

4.5 Energy_Case_03.XLS File

This file is also basically a link file consisting of the same file format and structure as **Energy_Case_01.XLS** and **Energy_Case_02.XLS** file. However, as in the case of **Energy_Case_02.XLS**, it does not include individual sheets such as **Subsector**, **Energyprices**, **GDP**, and **Home.App**.

Figure 4-4 shows organization of these sheets. Summaries of data contained in each sheet are given below.

(1) EnergyModel

(Refer to Screen 013)

This sheet contains a database which stores energy data items such as actual macro-economic data and historical energy demand data which are necessary for making forecasts about the future. It contains forecast values for years through 2025 as determined under the assumption of lower growth and as based on actual macro-economic data and historical energy demand from 1985 to 1995.

The data contents contained in this file by cell, in both row order and column order, are the same as in **Energy_Case_01.XLS** and **Energy_Case_02.XLS** files.

(2)Helpsheet

(Refer to Screen 014)

Into this sheet are inserted those forecast data items which are included in the **EnergyModel** sheet that are not actual data. In other words, it includes demand forecast calculation formulas and the foundations for these formulas found in all those cells other

Screen 013

	A	B	C	D	E
1					
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					

Energy Model

Screen 014

	A	B	C	D	E
1					
2					
3					
4					
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11					
12					
13					
14					
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87					
88					
89					
90					
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93					
94					
95					
96					
97					
98					
99					
100					

HelpSheet

than for 1985 through 1995. Note, however, that although actual calculation formulas are displayed for the forecast data item in cells on the **EnergyModel** sheet, both the character variables and mathematical formulas are displayed for the **Helpsheet**.

(3) MacRecord

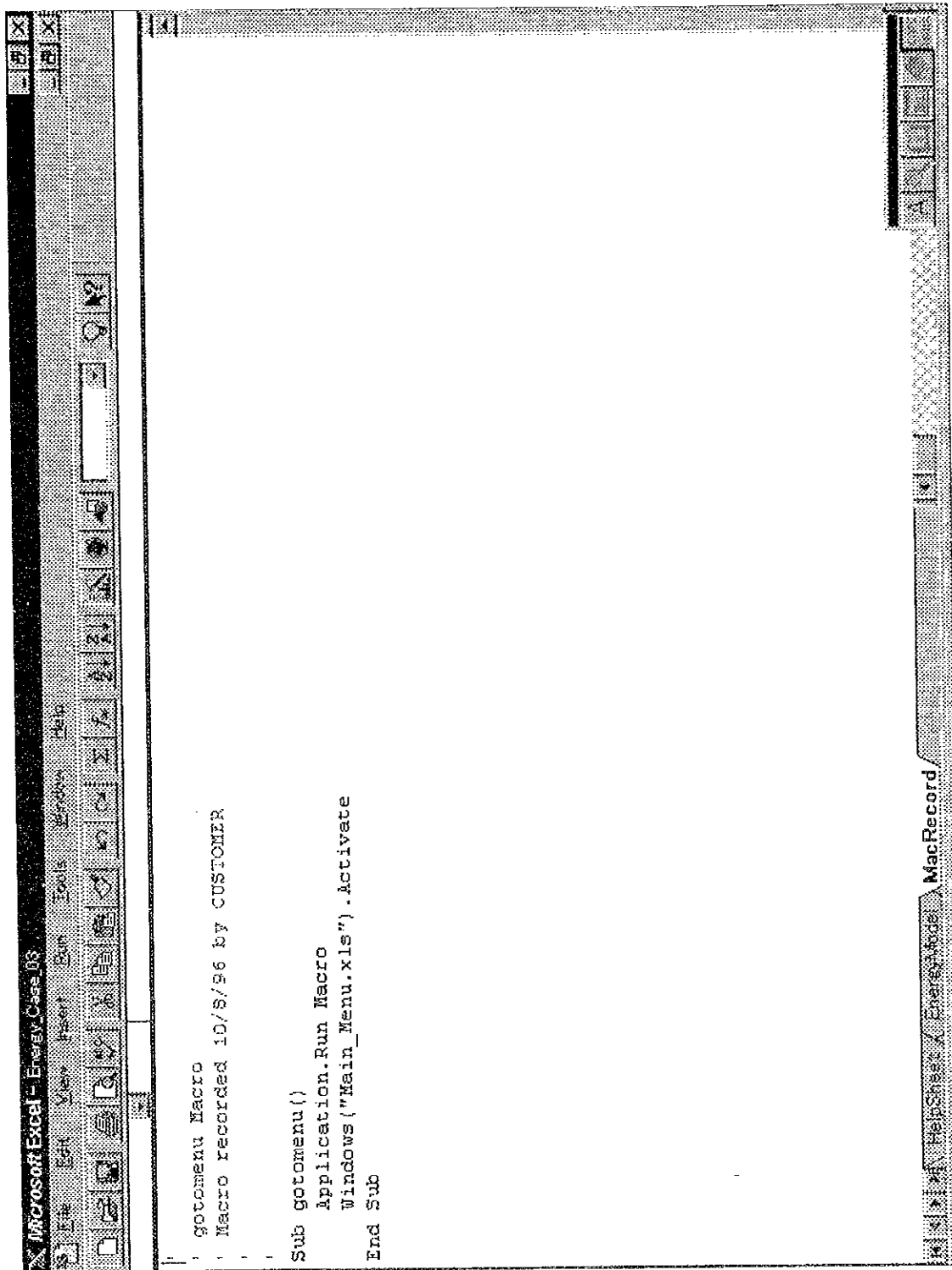
(Refer to Screen 015)

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 **Energy_Case_03.XLS** file currently open, the operators 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 the operators wish to maintain this program in its present form.

4.6REGM_Macro.XLS

REGM_Macro.XLS is a file used as a tool for regression analysis which arises in forecasting future growth of macro-economy. This file consists of a historical filing sheet (**Eng sheet**) made up of source data and baseline data and several other sheets used for defining the process of regression analysis by extracting baseline data from this first sheet and displaying the results. Forecast of macro-economy for the year 1996 and beyond is forecast by applying the future growth rates for various macro-economic variables found in this file and computational results derived from these rates in a formula for forecasting future economic growth.

Figure 4-5 shows the structure of these sheets. Summary of data contained in each sheet are given below.



(1) Eng

(Refer to Screen 016)

This sheet contains the historical data values used as the source data and baseline data in order to analyze future growth of the macro economy and energy demand. Historical data contained in this sheet includes historical macro-economic data for the years 1985 through 1995 and historical energy demand data. Historical data items for 1985 through 1995 are transferred as-is from **Energy_Case_01.XLS**, the master file of the energy database. The source of nearly all this data is based on statistical formulas from the Central Statistics Office (CSO).

Following sheets represent entire process of calculating regression formula, although the method of operation of calculation is all same by taking access method as follows (Here explained by taking an example from calculating process of **CPIMRT** which is Price index and exchange rate : Consumer Price Index shown in the next sheet (2) composition) :

- 1) From cell E1 to P1 represents all year to input so that is written from 1985 to 1995 horizontally. Operators are able to input all these numerical variables manually, however, it is much convenient to automatically bring those variables rather than input manually.
- 2) To cells such as E2, E3, and E4, data items to input vertically to the cells are automatically drawn from the first sheet of “ **ENG** “. Operators are able to input all these character variables manually, however, it is much convenient to automatically bring those variables. The user of this database now are able to see all data items, for example data item or character variable **CPIMRT** in cell E2, however actually command (here =**ENG!E97**) is recorded because this input item is drawn from original “ **ENG** “ sheet. Note that in case two or more multiple character variables are to input in one cell, so that these should be written manually. Therefore it appears to be “ **WAGSKL/LPVTOT** ” in the cell E3 to the user. Again, however, cell E4 consists from single character variables, it automatically dragged from “ **ENG** “ Sheet, so that will be able to read (=**ENG!E95**) in cell E4.

	A	B	C	D	E	F	G	H	I
1						1985	1986	1987	1988
2			Social statistics		1000 Persons	990	990	1,000	1,020
3	E		Population (Middle of Years		POP	990	990	1,000	1,020
4	I		Independent Households		HOH	165	165	167	170
5									
6			Labor Forces						
7	E		Agriculture, Hunting, Forestr		LABPRI	93,200	90,600	89,500	86,900
8	E		Manufacturing		LABMAN	66,200	90,300	110,200	124,900
9	E		Sugar		LABSUG				
10	E		EPZ		LABEPZ				
11	E		Domestic Manufacturing		LABDOM				
12	E		Electricity, Gas, and Water		LABELE	3,900	3,600	3,700	3,600
13	E		Construction		LABCON	12,800	13,400	19,300	25,100
14	E		Wholesale, Retail, Restaura		LABCOM	28,400	29,400	32,500	39,300
15	E		Transportation, Storage, and		LABTRA	18,900	19,400	21,900	23,200
16	E		Banking, Insurance, Real Es		LABBAN	6,200	6,500	7,000	7,700
17	E		Other service		LABSER	96,900	96,600	97,700	101,200
18	I		Total Labor Force		LABTOT	326,500	349,800	381,800	411,900
19	I		Labor Force in Population		LABSHA	33	35	38	40
20									
21			GDP at current Price						
22	I		Agriculture, Hunting, Forestr		NVAPRI	2,143	2,532	2,967	3,172
23	I		Manufacturing		NVAMAN	2,864	3,830	4,976	5,847
24	I		Sugar		NVASUG	438	605	676	597
25	I		EPZ		NVAEPZ	1,333	1,900		

- 3) In cell F2, numerical number 70 is shown, however, command code “ =ENG!F97 ” appeared in the command line shown in the top portion of the screen. Again that is dragged automatically from “ ENG “ Sheet. In G2 cell, it appeared that command code “ =ENG!F97 “ . That represent in cell G2 is a continuous command from F2 cell. That is meant that all command line from cell G2 to cell P2 is automatically copied from G2 cell horizontally. This is normal procedure of Excel when making related command line from one to others. Note that vertical cell F1 to F4 are copied to G1 - G4 vertically to P1 - P4 horizontally.

- 4) Cell A1 through cell D12 are exactly same value of cell E1 through P4, but copied in transpose formation. Since one the limitation of Excel in calculation of regression formula is taking only vertically input character or numerical variables, operators ought to arrange its formation of original sheet to transpose formation. This procedure is quite simple. What the user is to take is to high-lighten by dragging original cell area (in this case cell E1 through P4), and click right button of the mouse. When command box appears on the screen, then select second command line “ copy “. Then point the front tip of arrow of the mouse to cell A1 and again click right button of the mouse. When same command button as previous one appears on the screen, then point-out arrow of the mouse to choose command “ **Past Special** “ and click. When another command box appears on the screen, then choose “ **Values** “ and “ **Transpose** “ command, then click “ OK “ afterwards of this process.

- 5) All numbers appeared in the cells from A15 through D26 are converted numbers from historical data (1985 to 1995) to natural logarithm numbers. This conversion process has been automatically done by previously made programming. Therefore, no matter different, up-dated or revised numbers are input in transposed form into the cells from A1 through D12, these are automatically converted to natural logarithm form and copied down to the those cells.

- 6) Calculation of regression of these data mentioned in above 5) are also automatically furnished by previously written and loaded macro command to the hardware systems

along with using basic calculation function process which is already provided in Excel. To proceed calculation of regression analysis, next step that the users ought to take is to first point “ **Tools** “ command line which are shown in the screen and click using mouse left button. Then drag mouse and point “ **Macro** “ command line.

7) When “ **Macro Name/Reference** “ appeared on the screen after taking above 6) process, then choose the appropriate macro name, in this case “ **CPIMRT** “, and click “ **Run** “ command which is shown on the upper right of the command box.

8) Regression process is automatically done by taking above operation process.

(2) CPIMRT

(Refer to Screen 017)

Formula and result value of regression analysis using internal variables of :

Price index and exchange rate : Consumer Price Index, (wage at Current Price : All Sectors (Skilled)) / (Labour Productivity (1990) : Total Labour Productivity at Constant Price (1990)), and Price Index and Exchange Rate : Import unit value Index

(3) IMVLIX

(Refer to Screen 018)

Formula and result value of regression analysis using internal variables of :

Price Index and Exchange Rate : Import unit value Index, Price Index and Exchange Rate : Exchange Rates: Rs vs US Dollar, and (Price Index and Exchange Rate : Consumer Price Index of South Africa) / (Price Index and Exchange Rate : SA

exchange Rates: Rand vs US Dollar)

Screen 017

	A	B	C	D	E	F	G
1	0	CPIMRT	WAGSKL/PVTC	IMVLIX	0	1985	15
2	1985	70	18	86	CPIMRT	70	
3	1986	71	19	70	WAGSKL/PVTC	18	
4	1987	72	24	72	IMVLIX	86	
5	1988	78	33	79			
6	1989	88	38	84			
7	1990	100	40	100			
8	1991	107	46	105			
9	1992	112	50	107			
10	1993	124	51	118			
11	1994	133	55	127			
12	1995	141	58	136			
13							
14							
15		LOG	LOG	LOG			
16	1985	1.8457	1.2493	1.9345			
17	1986	1.8531	1.2721	1.9432			
18	1987	1.8549	1.3844	1.8578			
19	1988	1.8832	1.5180	1.8960			
20	1989	1.9450	1.5852	1.9717			
21	1990	2.0000	1.5973	2.0000			
22	1991	2.0294	1.6617	2.0199			
23	1992	2.0492	1.6961	2.0290			
24	1993	2.0924	1.7107	2.0719			
25	1994	2.1732	1.7415	2.1021			

CPIMRT

Screen 018

A	B	C	D	E	F	G	H
0	IMVLX	EXCHG	CPISAEXGSA	0	1985	1986	
1985	86	15	21	IMVLX	86	70	
1986	70	13	26	EXCHG	15	13	
1987	72	13	33	CPISAEXGSA	21	26	
1988	78	13	34			13	
1989	94	15	33			26	
1990	100	15	39				
1991	105	16	42				
1992	107	16	46				
1993	118	18	44				
1994	127	18	44				
1995	136	18	47				
	LOG	LOG	LOG				
1985	1.9345	1.1886	1.3172				
1986	1.8432	1.1284	1.4092				
1987	1.8579	1.1103	1.5207				
1988	1.8960	1.1284	1.5277				
1989	1.9717	1.1833	1.5238				
1990	2.0000	1.1720	1.5873				
1991	2.0199	1.1945	1.6215				
1992	2.0290	1.1920	1.8634				
1993	2.0719	1.2467	1.6447				
1994	2.1021	1.2543	1.6458				

IMVLX

(4) EXVLIX

(Refer to Screen 019)

Formula and result value of regression analysis using internal variables of :

Price Index and Exchange Rate : Export unit value Index, and GDP Deflator

(5) DFLGDP

(Refer to Screen 020)

Formula and result value of regression analysis using internal variables of :

GDP Deflator and Price Index and Exchange Rate : Consumer Price Index

(6) RPCON

(Refer to Screen 021)

Formula and result value of regression analysis using internal variables of :

GDE at Constant Price (1990) : Private Consumption Expenditure GDP per Capita at Constant Price and Wage at Current Price :All Sectors (Skilled) / Price Index and Exchange Rate : Consumer Price Index

(7) RPFIX

(Refer to Screen 022)

Formula and result value of regression analysis using internal variables of :

Screen 019

Microsoft Excel - REGM.Macro

File Edit View Insert Format Tools Data Window Help

100%

A1 0

	A	B	C	D	E	F	G	H
1	0	EXVLIX	DFLGDP		0	1985	1986	
2	1985	64	63			64	67	
3	1986	67	68			63	68	
4	1987	75	74					
5	1988	80	82					
6	1989	95	91					
7	1990	100	100					
8	1991	106	108					
9	1992	114	114					
10	1993	124	124					
11	1994	129	133					
12	1995	139	141					
13								
14								
15		LOG	LOG					
16	1985	1.8035	1.8007					
17	1986	1.8280	1.8344					
18	1987	1.8768	1.8704					
19	1988	1.9031	1.9133					
20	1989	1.9795	1.9586					
21	1990	2.0000	2.0000					
22	1991	2.0289	2.0342					
23	1992	2.0561	2.0565					
24	1993	2.0917	2.0927					
25	1994	2.1113	2.1235					

FILE EDIT VIEW INSERT FORMAT TOOLS DATA WINDOW HELP

EVLIX

Microsoft Excel - REQM_M550

File Edit View Insert Format Tools Data Window Help

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F14

	A	B	C	D	E	F	G	H
1	0	DFLGDP	CPIMRT		0	1985	1986	
2	1985	63.20	70.10					
3	1986	68.30	71.30			63	68	
4	1987	74.20	71.60			70	71	
5	1988	81.90	78.20					
6	1989	90.90	88.10					
7	1990	100.00	100.00					
8	1991	108.20	107.00					
9	1992	113.80	112.00					
10	1993	123.80	123.70					
11	1994	132.90	132.80					
12	1995	140.90	141.00					
13								
14								
15		LOG	LOG					
16	1985	1.8007	1.8457					
17	1986	1.8344	1.8531					
18	1987	1.8704	1.8548					
19	1988	1.9133	1.8932					
20	1989	1.9586	1.9450					
21	1990	2.0000	2.0000					
22	1991	2.0342	2.0294					
23	1992	2.0565	2.0492					
24	1993	2.0827	2.0924					
25	1994	2.1235	2.1232					

DFLGDP CPIMRT

DFLGDP

FILE EDIT VIEW INSERT FORMAT TOOLS DATA WINDOW HELP

Screen 021

	A	B	C	D	E	F	G	H
1	0	RPCON	RGDP	WAGSKLCPIMF	0	1985	1986	
2	1985	17591.77	27182.77	-	RPCON	17592	17570	1
3	1986	17569.55	28558.24	21.08	RGDP	27183	29558	3
4	1987	18797.84	32740.41	22.17	WAGSKLCPIN	-	21	
5	1988	21018.54	35176.47	29.02				
6	1989	22937.29	36557.07	36.00				
7	1990	24840.00	39263.80	37.85				
8	1991	25454.71	40678.17	35.24				
9	1992	27215.98	43158.18	38.13				
10	1993	28867.53	45470.53	40.45				
11	1994	30368.70	47112.76	36.70				
12	1995	31745.92	48992.22	38.91				
13								
14								
15		LOG	LOG	LOG				
16	1985	4.2453	4.4343	-				
17	1986	4.2448	4.4707	1.3240				
18	1987	4.2966	4.5151	1.3458				
19	1988	4.3228	4.5463	1.4627				
20	1989	4.3605	4.5630	1.5563				
21	1990	4.3952	4.5940	1.5781				
22	1991	4.4058	4.6094	1.5470				
23	1992	4.4348	4.6351	1.5813				
24	1993	4.4604	4.6577	1.6069				
25	1994	4.4824	4.6731	1.5877				
26	1995	4.5021	4.6877	1.5677				

RPCON

Screen 022

	A	B	C	D	E	F	G	H
1	0	RPFIX	N+RVACOM+RVATRA+RVAB		0	1985	1986	
2	1985	3322.78	18923.48		RPFIX	3323	3682	
3	1986	3682.28	20452.63	VAELE+RVACON+RVACOM+F		18923	20453	2
4	1987	4602.43	23869.43					
5	1988	5683.76	26221.60					
6	1989	6963.70	27922.28					
7	1990	7560.00	29832.03					
8	1991	8197.78	31430.04					
9	1992	7894.11	33850.20					
10	1993	8905.49	35967.74					
11	1994	10425.13	38416.37					
12	1995	8843.15	40378.32					
13								
14								
15		LOG	LOG					
16	1985	3.5215	4.2770					
17	1986	3.5861	4.3107					
18	1987	3.6630	4.3778					
19	1988	3.7546	4.4167					
20	1989	3.8428	4.4460					
21	1990	3.8785	4.4747					
22	1991	3.9137	4.4973					
23	1992	3.8968	4.5296					
24	1993	3.9487	4.5559					
25	1994	4.0181	4.5845					

RPFIX

GDE at Constant Price (1990) : Gross Domestic Fixed Capital Formation, Private Fixed Capital Formation, and (GDP at Constant Price (1990) : Manufacturing) + (GDP at Constant Price (1990) : Electricity, Gas, and Water) + (GDP at Constant Price (1990) : Construction) + (GDP at Constant Price (1990) : Wholesale, Retail, Restaurants, and Hotels) + (GDP at Constant Price (1990) : Transportation, Storage, and Communication) + (GDP at Constant Price (1990) : Banking, Insurance, Real Estate, Business service) + (GDP at Constant Price (1990) : Other service)

(8) REXP

(Refer to Screen 023)

Formula and result value of regression analysis using internal variables of :

(GDE at Constant Price (1990) : Export of Goods and Non-factor Services, and (GDP at Constant Price (1990) : Manufacturing, Sugar) + (GDP at Constant Price : Manufacturing, EPZ) + (GDP at Constant Price (1990) : Wholesale, GDP at Constant Price (1990) : Retail, Restaurants, and Hotels) + (GDP at Constant Price (1990) : Banking, Insurance, Real Estate, Business) + (GDP at Constant Price (1990) : Other services)

(9) RIMP

(Refer to Screen 024)

Formula and result value of regression analysis using internal variables of :

GDE at Constant Price (1990) : Import of Goods and Non-factor Service, and (GDE at Constant Price (1990) : Private Consumption Expenditure) + (GDE at Constant Price (1990) : Gov. Consumption Expenditure) + (GDE at Constant Price (1990) : Gross Domestic Fixed Capital Formation) + (GDE at Constant Price (1990) : Export of

Screen 023

	A	B	C	D	E	F	G	H
1	0	REXP	RVASUG+RVAEPZ+RVACOM		0	1985	1986	
2	1985	14074.37	12856.49		REXP	14074	17451	2
3	1986	17450.95	13884.16		RVASUG+RVA	12856	13884	1
4	1987	21076.92	16614.49					
5	1988	22667.89	18225.32					
6	1989	23501.65	18184.64					
7	1990	25619.00	20424.94					
8	1991	25749.54	21424.68					
9	1992	26127.30	23109.79					
10	1993	27071.89	24487.89					
11	1994	27108.35	25970.59					
12	1995	28470.55	27265.15					
13								
14								
15		LOG	LOG					
16	1985	4.1484	4.1091					
17	1986	4.2418	4.1425					
18	1987	4.3238	4.2205					
19	1988	4.3554	4.2607					
20	1989	4.3711	4.2830					
21	1990	4.4086	4.3102					
22	1991	4.4108	4.3309					
23	1992	4.4171	4.3638					
24	1993	4.4325	4.3891					
25	1994	4.4331	4.4145					

REXP

Screen 024

	A	B	C	D	E	F	G	H
1	0	RIMP	RPCON+RGCON+RDFX+RE		0	1985	1986	
2	1985	14572.78	39601.27		RIMP	14573	15530	2
3	1986	15630.01	43755.49		RPCON+RGCON	38601	43755	5
4	1987	20405.66	51402.96					
5	1988	24405.37	57727.72					
6	1989	26183.72	60181.42					
7	1990	28458.	66780.					
8	1991	27296.67	67276.34					
9	1992	27555.75	70467.95					
10	1993	29903.07	74426.48					
11	1994	31271.63	78066.97					
12	1995	30589.07	79329.31					
13								
14								
15		LOG	LOG					
16	1985	4.1635	4.5977					
17	1986	4.1912	4.6410					
18	1987	4.3098	4.7110					
19	1988	4.3875	4.7614					
20	1989	4.4180	4.7795					
21	1990	4.4542	4.8246					
22	1991	4.4361	4.8279					
23	1992	4.4402	4.8480					
24	1993	4.4757	4.8717					
25	1994	4.4952	4.8925					

RIMP

Goods and Non-factor Services)

(10) PROM

(Refer to Screen 025)

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.

(11) MacRecord

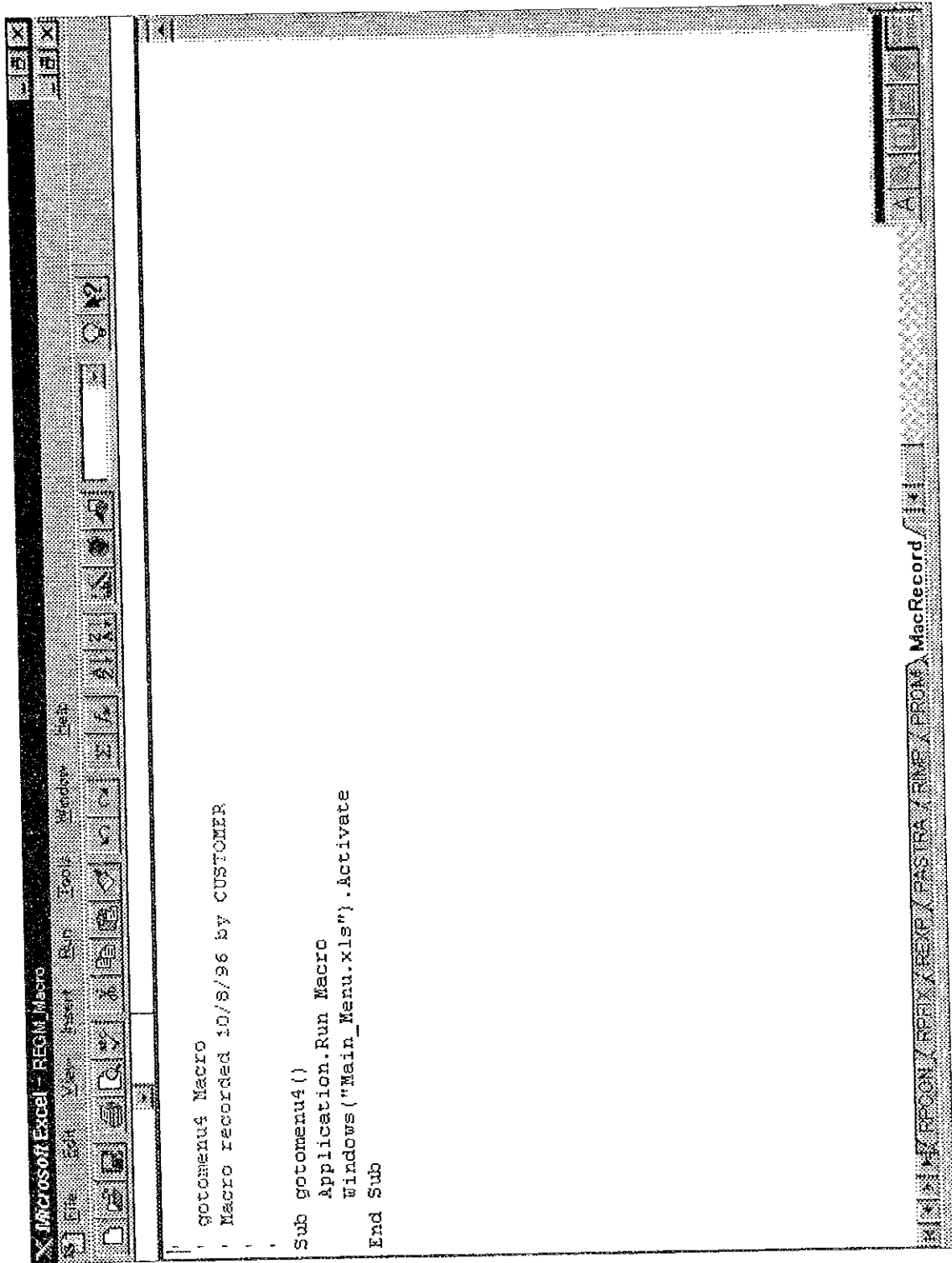
(Refer to Screen 026)

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 **REGM_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.

4.7 REGE_Macro.XLS File

REGE_Macro.XLS is a file used as a tool for regression analysis which arises in forecasting future energy demand. This file consists of a historical filing sheet (Eng sheet) made up of source data and baseline data and several other sheets used for defining

Screen 026



MacRecord

the process of regression analysis by extracting baseline data from this first sheet and displaying the results.

Figure 4-6 shows the structure of these sheets.

Demand for the year 1996 and beyond is forecast by applying the future growth rates for various macro-economic variables found in this file and computational results derived from these rates in a formula for forecasting future energy demand.

(1) ENG

(Refer to Screen 027)

This sheet contains the historical data values used as the source data and baseline data in order to analyze future growth of the macro economy and energy demand. Historical data contained in this sheet includes historical macro-economic data for the years 1985 through 1995 and historical energy demand data. Historical data items for 1985 through 1995 are transferred as-is from **Energy_Case_01.XLS**, the master file of the energy database. The source of nearly all this data is based on statistical formulas from the Central Statistics Office (CSO).

Following sheets represent entire process of calculating regression formula, although the method of operation of calculation is all same by taking access method as follows (Here explained by taking an example from calculating process of **ARTV** which is diffusion rate of TV set in private residential.

From cell E1 to P1 represents all year to input so that is written from 1985 to 1995 horizontally. Operators are able to input all these numerical variables manually, however, it is much convenient to automatically bring those variables rather than input manually.

Microsoft Excel - REGE.Macro												
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	A	B	C	D	E	F	G	H	I	J	K	
							1985	1986	1987	1988	1989	1990
1							990	990	1,000	1,020	1,030	1,030
2		Social statistics										
3	E	Population (Middle of Y-1000 Person POP					990	990	1,000	1,020	1,030	1,030
4	I	Independent Household:1000 familie HOH					165	165	167	170	172	172
5												
6		Labor Forces										
7	E	Agriculture, Hunting, Fc Person					93,200	90,600	89,500	86,900	86,700	72,91
8	E	Manufacturing					86,200	90,300	110,200	124,900	126,200	139,01
9	E	Sugar										7.51
10	E	EPZ										88.91
11	E	Domestic Manufact. Person										42.81
12	E	Electricity, Gas, and W Person					3,900	3,600	3,700	3,600	3,500	3.41
13	E	Construction					12,800	13,400	19,300	25,100	26,800	31.01
14	E	Wholesale, Retail, Rest Person					28,400	29,400	32,500	39,300	43,200	52.21
15	E	Transportation, Storage Person					18,900	19,400	21,900	23,200	26,600	28.71
16	E	Banking, Insurance, Re Person					6,200	6,500	7,000	7,700	9,600	11.51
17	E	Other service					96,900	96,600	97,700	101,200	99,200	102.11
18	I	Total Labor Force					326,500	349,800	381,800	411,900	421,800	440.81
19	I	Labor Force in Populati	%				33	35	36	40	41	
20												
21		GDP at current Price										
22	I	Agriculture, Hunting, Fc Rs. Million					2,143	2,532	2,967	3,172	3,501	4.01
23	I	Manufacturing					2,864	3,830	4,976	5,847	6,648	7.71
24	I	Sugar					436	605	676	597	852	7.11
25	I	EPZ					1,333	1,900	2,585	3,125		
26	ENG	RTV / ATOR / ANSO / SCIE / OTOS / GCEE / T / I /										

- 2) To cells such as E2, E3, and E4, data items to input vertically to the cells are automatically drawn from the first sheet of " ENG ". Operators are able to input all these character variables manually, however, it is much convenient to automatically bring those variables. The user of this database now are able to see all data items, for example data item or character variable ARTV in cell E2, however actually command (here =ENG!E97) is recorded because this input item is drawn from original " ENG " sheet. Note that in case two or more multiple character variables are to input in one cell, so that these should be written manually. Therefore it appears to be " ARTV " in the cell E3 to the user. Again, however, cell E4 consists from single character variables, it automatically dragged from " ENG " Sheet, so that will be able to read (=ENG!E95) in cell E4.
- 3) In cell F2, numerical number 12,695 is shown, however, command code " =ENG!F97 " appeared in the command line shown in the top portion of the screen. Again that is dragged automatically from " ENG " Sheet. In G2 cell, it appeared that command code " =ENG!F97 " . That represent in cell G2 is a continuous command from F2 cell. That is meant that all command line from cell G2 to cell P2 is automatically copied from G2 cell horizontally. This is normal procedure of Excel when making related command line from one to others. Note that vertical cell F1 to F4 are copied to G1 - G4 vertically to P1 - P4 horizontally.
- 4) Cell A1 through cell D12 are exactly same value of cell E1 through P4, but copied in transpose formation. Since one the limitation of Excel in calculation of regression formula is taking only vertically input character or numerical variables, operators ought to arrange its formation of original sheet to transpose formation. This procedure is quite simple. What the user is to take is to high-lighten by dragging original cell area (in this case cell E1 through P4), and click right button of the mouse. When command box appears on the screen, then select second command line " copy ". Then point the front tip of arrow of the mouse to cell A1 and again click right button of the mouse. When same command button as previous one appears on the screen, then point-out arrow of the mouse to choose command " **Past Special** " and click. When another command box appears on the screen, then choose " **Values** " and " **Transpose** " command, then

click “ **OK** “ afterwards of this process.

- 5) All numbers appeared in the cells from A15 through D26 are converted numbers from historical data (1985 to 1995) to natural logarithm numbers. This conversion process has been automatically done by previously made programming. Therefore, no matter different, up-dated or revised numbers are input in transposed form into the cells from A1 through D12, these are automatically converted to natural logarithm form and copied down to the those cells.
- 6) Calculation of regression of these data mentioned in above 5) are also automatically furnished by previously written and loaded macro command to the hardware systems along with using basic calculation function process which is already provided in Excel. To proceed calculation of regression analysis, next step that the users ought to take is to first point “ **Tools** “ command line which are shown in the screen and click using mouse left button. Then drag mouse and point “ **Macro** “ command line.
- 7) When “ **Macro Name/Reference** “ appeared on the screen after taking above 6) process, then choose the appropriate macro name, in this case “ **ARTV** “, and click “ **Run** “ command which is shown on the upper right of the command box.
- 8) Regression process is automatically done by taking above operation process.

(2) **ARTV**

(**Refer to Screen 028**)

Screen 028

	A	B	C	D	E	F	G
1	0	ARTV	RGDP	ARTV	0	1985	1986
2	1985	126955	27183	ARTV	ARTV	126955	129419
3	1986	129419	29558	ARTV	RGDP	27183	29558
4	1987	131978	32740	126955	ARTV	ARTV	126955
5	1988	138000	35176	129419	131978		
6	1989	143732	36557	138000	138000		
7	1990	146746	39284	143732	143732		
8	1991	150960	40678	146746	146746		
9	1992	156813	43158	150960	150960		
10	1993	159712	45471	156813	156813		
11	1994	162700	47113	159712	159712		
12	1995	165726	48932	162700	162700		
13							
14							
15		LOG	LOG	LOG			
16	1985	5.1036	4.4343	ARTV			
17	1986	5.1120	4.4707	5.1036			
18	1987	5.1205	4.5151	5.1120			
19	1988	5.1399	4.5463	5.1205			
20	1989	5.1576	4.5630	5.1399			
21	1990	5.1666	4.5940	5.1576			
22	1991	5.1789	4.6094	5.1666			
23	1992	5.1954	4.6351	5.1789			
24	1993	5.2033	4.6577	5.1954			
25	1994	5.2114	4.6731	5.2033			
26	1995	5.2194	4.6896	5.2114			

ARTV

Formula and result value of regression analysis using internal variables of :

Diffusion rate of TV set in the individual residence.

(3) ATCAR

(Refer to Screen 029)

Formula and result value of regression analysis using internal variables of :

Diffusion rate of TV in Residential and GDP per Capita at Constant Price (1990)

(4) ATCYC

(Refer to Screen 030)

Formula and result value of regression analysis using internal variables of :

Transportation Equipment : Motor cycle and Auto Cycle (Registered), GDP per Capita at Constant Price, and Transportation Equipment : Motor cycle and Auto Cycle (Registered)

(5) GCIELE

(Refer to Screen 031)

Formula and result value of regression analysis using internal variables of :

Consumption by Industry (PHY) : Electricity including irrigation, GDP at Constant Price (1990) : Manufacturing, and Electricity (Prices (PHY) : Electricity (Industry General)) / (Price Index and Exchange Rate : Consumer Price Index)

Screen 029

	A	B	C	D	E	F	G
1	0	ATCAR	RGDP	ATCAR	0	1985	1986
2	1985	33982	27183	ATCAR	ATCAR	33982	35124
3	1986	35124	29558	33982	RGDP	27183	29558
4	1987	37544	32740	35124	ATCAR	ATCAR	33982
5	1988	40566	35176	37544			
6	1989	43379	36557	40566			
7	1990	46793	39264	43379			
8	1991	50016	40678	46793			
9	1992	53942	43158	50016			
10	1993	57393	45471	53942			
11	1994	61378	47113	57393			
12	1995	65374	48932	61378			
13							
14							
15		LOG	LOG	LOG			
16	1985	4.5312	4.4343	ATCAR			
17	1986	4.5456	4.4707	4.5312			
18	1987	4.5745	4.5151	4.5456			
19	1988	4.6082	4.5463	4.5745			
20	1989	4.6373	4.5630	4.6082			
21	1990	4.6702	4.5940	4.6373			
22	1991	4.6991	4.6094	4.6702			
23	1992	4.7319	4.6351	4.6991			
24	1993	4.7589	4.6577	4.7319			
25	1994	4.7880	4.6731	4.7589			
26	1995	4.8154	4.6896	4.7880			

ATCAR

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F10

	A	B	C	D	E	F	G	H
1	0	ATCYC	RGDP	ATCYC	0	1985	1986	
2	1985	28528	27183	ATCYC	ATCYC	28528	29564	33
3	1986	29564	28558	28528	RGDP	27183	29558	32
4	1987	33560	32740	29564	ATCYC	ATCYC	28528	29
5	1988	39093	35176	33560				
6	1989	46404	36557	39093				
7	1990	57094	39264	46404				
8	1991	68574	40678	57094				
9	1992	77739	43158	68574				
10	1993	85540	45471	77739				
11	1994	92970	47113	85540				
12	1995	97809	48932	92970				
13								
14								
15		LOG	LOG	LOG				
16	1985	4.4553	4.4343					
17	1986	4.4708	4.4707	4.4553				
18	1987	4.5258	4.5151	4.4708				
19	1988	4.5921	4.5463	4.5258				
20	1989	4.6666	4.5630	4.5921				
21	1990	4.7566	4.5940	4.6666				
22	1991	4.8362	4.6094	4.7566				
23	1992	4.8906	4.6351	4.8362				
24	1993	4.9322	4.6577	4.8906				
25	1994	4.9683	4.6731	4.9322				
26	1995	4.9904	4.6896	4.9683				

MIN NUMERS (ATCYC/ATCAR) ATCYC (GDP) TO BE (GDP)E (TIM)

Screen 031

	A	B	C	D	E	F	G	H
1	0	GCIELE	RVAMAN	GPelig/OPIMR		1985	1986	1
2	1985	103900	4630	0	GCIELE	103900	125200	145
3	1986	125200	5564	0	RVAMAN	4630	5564	6
4	1987	149200	6362	0	GPelig/OPIMR	0.0245	0.0236	0.0
5	1988	174000	6872	0				
6	1989	191600	7228	0				
7	1990	226200	7784	0				
8	1991	246400	8147	0				
9	1992	260200	8681	0				
10	1993	272700	9081	0				
11	1994	295800	9493	0				
12	1995	322476	10041	0				
13								
14								
15		LOG	LOG	LOG				
16	1985	5.0166	3.6655	-1.6102				
17	1986	5.0976	3.7454	-1.6278				
18	1987	5.1738	3.8036	-1.6348				
19	1988	5.2405	3.8371	-1.6731				
20	1989	5.2824	3.8590	-1.7275				
21	1990	5.3545	3.8912	-1.7852				
22	1991	5.3916	3.9110	-1.7741				
23	1992	5.4153	3.9386	-1.7820				
24	1993	5.4357	3.9582	-1.8113				
25	1994	5.4710	3.9774	-1.8444				
26	1995	5.5085	4.0018	-1.8774				

GCIELE

(6) TCITOE

(Refer to Screen 032)

Formula and result value of regression analysis using internal variables of :

(GDP at Constant Price (1990) : Manufacturing, EPZ) + (GDP at Constant Price (1990) : Manufacturing, Domestic Manufacturing), and (Energy Retail Prices (PHY) : Fuel Oil) / (Price Index and Exchange Rate : Consumer Price Index)

(7) GCCELE

(Refer to Screen 033)

Formula and result value of regression analysis using internal variables of :

Consumption by Commercial (PHY) : Electricity, and (GDP at Constant Price (1990) : Wholesale, Retail, Restaurants, and Hotels) + (GDP at Constant Price (1990) : Banking, Insurance, Real Estate, Business service) + (GDP at Constant Price (1990) : Other service) and (Electricity Prices (PHY) : Electricity (Commercial)) / (Price Index and Exchange Rate : Consumer Price Index)

(8) TCCTOE

(Refer to Screen 034)

Formula and result value of regression analysis using internal variables of :

(Consumption by Commercial (TOE) : Total Consumption by Commercial and GDP at Constant Price (1990) : Wholesale, Retail, Restaurants, and Hotels) + (GDP at Constant Price (1990) : Banking, Insurance, Real Estate, Business service) + (GDP at Constant Price (1990) : Other service)

Screen 032

	A	B	C	D	E	F	G	H
1	0	TCITOE	VAEPZ+RVADCGRFUE/CPIMRI	0	TCITOE	0	1985	1986
2	1985	38127	3876	0	TCITOE	38127	32923	37
3	1986	32923	4715	0.0440	RVAEPZ+RVAC	3876	4715	5
4	1987	37101	5546	0.0440	GRFUE/CPIMR	0.04401617	0.04401617	0.044
5	1988	42328	6139	0.0440				
6	1989	47462	6586	0.0440				
7	1990	53527	7064	0.0440				
8	1991	60119	7439	0.0440				
9	1992	66682	7915	0.0440				
10	1993	83953	8428	0.0440				
11	1994	73293	8919	0.0440				
12	1995	60263	9409	0.0440				
13								
14								
15		LOG	LOG	LOG	LOG			
16	1985	4.5812	3.5683	-1.3564				
17	1986	4.5175	3.6735	-1.3564				
18	1987	4.5694	3.7440	-1.3564				
19	1988	4.6266	3.7881	-1.3564				
20	1989	4.6763	3.8186	-1.3564				
21	1990	4.7286	3.8491	-1.3564				
22	1991	4.7790	3.8715	-1.3564				
23	1992	4.7831	3.8984	-1.3564				
24	1993	4.9240	3.9257	-1.3564				
25	1994	4.8651	3.9503	-1.3564				
26	1995	4.9045	3.9735	-1.3564				
WIN+H ENG/ARTD/ATCYS/GOELE/TCITOE/SCORE/T14								

TCITOE

Screen 033

	A	B	C	D	E	F	G	H
1	0	GCCELE	DM+RVABAN+RIPELCO/OPIMR	GCCELE	0	1985	1986	1
2	1985	73000	10201	GCCELE	GCCELE	73000	81600	92
3	1986	81600	10470	0.0281	RVACOM+RVA	10201	10470	12
4	1987	92000	12669	0.0272	GRELCO/OPIM	GCCELE	0.02810271	0.027
5	1988	102000	13987	0.0270				
6	1989	108600	14828	0.0247				
7	1990	126400	15729	0.0220				
8	1991	149400	16543	0.0194				
9	1992	168300	17919	0.0216				
10	1993	185000	19155	0.0217				
11	1994	206800	20518	0.0213				
12	1995	227327	21511	0.0197				
13								
14								
15		LOG	LOG	LOG				
16	1985	4.8633	4.0086	GCCELE				
17	1986	4.9117	4.0199	-1.5513				
18	1987	4.9638	4.1027	-1.5653				
19	1988	5.0086	4.1457	-1.5694				
20	1989	5.0358	4.1711	-1.6076				
21	1990	5.1017	4.1967	-1.6572				
22	1991	5.1744	4.2186	-1.7122				
23	1992	5.2261	4.2533	-1.6658				
24	1993	5.2672	4.2823	-1.6636				
25	1994	5.3156	4.3121	-1.6724				
26	1995	5.3567	4.3327	-1.7049				
M:MIN ENUS/RTD/CATGR/ATOCG/GCCELE X 109E GCCELE / N								

GCCELE

Screen 034

	A	B	C	D	E	F	G	H
1	0	TCCTOE	DM+RVABAN+RRLPG/CPIMR	TCCTOE	0	1985	1986	
2	1985	1543	10201	TCCTOE	TCCTOE	1543	1450	
3	1986	1450	10470	0.2004	RVACOM+RVA	10201	10470	12
4	1987	1601	12669	0.2081	GRLPG/CPIMR	TCCTOE	0.20049643	0.208
5	1988	2080	13987	0.1115				
6	1989	2591	14828	0.1021				
7	1990	2915	15729	0.0981				
8	1991	2946	16543	0.1036				
9	1992	3534	17919	0.0969				
10	1993	4265	19155	0.0925				
11	1994	4283	20518	0.0838				
12	1995	3994	21511	0.0780				
13								
14								
15		LOG	LOG	LOG				
16	1985	3.1883	4.0086					
17	1986	3.1612	4.0199	-0.6980				
18	1987	3.2043	4.1027	-0.6818				
19	1988	3.3202	4.1457	-0.9529				
20	1989	3.4135	4.1711	-0.9912				
21	1990	3.4646	4.1967	-1.0039				
22	1991	3.4692	4.2186	-0.9845				
23	1992	3.5483	4.2533	-1.0139				
24	1993	3.6299	4.2823	-1.0337				
25	1994	3.6318	4.3121	-1.0769				
26	1995	3.6014	4.3327	-1.1077				

TCCTOE

(9) TCTGAS

(Refer to Screen 035)

Formula and result value of regression analysis using internal variables of :

Consumption by Transport (TOE) : Gasoline, and (10 times of Transportation Equipment : Car and Dual Purpose Car (Registered)) + (Transportation Equipment : Motor cycle and Auto Cycle (Registered)), and (Energy Retail Prices (PHY) : Gasoline) / (Price Index and Exchange Rate : Consumer Price Index)

(10) TCTDIE

(Refer to Screen 036)

Formula and result value of regression analysis using internal variables of :

Consumption by Transport (TOE) : Diesel, and (Transportation Equipment : Lorry, Truck, and Van (Registered)) + (Transportation Equipment : Bus (Registered)), and (Energy Retail Prices (PHY) : Diesel (Gas oil)) / (Price Index and Exchange Rate : Consumer Price Index)

(11) GCDELE

(Refer to Screen 037)

Formula and result value of regression analysis using internal variables of :

Consumption by Residential (PHY) : Electricity, GDE at Constant Price (1990) : Private Consumption Expenditure, and Consumption by Residential (PHY) : Electricity 1986 through 1995

	A	B	C	D	E	F	G	H
9	1992	73276	617159	0.0878				
10	1993	78093	658470	0.0889				
11	1994	85963	706750	0.0759				
12	1995	90675	751549	0.0707				
13								
14								
15		LOG	LOG	LOG				
16	1985	4.5749	5.5663	-				
17	1986	4.6150	5.5807	-0.9366				
18	1987	4.6696	5.6117	-0.9690				
19	1988	4.7098	5.6481	-0.9708				
20	1989	4.7571	5.6814	-1.0091				
21	1990	4.8057	5.7202	-1.0609				
22	1991	4.8220	5.7549	-1.1159				
23	1992	4.8650	5.7904	-1.0566				
24	1993	4.8926	5.8192	-1.0764				
25	1994	4.9343	5.8493	-1.1195				
26	1995	4.9575	5.8760	-1.1504				
27								
28								
29								
30								
31								
32								
33								
34								

TCTGAS

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	A	B	C	D	E	F	G	H	I
	1985	1986	1987	1988	1989	1990	1991	1992	1993
1	0	TOTDIE	ATTRU+ATBUS	GRDIE/CPIMRT	TCTDIE	0	1985	1986	1
2	1985	41623	9305	TCTDIE	TCTDIE	41623	54420	6C	
3	1986	54420	9517	0.0692	ATTRU+ATBUS	9305	9517	1C	
4	1987	60869	10003	0.0632	GRDIE/CPIMRT	TCTDIE	0.069189747	0.06	
5	1988	66878	10943	0.0629					
6	1989	70188	12180	0.0576					
7	1990	76710	13435	0.0511					
8	1991	77969	15222	0.0451					
9	1992	85666	16925	0.0506					
10	1993	94332	18742	0.0483					
11	1994	98590	20105	0.0438					
12	1995	101458	21215	0.0408					
13									
14									
15		LOG	LOG	LOG					
16	1985	4.6193	3.9687	TCTDIE					
17	1986	4.7358	3.9785	-1.1600					
18	1987	4.7844	4.0001	-1.1994					
19	1988	4.8253	4.0391	-1.2012					
20	1989	4.8463	4.0856	-1.2395					
21	1990	4.8848	4.1282	-1.2912					
22	1991	4.8919	4.1825	-1.3463					
23	1992	4.9328	4.2285	-1.2959					
24	1993	4.9747	4.2728	-1.3158					
25	1994	4.9938	4.3033	-1.3589					
26	1995	5.0063	4.3266	-1.3898					

Screen 037

	A	B	C	D	E	F	G	H
1	0	GCDELE	RPCON	GCDELE(1)	0	1985	1986	1
2	1985	138200	17592	GCDELE	GCDELE	138,200	143,400	154
3	1986	143400	17570	138200.0000	RPCON	17,592	17,570	15
4	1987	154400	19798	143400.0000	GCDELE(1)	GCDELE	138,200	14
5	1988	167300	21020	154400.0000				
6	1989	178800	22937	167300.0000				
7	1990	198900	24840	178800.0000				
8	1991	220400	25455	198900.0000				
9	1992	249300	27216	220400.0000				
10	1993	274300	28868	249300.0000				
11	1994	295600	30369	274300.0000				
12	1995	330792	31746	295600.0000				
13								
14								
15		LOG	LOG	LOG				
16	1985	51405	42453	GCDELE				
17	1986	51565	42448	51405				
18	1987	51886	42966	51565				
19	1988	52235	43226	51886				
20	1989	52548	43605	52235				
21	1990	52986	43952	52548				
22	1991	53432	44058	52986				
23	1992	53967	44348	53432				
24	1993	54382	44604	53967				
25	1994	54707	44824	54382				
26	1995	55196	45017	54707				

GCDELE

(12) TCDTOE2

(Refer to Screen 038)

Formula and result value of regression analysis using internal variables of :

Consumption by Residential (TOE) : Total Consumption by Residential, and
GDE at Constant Price (1990) : Private Consumption Expenditure

(13) TCDTOE

(Refer to Screen 039)

Formula and result value of regression analysis using internal variables of :

Consumption by Residential (TOE) : Total Consumption by Residential, and
(Wage at Current Price : All Sectors (Skilled)) / (Price Index and Exchange Rate :
Consumer Price Index)

(14) PROE

(Refer to Screen 040)

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.