								
22	Government Finance at Current Price	1985	1995	2000	2010				
23	Revenue	Rs million	3,593	14,295					
24	Investment	Rs million							
25	Trade Balance / Exour production								

(4) Trade Balance

(Refer to Screen 052)

Trade balance between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by industry sector including following outputs.

- Export of Goods and Services
- Import of Goods and Services
- Balance
- Ratio to GDP(%)

(5) labour produ. sector

(Refer to Screen 053)

Labour productivity between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by individual industry subsector.

- Agriculture, Hunting, Forestry, Mining, and Quarrying
- Manufacturing
 - Sugar
 - EPZ
 - Domestic Manufacturing
- Electricity, Gas, and Water
- Construction
- Wholesale, Retail, Restaurants, and Hotels
- Transportation, Storage, and Communication
- Banking, Insurance, Real Estate, Business service
- Other service
- Total labour productivity at constant price (1990)

Table 4. Trade Balance (Base Case)						
		1985	1995	2000	2010	
3	Export of Goods and Services	Rs million	8,895	40,115	78,827	217,382
4	Import of Goods and Services	Rs million	9,210	43,100	84,365	231,883
5	Balance	Rs million	-315	-2985	-5,538	-14,501
6	Ratio to GDP(%)		1.9	4.3	4.4	4.6
Trade Balance (High Case)						
		1985	1995	2000	2010	
10	Export of Goods and Services	Rs million	8,895	40,115	80,177	241,370
11	Import of Goods and Services	Rs million	9,210	43,100	85,580	253,511
12	Balance	Rs million	-315	-2985	-5,402	-12,141
13	Ratio to GDP(%)		1.9	4.3	4.2	3.4
Trade Balance (Low Case)						
		1985	1995	2000	2010	
17	Export of Goods and Services	Rs million	8,895	40,115	78,294	207,759
18	Import of Goods and Services	Rs million	9,210	43,100	83,506	221,070
19	Balance	Rs million	-315	-2985	-5,213	-13,311
20	Ratio to GDP(%)		1.9	4.3	4.2	4.4
(Source: CSO and JICA Study Team)						

Microsoft Excel - Checking Outcome						
File Edit View Insert Format Tools Data Window Help						
A1 120%						
A	B	C	D	E	F	
1		Table 5 Labour Productivity by Industrial Sector				
2		1985*1	1995	2000	2010	
3	Labour Productivity (1990)					
4	Agriculture, Hunting, Forestry, Mining, and Quarrying	42	55	78	156	
5	Manufacturing	70	70	96	201	
6	Sugar	-	102	152	229	
7	EPZ	-	63	96	201	
8	Domestic Manufacturing	-	76	90	198	
9	Electricity, Gas, and Water	96	204	315	751	
10	Construction	103	86	95	115	
11	Wholesale, Retail, Restaurants, Hotels	116	93	91	100	
12	Transportation, Storage, and Communication	127	137	140	170	
13	Banking, Insurance, Real Estate, Business service	559	428	459	582	
14	Other service	35	56	65	96	
15	Total Labor Productivity at Constant Price (1990)	83	95	113	161	
16						
17		Labour Productivity by Industrial Sector				
18		1985*1	1995	2000	2010	
19	Labour Productivity (1990)					
20	Agriculture, Hunting, Forestry, Mining, and Quarrying	42	55	78	156	
21	Manufacturing	70	70	96	259	
22	Sugar	-	102	152	229	
23	EPZ	-	63	96	275	
24	Domestic Manufacturing	-	76	90	243	
25	Electricity, Gas, and Water	96	204	315	751	
26	Construction	103	86	95	115	
27	Wholesale, Retail, Restaurants, Hotels	116	93	91	100	
28	Transportation, Storage, and Communication	127	137	140	170	
29	Banking, Insurance, Real Estate, Business service	559	428	459	582	
30	Other service	35	56	65	96	
31	Total Labor Productivity at Constant Price (1990)	83	95	113	161	
32						
33						
34						
35						
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labour produ. sector

(6) cpi and deflator

(Refer to Screen 054)

CPI and GDP deflator between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 including followings.

- Consumer Price Index
- GDP Deflator

(7) Consumption total

(Refer to Screen 055)

Total energy demand between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by sector including followings.

- Non-electricity Consumption by Industry
- Electricity Consumption by Industry
- Conversion to TOE
- Total Consumption by Industry
- Non-Electricity Consumption by Commercial
- Electricity Consumption by Commercial
- Conversion to TOE
- Total Consumption by Commercial
- Total Consumption by Transport
- Non-Electricity Consumption by Residential
- Electricity Consumption by Residential
- Conversion to TOE
- Total Consumption by Residential
- Electricity Consumption by Others
- Total Electricity Consumption by all Sectors

Table 6 CPI and GDP Deflator (Base Case)						
	A	B	C	D	E	F
1						
2		1985*1	1995	2000	2010	2025
3	Consumer Price Index	70.1	141.0	195.2	291.3	527.7
4	GDP Deflator	63.2	140.9	197.7	299.7	555.3
5						
6						
7		1985*1	1995	2000	2010	2025
8	Consumer Price Index	70.1	141.0	197.3	296.7	552.6
9	GDP Deflator	63.2	140.9	199.9	305.5	583.3
10						
11						
12		1985*1	1995	2000	2010	2025
13	Consumer Price Index	70.1	141.0	192.9	283.6	500.6
14	GDP Deflator	63.2	140.9	195.2	291.5	526.4
15	(Notes *1: Index figure assuming 1990 equal to 100))					
16	(Notes *2: Annual average growth rate in %)					
17	(Source: CSO and JICA Study Team)					
18						
19						
20						
21						
22						

- Total Energy Consumption by all Sectors
- Final Energy Consumption per Capita

(8) Consumption by sources

(Refer to Screen 056)

Energy demand between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by sources including following outputs.

- Gasoline
- Diesel
- Kerosene
- Fuel Oil
- LPG
- Coal
- Fuel Wood
- Charcoal
- Bagasse (For National Grid)
- Total Primary Energy Consumption
 - Of which Inputs for Electricity
- Inputs for Electricity/Total Consumption (%)
- Primary Energy Consumption per Capita

(9) Energy intensity

(Refer to Screen 057)

Energy intensity between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 including following outputs.

- Total Electricity Consumption(PHY)

		Energy Demand by Sources (Base Case)					Energy Demand by Sources (High Case)				
		1985	1995	2000	2010	2025	1985	1995	2000	2010	2025
1											
2		37,579	175,436	288,080	674,552	2,164,446	37,579	175,436	290,441	930,652	3,011,466
3	Gasoline										
4	Diesel	56,851	36,396	53,851	91,615	228,765	56,851	36,396	54,046	98,782	257,979
5	Jet Fuel	18,056	39,113	59,278	110,018	244,289	18,056	39,113	59,639	141,225	372,990
6	Kerosene	53,684	4,940	1,792	192	7	53,684	4,940	1,792	192	7
7	Fuel Oil	2,741	962	421	313	300	2,741	962	421	313	300
8	LPG	22,358	31,582	61,384	78,137	162,440	22,358	31,582	61,384	78,137	162,440
9	Coal	19,457	556,812	771,874	1,420,773	3,451,114	19,457	556,812	771,874	1,420,773	3,451,114
10	Fuel Wood	1,850	962	421	313	300	1,850	962	421	313	300
11	Charcoal	22,734	31,582	61,384	78,137	162,440	22,734	31,582	61,384	78,137	162,440
12	Bagasse (For National Grid)	9,881	11,558	11,180	11,180	11,180	9,881	11,558	11,180	11,180	11,180
13	Total Energy Consumption	245,192	556,812	771,874	1,420,773	3,451,114	245,192	556,812	771,874	1,420,773	3,451,114
14	Of which Inputs for Electricity	80,878	223,782	355,457	716,018	2,005,661	80,878	223,782	355,457	716,018	2,005,661
15	Inputs for Electricity/Total Consumption (%)	33.	40.2	46.1	50.4	58.1	33.	40.2	46.1	50.4	58.1
16											
17											
18											
19	Gasoline	37,579	175,436	290,441	930,652	3,011,466	37,579	175,436	290,441	930,652	3,011,466
20	Diesel	56,851	36,396	54,046	98,782	257,979	56,851	36,396	54,046	98,782	257,979
21	Jet Fuel	18,056	39,113	59,639	141,225	372,990	18,056	39,113	59,639	141,225	372,990
22	Kerosene	53,684	4,940	1,792	192	7	53,684	4,940	1,792	192	7
23	Fuel Oil	2,741	962	421	313	300	2,741	962	421	313	300

Consumption by sources

Microsoft Excel - Checking Outcome						
File Edit View Insert Format Tools Data Window Help						
A B C D E F						
Table 9 Energy Intensity (Base Case)						
		1985	1995	2000	2010	
3	Total Electricity Consumption(PHY)	Mwh	320,900	895,085	1,334,850	2,846,772
4	Total Energy Consumption (TOE)	TOE	245,192	556,812	771,874	1,420,773
5	GDP at constant (1990)	Rs million	27,183	48,932	63,622	106,211
6	Energy Intensity of Electricity	(Mwh/Rs mil.)	11.8	18.3	21.0	26.8
7	Energy Intensity of Total Energy	(TOE/Rs mil.)	9.0	11.4	12.1	13.4
Energy Intensity (High Case)						
		1985	1995	2000	2010	
11	Total Electricity Consumption(PHY)	Mwh	320,900	895,085	1,341,287	3,583,466
12	Total Energy Consumption (TOE)	TOE	245,192	556,812	778,156	1,760,700
13	GDP at constant (1990)	Rs million	27,183	48,932	63,798	115,687
14	Energy Intensity of Electricity	(Mwh/Rs mil.)	11.8	18.3	21.0	31
15	Energy Intensity of Total Energy	(TOE/Rs mil.)	9	11.4	12.2	15.2
Energy Intensity (Low Case)						
		1985	1995	2000	2010	
19	Total Electricity Consumption(PHY)	Mwh	320,900	895,085	1,333,452	2,629,361
20	Total Energy Consumption (TOE)	TOE	245,192	556,812	767,940	1,307,047
Energy intensity / income at base						
Energy intensity / income at base						

Energy intensity

- Total Energy Consumption (TOE)
- GDP at constant (1990)
- Energy Intensity of Electricity
- Energy Intensity of Total Energy
- Electricity Consumption per capita
- Energy Consumption per capita

(10) income ela. by sector

(Refer to Screen 058)

Income elasticity between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 including following outputs.

- Non-Electricity consumption by industry
- Electricity including irrigation
- Conversion to TOE
- Total Consumption by Industry
- Average Annual Growth Rate
- Real GDP by Industry
- Average Annual Growth Rate by industry
- Income Elasticity
- Non-Electricity Consumption by Commercial
- Electricity including irrigation
- Conversion to TOE
- Total Consumption by Industry
- Average Annual Growth Rate
- Real GDP by Industry
- Average Annual Growth Rate by industry
- Income Elasticity
- Total Consumption by Transport
- Electricity including irrigation
- Conversion to TOE

A		B	C	D	E	F
Table 10 Income Elasticity by Sector (Base Case)						
1		Unit	1985	1995	2000	
2		TOE	38,127	80,263	114,607	22
3	Non-Electricity consumption by industry	mWh	103,900	322,476	505,425	1,18
4	Electricity including irrigation	TOE	8,935	27,733	43,467	10
5	Conversion to TOE	TOE	47,062	107,996	158,074	32
6	Total Consumption by Industry	(%)	-	8.7	7.9	
7	Average Annual Growth Rate	Rs. million	10,244	17756.1	22660.4	3
8	Real GDP by Industry	%	-	5.7	5.0	
9	Average Annual Growth Rate by industry		-	1.5	1.6	
10	Income Elasticity					
11						
12	Non-Electricity Consumption by Commercial	TOE	1,543	3,994	6,942	21
13	Electricity Consumption by Commercial	mWh	73,000	227,327	326,387	66
14	Conversion to TOE	TOE	6,278	19,550	28,069	50
15	Total Consumption by Commercial	TOE	7820.76	23,544	35,011	7
16	Average Annual Growth Rate	(%)	-	11.7	8.3	
17	Real GDP by Commercial	Rs. million	10,201	21511.2	28796.9	51
18	Average Annual Growth Rate by Commercial	%	-	7.7	6.0	
19	Income Elasticity		-	1.5	1.4	
20						
21	Total Consumption by Transportation	TOE	79,202	192,132	231,424	38
22	Average Annual Growth Rate	(%)	-	9.3	3.8	
23	Real GDP by Transportation, etc.	Rs. million	2,406	5016.3		
24	Enter industry income ela. by sector					

income els. by sector

- Total Consumption by Industry
- Average Annual Growth Rate
- Real GDP by Industry
- Average Annual Growth Rate by industry
- Income Elasticity
- Non-Electricity Consumption by Residential
- Electricity including irrigation
- Conversion to TOE
- Total Consumption by Industry
- Average Annual Growth Rate
- Real GDP by Industry
- Annual Growth Rate by industry
- Income Elasticity
- Total Electricity Consumption by all sectors
- Average Annual Growth Rate
- Income Elasticity
- Total Energy Consumption by all sectors
- Average Annual Growth Rate
- Income Elasticity
- GDP at constant (1990)
- Average Annual Growth Rate

(11) peak ele.

(Refer to Screen 059)

Peak electricity demand between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 including following outputs.

- Total electricity consumption
- Electricity consumption per hour
- Load factor (%)
- Peak Electricity Demand

Microsoft Excel - Checking Outcome 1						
File Edit View Insert Format Tools Data Window Help						
A4 Electricity consumption per hour						
A	B	C	D	E	F	
1	Table 11 Peak Electricity Demand (Base Case)					1
2	1985	1995	2000	2010	2025	
3	320,900	895,085	1,334,850	2,846,772	8,196,931	
4	36	101	152	325	936	
5	51.1	57.9	61.2	63.0	63.0	
6	85	200	288	584	1680	
7	22.4	16.9	14.8	13.0	13.0	
8						
9	Peak Electricity Demand (High Case)					
10	1985	1995	2000	2010	2025	1
11	320,900	895,085	1,341,287	3,583,466	10,353,672	
12	36	101	153	409	1,182	
13	51.1	57.9	61.2	63.0	63.0	
14	85	200	289	735	2,122	
15	22.4	16.9	14.8	13.0	13.0	
16						
17	Peak Electricity Demand (Low Case)					
18	1985	1995	2000	2010	2025	1
19	320,900	895,085	1,333,452	2,629,361	6,904,787	
20	36	101	152	300	788	
21	51.1	57.9	61.2	63.0	63.0	
22	85	200	288	584	1680	
23	22.4	16.9	14.8	13.0	13.0	

peak ele

- Self consumption and loss (%)

(12) MacRecord

(Refer to Screen 060)

The **MacRecord** sheet is a screen containing the macro program code for calling up all files. In other words, in order to call up another file from the **Check_Outcomes.XLS** file currently open, you first return to **Main_Menu.XLS** and then select any one of the files from the menu screen. This macro program must be rewritten if the user wishes to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

4.12 Case_Simulations.XLS File

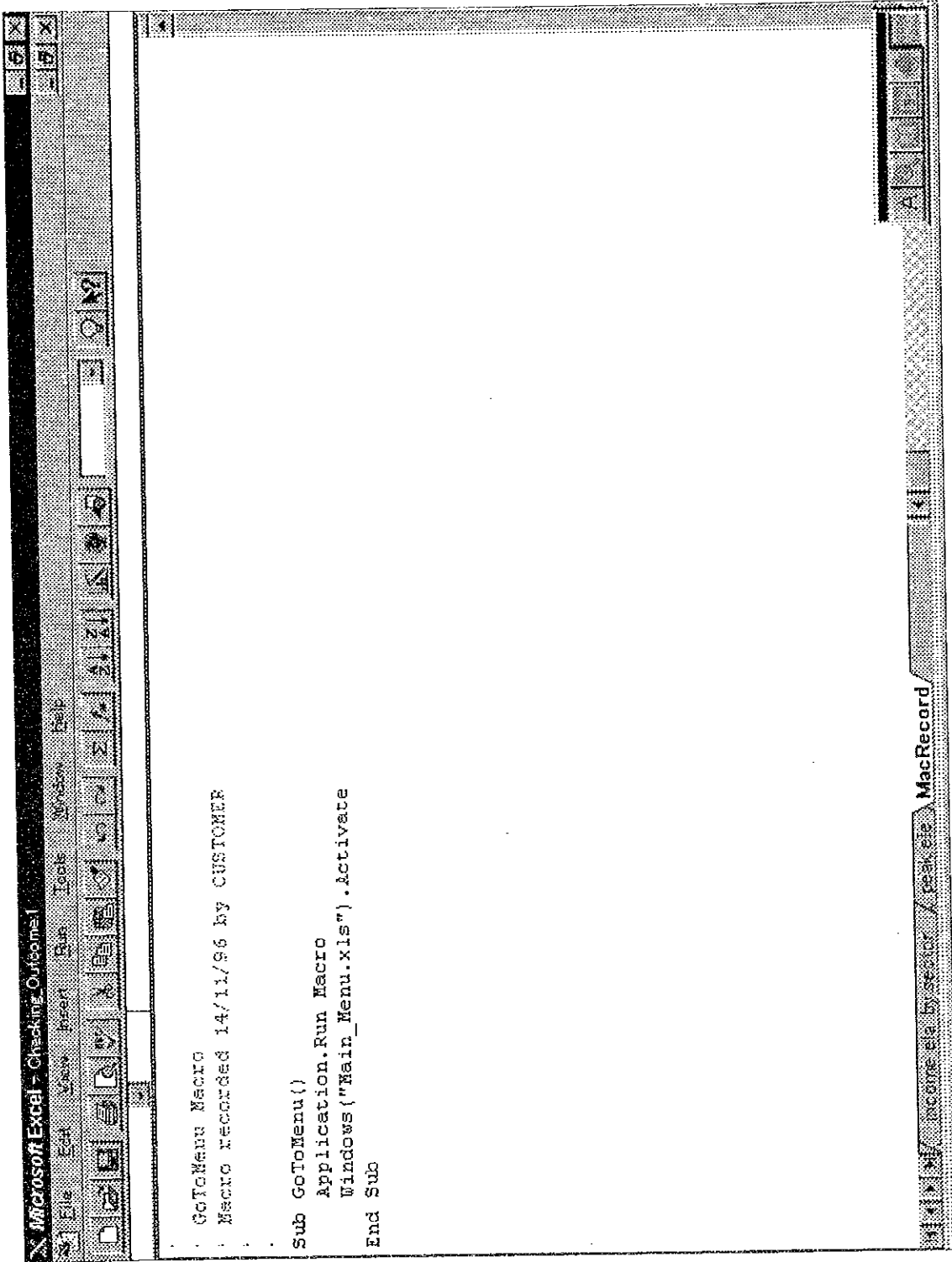
Figure 4-11 shows the structure of the sheets which are contained in the file.

As described in the section of the **Base_Case.XLS** file, the **Case_Simulations.XLS** file is configured as a user's file. Although **Base_Case.XLS** is basically identical to **Energy_Case_01.XLS** (macro-economic indicators for this file have already been set), **Case_Simulations.XLS** allows the user to freely change these preset values. This allows the user to simulate energy demand trends in conjunction with possible fluctuations in macro-economic indices. When performing simulations, all you need to do is activate external variables (such as growth rate by sector, growth rate by income, international energy prices, etc.) and execute. It is recommended when the user uses this file, that it be displayed on screen together with the **Base_Case.XLS** file.

(1) EnergyModel

(Refer to Screen 061)

Screen 060



MacRecord

Screen 061

AI	A	B	C	D	E	F
1			GoToMenu			
2			Social statistics			
3	E		Population (Middle of Years)	1000 Persons	POP	
4	I		Independent Households	1000 families	HOH	
5						
6			Labor Forces			
7	E		Agriculture, Hunting, Forestry, Mining, and Quarrying	Person	LABPRI	
8	E		Manufacturing	Person	LABMAN	
9	E		Sugar	Person	LABSUG	
10	E		EPZ	Person	LABEPZ	
11	E		Domestic Manufacturing	Person	LABDOM	
12	E		Electricity, Gas, and Water	Person	LABELE	
13	E		Construction	Person	LABCON	
14	E		Wholesale, Retail, Restaurants, and Hotels	Person	LABCOM	
15	E		Transportation, Storage, and Communication	Person	LABTRA	
16	E		Banking, Insurance, Real Estate, Business service	Person	LABBAN	
17	E		Other service	Person	LABSER	
18	I		Total Labor Force	Person	LABTOT	
19	I		Labor Force in Population	%	LABSHA	
20						
21			GDP at current Price			
22	I		Agriculture, Hunting, Forestry, Mining, and Quarrying	Rs Million	NVAPRI	

EnergyModel / Base Record /

EnergyModel / Base Record /

This sheet consists of a list of macro-economic indices and energy supply and demand indices derived from the file **Energy_Case_01.XLS**.

(2) MacRecord

(Refer to Screen 062)

The **MacRecord** sheet is a screen containing the macro program code for calling up all files. In other words, in order to call up another file from the **Case_Simulation.XLS** file currently open, you first return to **Main_Menu.XLS** and then select any one of the files from the menu screen. This macro program must be rewritten if the user wishes to create a macro program which can call up other screens. Do not change this sheet in any way if you wish to maintain this program in its present form.

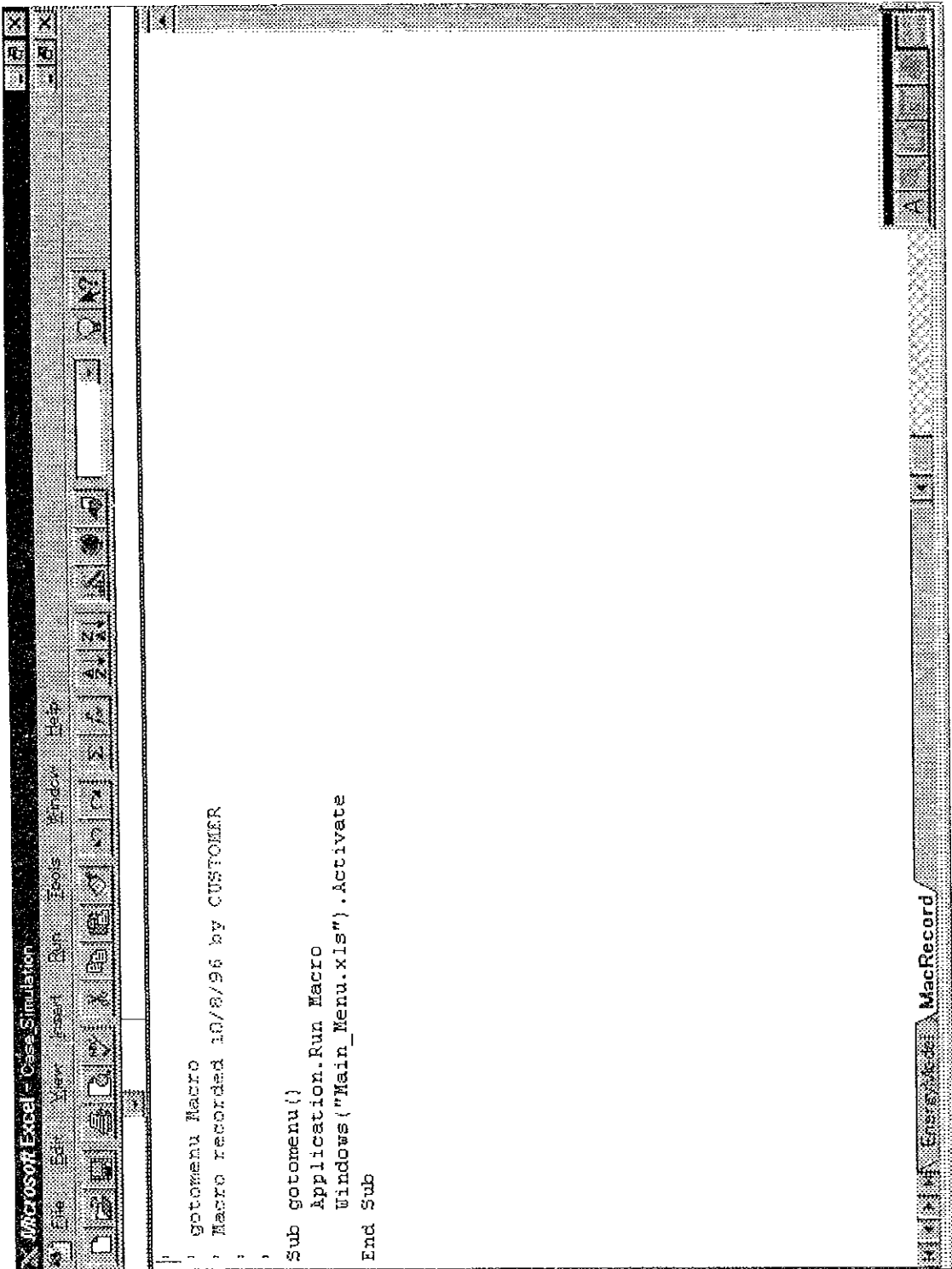
4.13 Outcome_Simulations.XLS File

This file displays the values resulting from the simulation models resulting when the user has used the **Case_Simulations.XLS** file to freely change the preset values for macro-economic indices. This allows the modeling of economic trends and energy demand trends which are dependent on fluctuations of major macro-economic indicators. The file is setup such that values resulting from linked computations based on the input of preset macro-economic indicators (values resulting from links to the **Base_Case.XLS** file) are also displayed on the screen associated with each sheet. It is therefore recommended when the user uses this file that it be displayed on-screen together with the **Base_Case.XLS** file and the **Case_Simulations.XLS** file.

Figure 4-12 shows the structure of the sheets which are contained in the file.

Outputs which will be retrieved through the emulation of this sheets are as follows.

Screen 062



MacRecord

(1) gdp Sector growth

(Refer to Screen 063)

GDP growth rate between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by industry sector as shown below.

- Agriculture, Hunting, Forestry, Mining, and Quarrying
- Manufacturing
 - Sugar
 - EPZ
- Domestic Manufacturing
- Electricity, Gas, and Water
- Construction
- Wholesale, Retail, Restaurants, and Hotels
- Transportation, Storage, and Communication
- Banking, Insurance, Real Estate, Business service
- Other service
- Imputed Bank Service Charge
- GDP at Factor cost
- Net Indirect Taxes
- GDP at constant (1990)

(2) Investment

(Refer to Screen 064)

Investment ratio between 1985 - 1995, 1996 - 2000, 2001 - 2010, 2011 - 2015 by public and private sector including followings.

- Gross Domestic Fixed Capital Formation

Microsoft Excel - Outcome Simulation1											
Table 1. GDP Growth Rate by Sector (Case in Simulation)											
	A	B	C	D	E	F					
		1995/1985	2000/1995	2010/2000	2025/2010	2025/1995					
3	GDP at Constant Price (1990)										
4	Agriculture, Hunting, Forestry, Mining, and Quarrying	-0.1	4.0	4.0	4.0	4.0					
5	Manufacturing	8.1	5.2	5.5	7.8	7.8					
6	Sugar	-1.7	4.0	0.0	0.0	0.0					
7	EPZ	10.4	5.0	5.5	8.0	8.0					
8	Domestic Manufacturing	8.1	5.5	6.0	8.0	8.0					
9	Electricity, Gas, and Water	6.7	8.0	8.0	8.0	8.0					
10	Construction	9.0	5.0	5.0	5.0	5.0					
11	Wholesale, Retail, Restaurants, and Hotels	8.5	6.5	6.0	5.0	5.0					
12	Transportation, Storage, and Communication	7.6	6.5	6.5	6.0	6.0					
13	Banking, Insurance, Real Estate, Business service	7.0	6.5	6.5	6.0	6.0					
14	Other service	7.7	5.0	5.0	5.0	5.0					
15	Imputed Bank Service Charge	0.0	11.0	12.0	12.0	12.0					
16	GDP at Factor cost	6.5	5.4	5.3	5.2	5.2					
17	Net Indirect Taxes	3.7	5.0	5.0	5.0	5.0					
18	GDP at constant (1990)	6.1	5.4	5.3	5.1	5.1					
GDP Growth Rate by Sector (Base Case)											
22	GDP at Constant Price (1990)										
23	Agriculture, Hunting, Forestry, Mining, and Quarrying	-0.1	4.0	4.0	4.0	4.0					
24	gdp sector growth										

gdp sector growth