O-1

Operation Manual
of
Simple E.

JICA Study Team

The Institute of Energy Economics, Japan

Simple Econometric Simulation System

Excel Add-In

Simple E. V3.0

for Excel 97 and Excel 2000

Introductory Manual

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1. Introduction

Simple E. (Simple Econometric Simulation System) is developed to assist econometric modelers to concentrate on data preparation and model specifications. The processes of regression, simulation, and forecasting are automated as much as possible. Also, the increasing popularity of data manipulation in spreadsheets with the emergence of powerful PC and sophisticated spreadsheet software is the increasing pressure to do analysis within the spreadsheet. *Simple E.* is the response, which is designed to be fully compatible with a spreadsheet.

Simple E. is an *Add-In* application of *Microsoft Excel 97 (and 2000)*. It takes the full advantages of the native spreadsheet functions as well as the open interfaces with other *Windows* applications. At the same time, it integrates the processes of data inputs, modeling, model analysis, forecasting, and simulations. It requires no programming. Besides, the graphical and visible operations make *Simple E.* easy to use and learn. The users can concentrate on the most demanding tasks of modeling and simulations with the advantages of full transparency and compatibility with other data and program interfaces within *Windows*.

Simple E. uses ordinary least square (OLS) as the estimator of regression models. Groups (systems) of equations can include various forms of regression models and defined equations. Each time series variable or its model is assigned to one row of worksheets. Each time period or each case of variables is assigned to one column of worksheets. Therefore, the number of equations or models can be up to 65534 depending on the limit of the number of spreadsheet rows. The number of cases for each variable can be up to 245 depending on the limit of the number of spreadsheet columns.

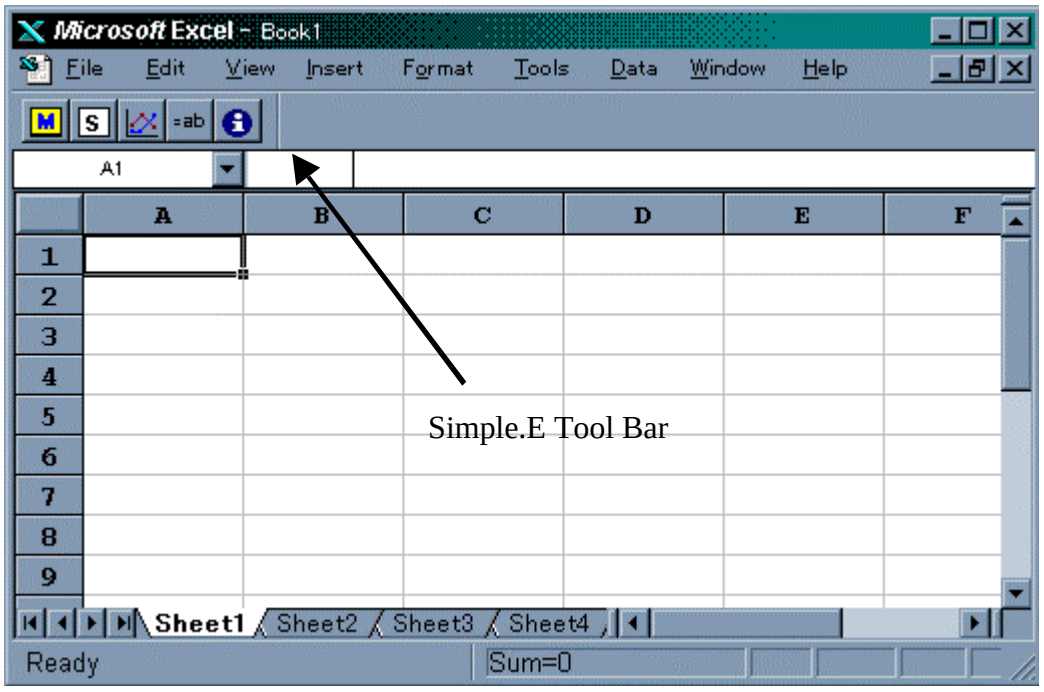
2. Install (Load) and Un-install (Unload)

Simple E. Program file consists of one file named *Simple_E.xla*.

Installation Procedure:

1) Copy *Simple_E.xla* to your favorite hard disk directory.
2) Open "Add-In" menu from "Tools" menu.
3) If *Simple_E.xla* is in "Library" directory of *Office*, you can find *Simple_E.* in the "Add-In" Menu. Otherwise, open "Browse" to find and select *Simple_E.*
4) Check the box of *Simple_E.* in "Add-In" menu and click "OK."

The program *Simple E.* will be loaded and the five buttons of *Simple E.* toolbar will be displayed on the upper-left corner as follows.



Un-installation Procedure:

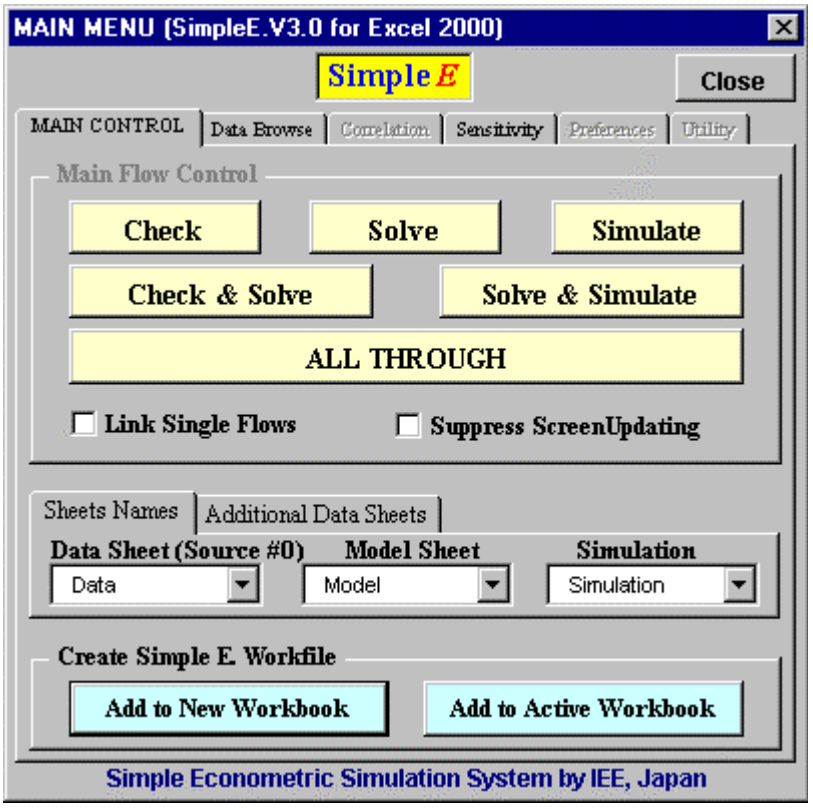
1) To unload, clear the box of *Simple_E.* of "Add-In" menu and click "OK." The program will be unloaded and the toolbar will disappear.
2) To remove the program, delete or remove the program from the installed directory and delete *Simple_E.* from "Add-In" menu.

3. Create *Simple E.* application worksheets (file)

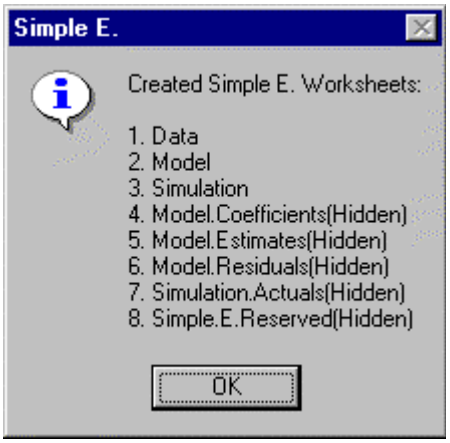
All processes are carried out in the specially designed worksheets. These worksheets can be created using a utility in the program. Before the creation, *Simple E.* have to be loaded. If *Simple E.* is not loaded, it should be loaded from "Add-In" menu.

To create new *Simple E.* worksheets into a new workbook, first, click the "Main Menu" button M of the Simple E. tool bar. The following "Main Menu" will be displayed.

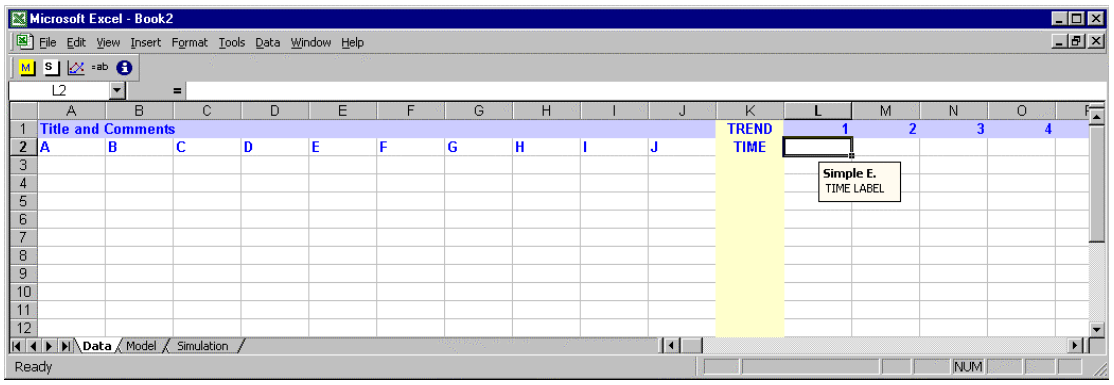
Main-Menu:



Next, click the command button "Add to New Workbook" of the Main Menu. Or, if you want to create new *Simple E.* worksheets in the same active workbook, click the button "Add to Active Workbook." The following message will be displayed.



The new *Simple E.* Worksheets should have the visible three sheets: 1) Data; 2) Model; 3) Simulation as follows. These names are default. Other names can be directly set in Sheet Names box before the creation of these worksheets.



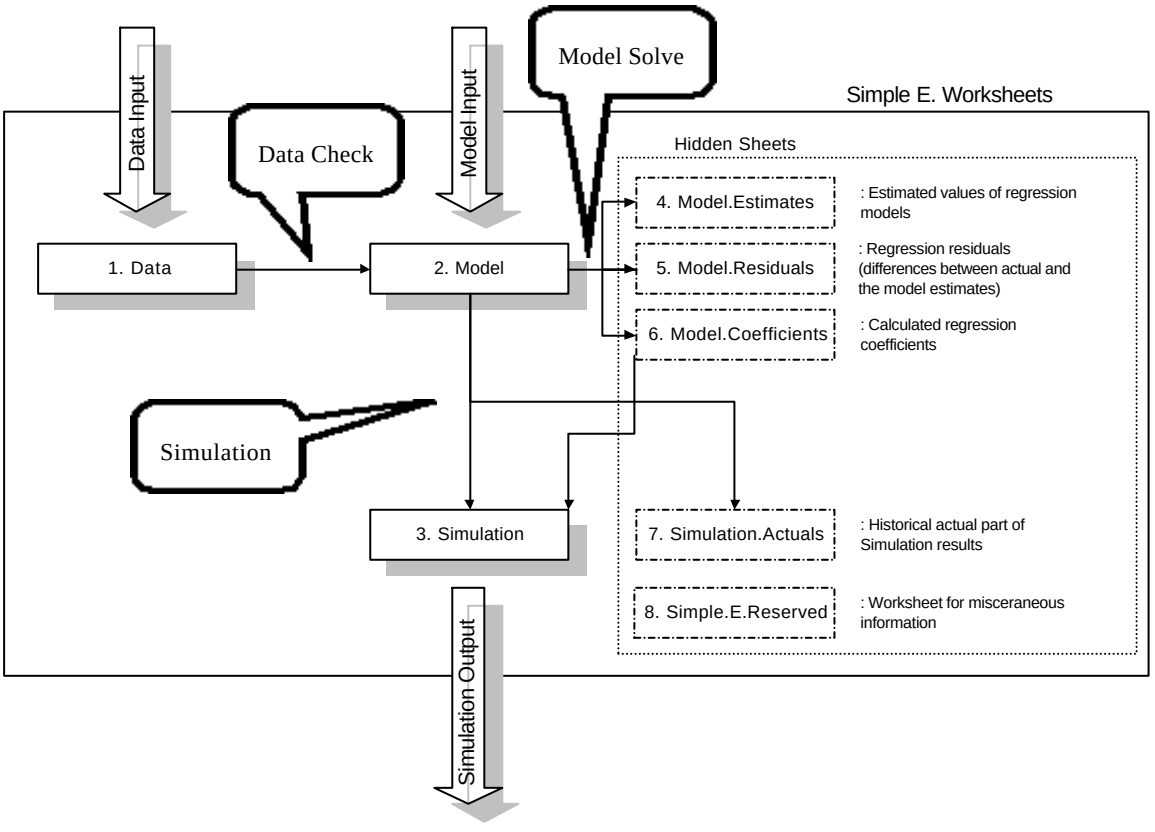
4. Basic concepts of *Simple E.*

4.1 Basic components of *Simple E.* application file and *Simple E.* main processes

Simple E. application file is an *Excel* workbook file that includes the above three sheets. *Simple E.* cannot work without these sheets. On the other hand, the inputs and outputs in these three sheets can be used without *Simple E.* From data input to simulation, there are three processes -- 1) Model check, 2) Model Solve (Estimation of coefficients), and 3) Simulation-- are the main flows automated by *Simple E.* The next diagram shows the basic concepts and the relationship of these processes with the above three sheets.

Conceptual Diagram:

Conceptual Diagram of Simple E. Worksheets



As shown in the above diagram, first, users have to prepare the necessary data and their idea of model specifications. Next, the users have to prepare the data in "Data" sheet and the model specifications in "Model" sheet. The rest of the tasks from model checking to simulation are the works of *Simple E*. "Model" will be solved in the hidden sheets "Model.Estimates", "Model.Residuals", and "Model.Coefficients." The "Model" sheet presents the statistical summary and estimated equations. The simulation results will be calculated in "Simulation" sheet. The part of the actual past will be set in the hidden sheet "Simulation.Actuals."

4.2 *Simple E.* Main flows

The machine-manageable processes are separated to the above three main flows to get an easy feedback from each stage. The flows are started by the command buttons in main menu: *Check*, *Solve* and *Simulate.* The combined buttons are *Check & Solve*, *Solve & Simulate,* and *All Through*.

1) Check (Model Check)

The data and models have to be consistent. "Model Check" flow automates the following processes.

i. Check whether the variable codes used in "Model" sheets are consistent with those in "Data" sheets.
ii. Check and set valid range of time interval for each model.
iii. Distinguish internal and external variable from models.

2) Solve (Model Solve)

This flow completes "Model" sheet. This solves each regression model in "Model" sheet and sets the results in "Regression" sheet. The following statistics will be calculated.

i. R-Square
ii. Adjusted R-Square
iii. Durbin Watson Statistics
iv. Durbin h Statistics (for models with one-period-lagged dependent variable)
v. Coefficient of serial correlation (for grid search models and Durbin h)
vi. Coefficients of variables and their t-values
vii. Degree of freedom with p-value 5% level of R-Square and t-value
viii. F-statistics and the p-value
ix. Residual Sum of Square

x. Correlation
xi. Multiple Coefficient of Determination (R-Square),
xii. Adjusted R-Square
xiii. Durbin-Watson Statistics,
xiv. Model estimates and residuals.

3) Simulation

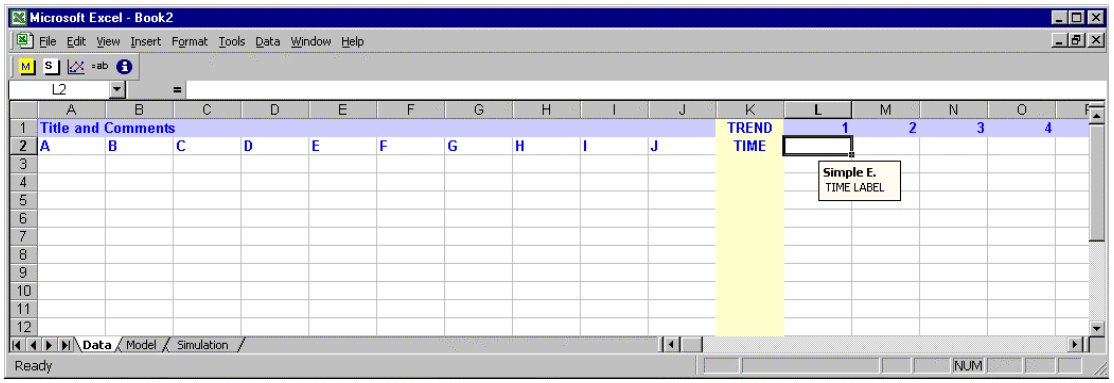
This flow completes "Simulation" sheet. This solves each model under given future assumptions of external variables. The definitions (deterministic equations) can be included. For regression models, coefficients of independent variables in solved in "Model" sheet will be used for simulation.

These three flows can be started independently or in combination of all or two. Note that, however, simulation requires the results of the estimated coefficients of regression models if *Model* includes regression model.

5. Data Input

Data are the fundamental requirement in *Simple E*. *Simple E*. looks for the code name that is specified in "Model" sheet and then picks up the necessary data looking into the row of "TIME" that is also specified in the "Sample Range" columns in "Model" sheet. Therefore, among all, the values of data, their code name and the time label in the "TIME" row are the three basic components to be prepared for analysis. The purpose of each area is described below.

5.1 Data sheet



Data sheet consists of five parts.

i) FREE AREA "A:J": The first ten columns (Range A:J) are the area for free. This area will be useful to set such information as data categories, data source information, unabbreviated name of the variable, unit, and other comments.

ii) Trend Constant "K1": "TREND" is the default code name for the serial number from 1 to 245 for the range "L1:IV1". The code name "TREND" can be used as a variable of series "1, 2, 3, … , 245". Also the number shows the order of each column.

iii) CODE Area "K": The column "K" is for code name of each variable. Code name should be unique for each variable and every variable must have code name to be used with *Simple E.* The letters to be used for code name are limited to from "A(a)" to "Z(z)", from "0" to "9", ".", "_". A code name like "A1" can confuse with the cell address name "A1" so that code, which resemble cell address should not be used. Also, some special code name such as "C" is reserved for Excel and cannot be used. The length of the code had better be short. Because, the length of

each equation, which could includes several code names as well as operators and functions is limited to 255 characters.

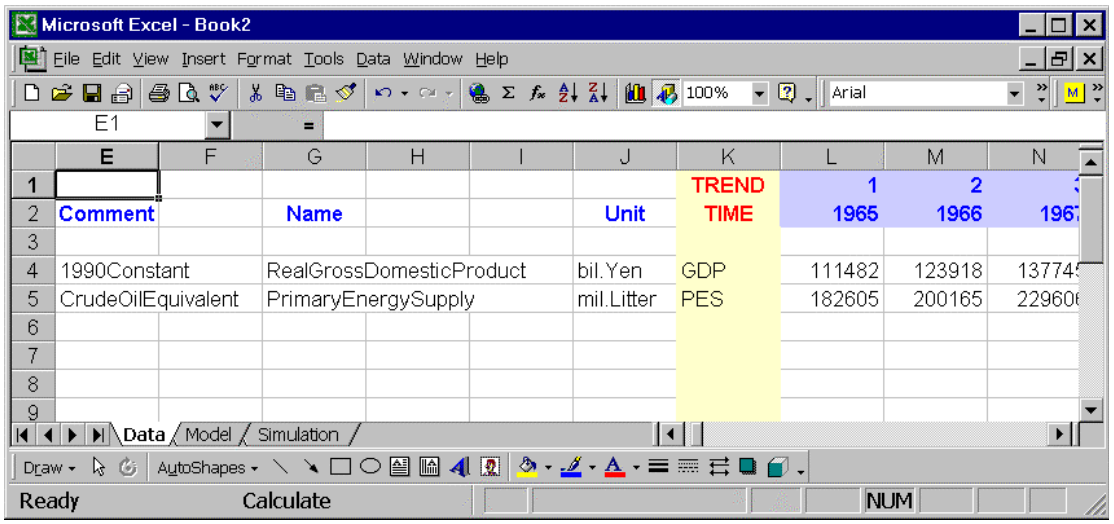
iv) TIME LABEL "L2:IV2": "TIME" is the default code name for the variable that define each case of time period. Time Label can be either number or characters. **The scope of the forecast (Simulation) is determined by the range specified by this variable.** For example, if the actual data is prepared from 1980 to 1990 and if the TIME is set from 1970 to 2000, *Simple E.* automatically takes the range between 1991 and 2000 for forecast. If another variable is set from 1970 to 1995, for example, forecast range for this variable is between 1996 and 2000. The code name "TIME" can be used with model only if the time labels are number.

v) DATA "L3:IV65536": This area is for the data of each variable for corresponding time period. For each variable, data should be prepared for one and only one set of time interval. For example, if a variable is available from 1975 to 1995, all cells between 1975 and 1995 must be filled with actual numbers. No missing data or non-numeric values between 1975 and 1995 is allowed. The cells out of 1975-1995 must be left blank. If you put data, for example, between 1980-1985 and 1990-1995, the first range 1980-1985 is taken as the range of this variable. Different set of available time ranges for different variables are allowed. For example, GDP(Gross Domestic Product) can have the data from 1975 to 1992, and CPI(Consumer Price Index) can have the data from 1980 to 1995. Then the sample range of a model with both GDP and CPI will be between 1980 and 1992.

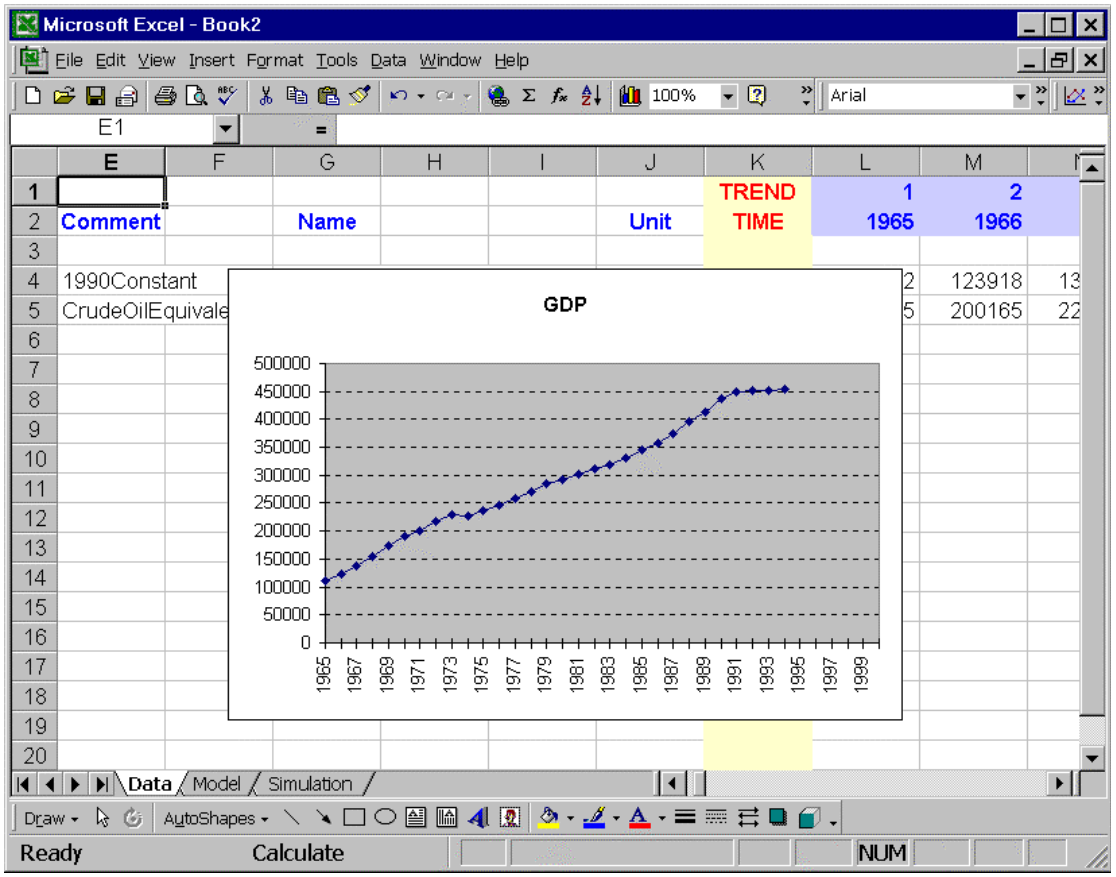
5.2 Example

The next picture shows a part of the "Data" sheet used for the example in the Appendix. The first two rows are the required the data of Real Gross Domestic Product (GDP) and Primary Energy Supply (PES) of Japan.

The free columns could be used, for example, for the unabbreviated name of the variable as is set in the column of "Name." Or can be used for the description of unit as is set in "Unit" Column.



Once the data of a variable is set in "Data" sheet, charts of the variable(s) of selected range can be created instantly by clicking button of *Simple E.* toolbar. As the next picture show, you can check the data graphically.



6. Model Input

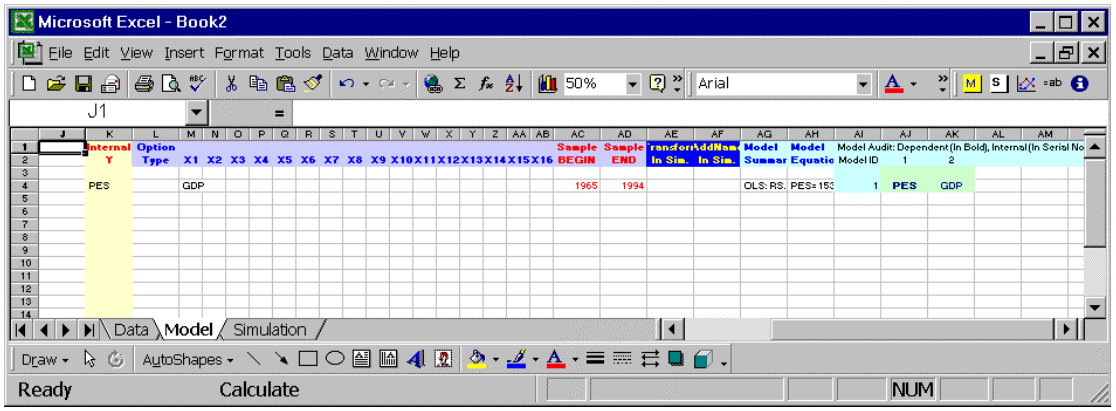
6.1 Model sheet

"Model" sheet is the place for model specification. The sheet consists of 1) free area 2) model specification area, and 3) model result and analysis area.

The free area is the first ten columns A:J.

The model specification area consists of 1) internal variable, 2) option type, 3) independent variables, 4) sample range, and 5) simulation adjustment area. The internal variable is specified in column K using code name. The column L is for options of model type. The columns M:AB are for independent variables. The next columns AC:AD are for sample range of the periods of begin and end. The sample range will be set by *Simple E.* unless it is specified by the non-red color font. The columns AE:AF are for simulation adjustments or for modification of the estimated equation if necessary to be modified in the simulation sheet.

The model result area has two parts. One is for model summary and model equation. Another part is for model audit. That is, the column AG for Model Summary is a place to present the summary results of regression analysis. The estimated or defined model equations will be presented in column AH. The rest of the columns are used for "Model Audit," to present the model structure.



6.2 Model Specification

A user can specify two types of equations as a model in *Simple E.* The first one is regression model that requires statistical estimation to complete the model equation. The second is an equation of definition or a directly set equation. Symbolically, the i-

th model of each row of "Model" sheet can be either;

1. Regression Type (with coefficients β_0, $\beta_{1,,,}$ and error ε)

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_j X_j + \varepsilon$ $\quad [X_k = f_k(V_1, V_{2,,,}, Y_1, Y_{2,,})]$

$[1 \le j \le 10,\ 1 \le k \le j]$

2. Direct Equation Type

$Y_i = g(V_1, V_{2,,,}, Y_1, Y_{2,,})$

For both types of models, Y has to be put into the column K (or "Internal Y")

For regression type, the each variable or the function from X1 to Xj have to be put into the column individually between "M" (X1) and "AB"(X16). The column "Type" can be left Blank if it is a model of OLS. At this stage, the coefficients β_0, $\beta_{1,,,}$ and the error ε are not known. They will be estimated only after the execution of "Solve." After this execution, the regression results are in the columns of Model Summary and Model Equation. Also, you can click  button anywhere on the same row of the regression model of which you want to check the result.

For a direct equation type, put the character "=" or $EQ" in the column "Type" to declare that this is a direct equation and put the right side part of the equation $g(V_1, V_{2,,,}, Y_1, Y_{2,,})$ in the column M or "X1" .

For a case of strong serial correlation, a user can specify "$GS" (Grid Search method[1]) to find the value of ρ, which minimizes the RSS (Residual sum of square). The optimum ρ will be searched and the coefficients will be adjusted..

Any variable used in model sheet should exists in data sheet or should be defined model sheet using the existing or predefined code names. For example, the picture below shows a simple regression model of primary energy supply (PES) explained by real GDP (GDPR). This model assumes the data of PES and GDPR are already prepared in data sheet.

Internal Y	Option Type	X1
PES		GDPR

If GDPR is not prepared in data sheet, but nominal GDP (GDPN) and the deflator (DEF) are prepared. Then, the PES can be modeled using the predefined GDPR in

[1] Called Hildreth-Lu procedure. This is an alternative to Cochrane-Orcutt proceure.

model sheet as follows.

Internal Y	Option Type	X1
GDPR	=	GDPN/DEF
PES		GDPR

The variables Y_1, Y_2,,, can be in functional form and include one or more such characters of operations— +, -, *, /, (,), ^, and etc. However, *Simple E.* cannot accept them as a variable code name (depends on *Excel*'s naming method).

Therefore, if Y is in a functional format and if a user wants to use it in other place (especially in simulation sheet) as a newly defined variable, the functional format will be converted to a new variable name to be used in simulation sheet. The converted variable name will be shown in the "Code" column (or column "AJ") in the area of model audit. For example, "LN(GDPN/DEF)" will be converted to "LN_GDPN_DEF" as shown below in italic font.

Internal Y	Model Audit: Depend CODE
Ln(GDPN/DEF)	*LN_GDPN_DEF*

To use the calculated result of LN(GDPN/DEF) as a variable, the code name LN_GDPN_DEF has to be used to be referred in other places.

The number of independent variables is limited to maximum 16 (columns M:AB), but one independent variable can contain numbers of variables. The maximum the length of one code name and maximum number of characters in one equation is 255. Therefore, the shorter the code name, the more complex the model could be.

The column "AE" is to redefine Y from functional format f(Y) to show code of Y explicitly in simulation sheet. For example, semi-log model: ln(Y)=a+bX can be redefined by "Y=exp($Y)". $Y represents the original equation of the model, thus $Y=a+bX. The column "AF" is to name equation to be used in simulation. For example, AAA=A+B defines new name AAA to refer to A+B.

6.3 Model Check

After you finished model specification, it is time to check it. *Simple E.* "Model Check" program can be started by a click of "Check" button of *Simple E.* Main Menu. The two primary functions of this process are: 1) Set available sample range for each model; and 2) Model audit including simple spell check of variables and separation of internal and external variables.

For each model, each sample range of all variables in the model will be searched and the available sample range for the model will be set in the columns of "Sample Begin" and "Sample End" unless specified with black font.

Model audit creates a table "Model Audit." The table shows the code of every internal variable and external variable of each model without functional form. If the side of independent variables of one row includes internal variable of somewhere, it shows the location that internal variable that it refers. The location is shown by the serial order number of the referring equation. All variables that appear in "Internal Y" column are shown with Blue and **Bold** font. All other variables that are not in "Y" are shown with their codes in the whole model. The variables without **Bold** face are categorized as external variables.

6.4 Manual Set of Sample Range

If the sample range needs to be specified manually within the available range, just input the code of the period and change the font color to black font.

6.5. Special Variables: Lagged Variables and Dummy Variables

Simple E. creates lagged variables and dummy variables dynamically. Therefore, a user does not need to prepare these variables in "Data" sheet.

The code of lagged variable "A" with the time lag from 1 to 99 is defined with from "Lag1.A" to "Lag99.A". But, "A" cannot be a functional form. For example, the code of a lagged variable of Log(GDP) with two periods should not be "Lag2.Log(GDP)", but should be "Log(Lag2.GDP)".

The code of dummy variable of the year 1980 is "Dum.1980". It means the value of Dum.1980 is "1" in 1980 and "0" for other years. The continuous two periods ".." indicates a continuous dummy. For example, "Dum..1980" indicates it is "1" for 1980 and the years before 1980. "Dum.1990.." indicates it is "1" for 1990 and the years after 1990. "Dum.1970.1973.1980..1985.1990.." indicates it is "1" for 1970, 1973, between 1980 and 1985, and 1990 and the after.

6.6 Example

The next two equations show an example of model.

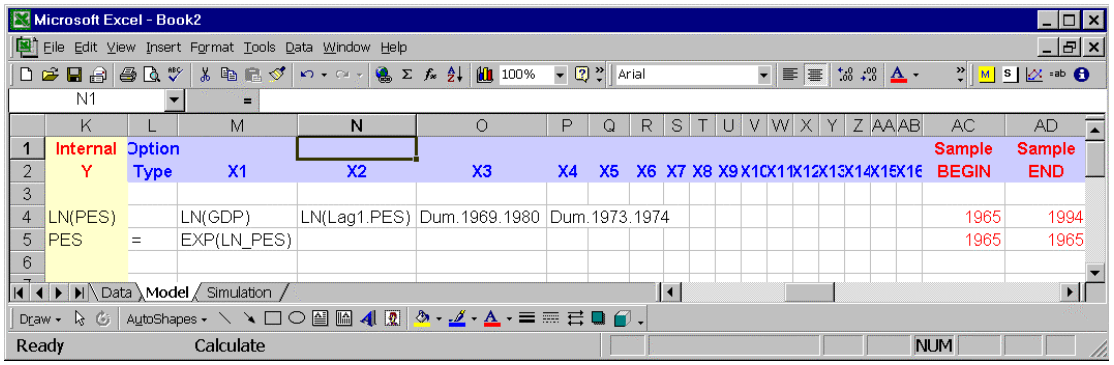
1. LN(PES)= $\beta_0 + \beta_1 * LN(GDP) + \beta_3 * LN(Lag1.PES) + \beta_4 * Dum.1969.1980 + \beta_5 * Dum.1973.1974 + \varepsilon$

2. PES=EXP(LN_PES)

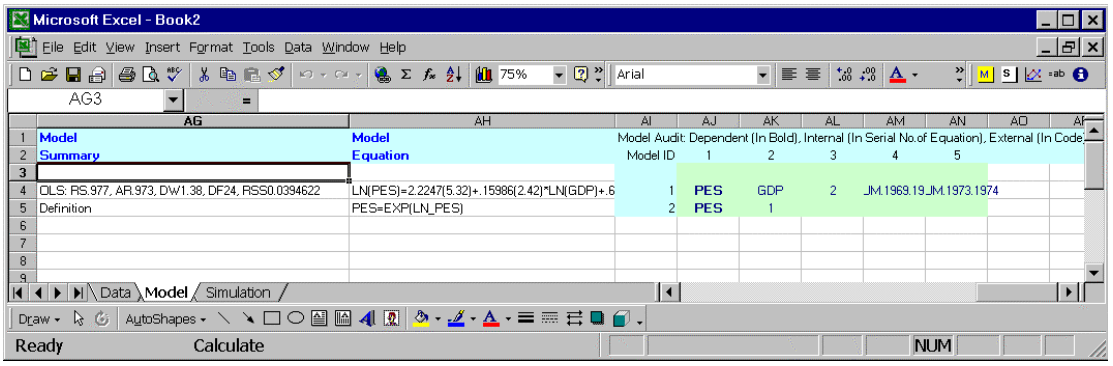
Note: "LN()" is natural logarithm of *Excel* worksheet function

The first equation is a regression type and the second is a direct equation (definition) type. The variable in the second equation LN_PES is the same as the estimated variable of the first equation. A user can do regression analysis without the second equation. To make a forecast from the first equation, the future value of the variables of GDP and Lag1.PES have to be prepared. In this case, GDP is an external variable and have to be prepared in assumption. For Lag1.PES, this is a predetermined variable if PES is known. However, the first equation is calculate not PES but LN(PES). Therefore, PES must be defined using the second equation. Note that LN(PES) is converted to one variable in a code name "LN_PES".

The sample range (Sample Begin and Sample End) was set by the system with red font. The data was prepared from 1965 to 1994. In this example, because the first model includes one period lagged dependent variable, the available sample range begins from 1966.



The next picture shows the part of "Model Summary" and "Model Audit" of the above example. The results of regression analysis for the first equation are put in the column of the "Model Summary." The whole equation of the regression model is set in the column of "Model Equation." The values in parentheses is t-statistics of the coefficients.



The result of Model Audit is shown in the colored area. For the equation No.1, the table says the first variable PES in **Bold** font is internal variable and the next variable GDP in normal font is external variable. The third variable represented by number "2" is the variable defined in equation No.2. Actually this is the variable LN(Lag1.PES) which is referring PES defined in the equation No.2. The fourth and the fifth variables are dummy variables to be treated as external variables.

For the second equation, the table says, the first variable PES is internal variable and the second variable with number "1" is the variable defined in equation No.1. Actually this is the variable LN_GDP and this is equivalent to the estimated variable from the first regression model. However, if there is another variable that has the same name of LN_GDP, for example, in "Data" sheet, *Simple E.* regards the LN_GDP in "Model" sheet as the variable LN_GDP in "Data" sheet.

Other useful tips:

1. Temporary skip: If you want to temporary skip some models, just turn the font color of the cells of "Internal Y" to red. *Simple E.* skips these colored models and moves to next models.
2. Model Type: There are ten options.
    a. "$OLS" or Blank cell -- OLS: If there are both "Y" and "X" variables (X1,X2,,,), *Simple E.* executes regression based on Ordinary Least Square. At the same time it sets the values of the "Y" variable in "Simulation" and hidden "Simulation.Actuals" sheets based on the actual data. If there is "Y" and no "X", *Simple E.* sets the values of "Y" in "Simulation" and hidden "Simulation.Actuals" sheets based on the actual data.
    b. "=" or "$EQ"-- Direct Equation: The variable in "Y" is defined directly by the formula in "X." *Simple E.* sets the values of "Y" in "Simulation" and hidden "Simulation.Actuals" sheets based on the actual data of "X".
    c. "$GS" – Grid Search: *Simple E.* executes regression based on Grid Search Method.

d. "$DL" – Double Log: *Simple E.* executes regression after transforming the variables of both sides to log format.
e. "$SL" – Semi Log: *Simple E.* executes regression after transforming the variable of "Y" side to log format.
f. "$CA" – Constant Adjustment: Constant in the equation will be adjusted so that the value sample end fits to the estimated value.
g. "$NC" – No Constant: The coefficient of the constant will be forced to zero.
h. "$TG" – Growth Trend: Forecast simulation will be set in growth trend. This extrapolation is based on the "Fill-Series-Type(Growth)" of Excel. "$TL" – Linear Trend: Forecast simulation will be set in linear trend. This extrapolation is based on the "Fill-Series-Type(Trend)" of Excel.
i. "$SR" – Constrained sample range: Simulation neglects the actual data and fill the cells with model equations even if they have actual values after the sample end.

7. Model Analysis

7.1 Solve Regression Models

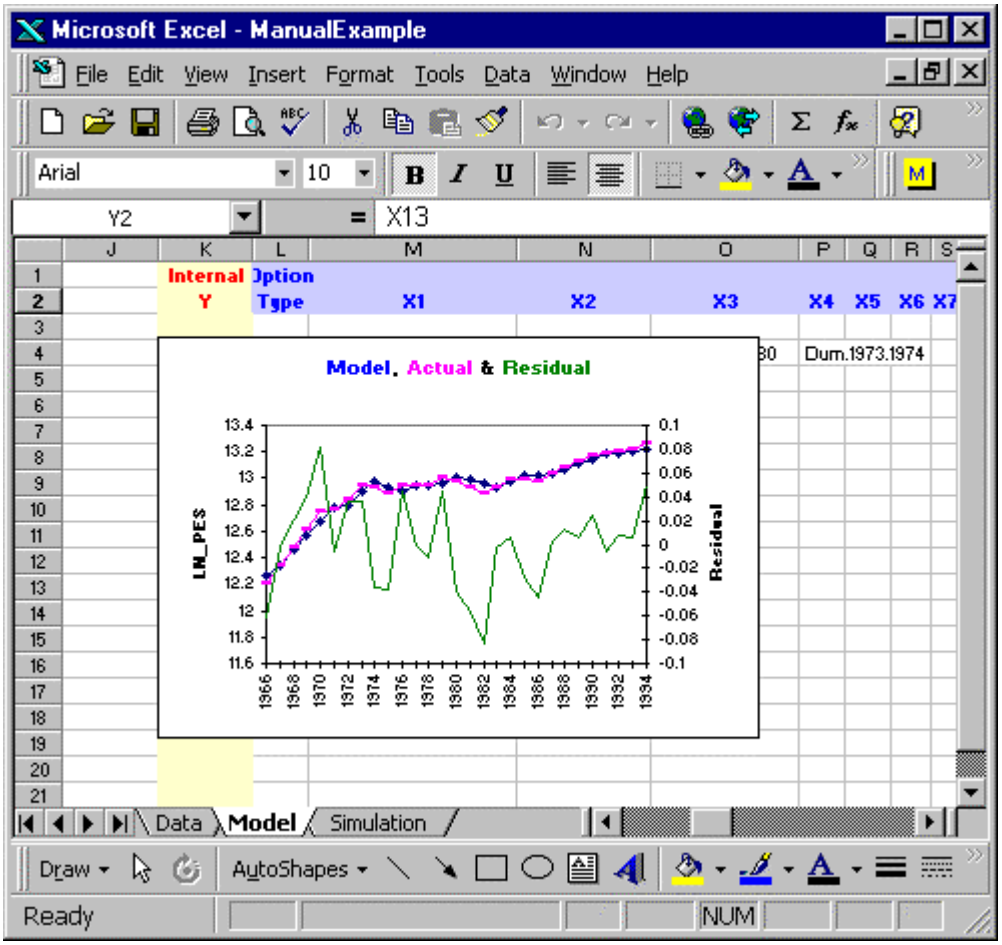
All regression models in "Model" sheet can be analyzed by "Solve" program prepared by *Simple E*. To start this program, open *Simple E*. Main Menu and click "Solve" button. The results will be set into the columns of model summary and model equation of "Model" sheet.

7.2 Regression sheet and the example

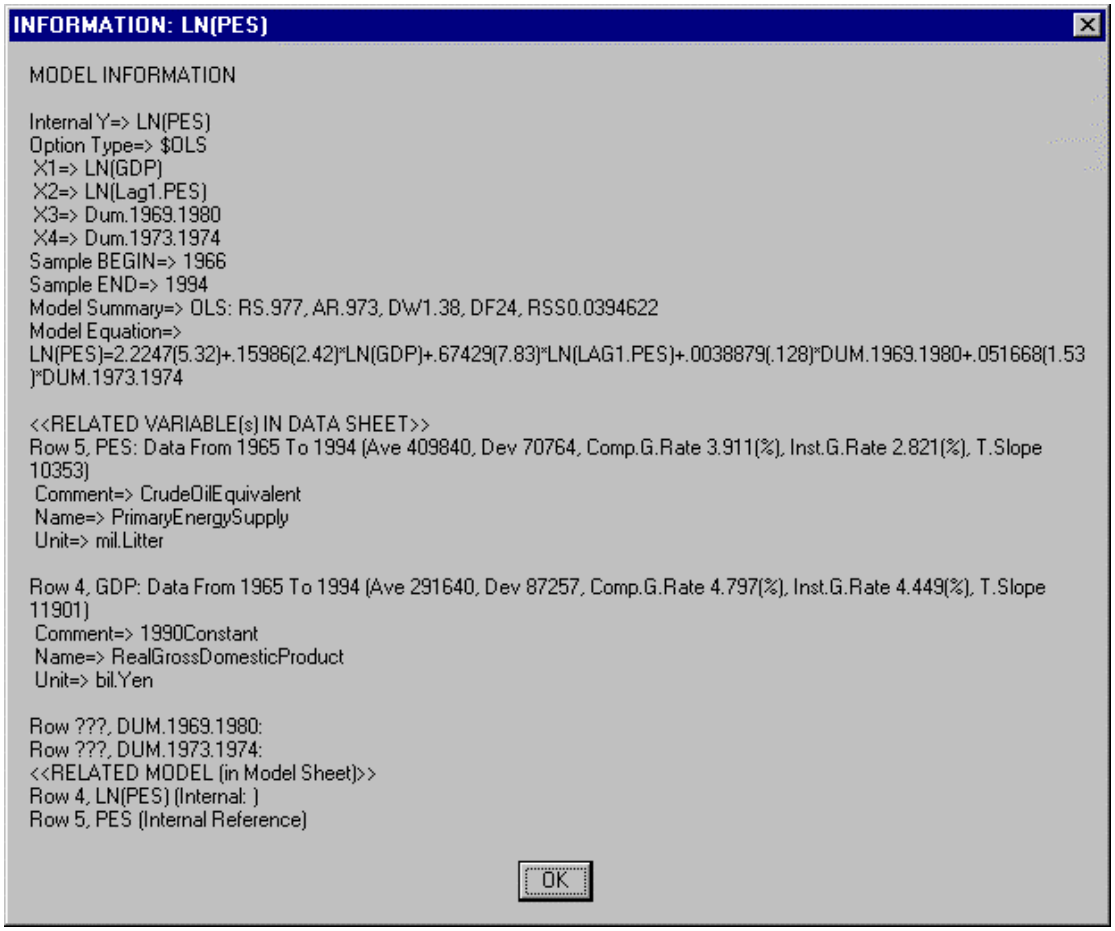
The regression analysis consists of such statistics as

1) Coefficients
2) t-Value (t-Ratio) of each coefficient
3) RSS (Residual Sum of Square)
4) R-Square
5) Adjusted R-Square
6) Durbin-Watson (and h stat. for lagged dependent variable) statistics
7) F statistics
8) Correlation coefficients between Y and Xs and between Xs.
9) Simulation of the sample range (This new estimated variable and the residual are saved with codes of additional ".Est" for model estimate and ".Res" for model residuals. For example, the model estimation of past "GDP" and the residual can be referred with the code name "GDP.Est" and "GDP.Res". Once you could get this simulation result, you can use this variable with this new code names in your model)

Once the regression result of a model is solved, chart(s) of the variable(s) of selected range can be created instantly by clicking  button of *Simple E*. toolbar in the sheet of the model. As the next picture shows, the actual value, the model estimate, and the residuals can be graphically compared.



A user can access to this regression result by just selecting a cell of the row of any column of your interested model and click . The summarized information like below example will be presented.



7.3 Defined equations

The *Solve* procedure calculates the given equation within the sample range and set the result in the simulation sheet.

8. Simulation

8.1 Start Simulation

To get future forecast simulation, the future periods must be set in the data sheet.

Simulation using the results of "Model" can be automated by "Simulation flow" program in *Simple E.* To start this program, open *Simple E.* Main Menu and click "Simulate" button. The results will be set into the "Simulation" sheet. All external variables are set just below the last row of internal variables. *Simple E.* assumes the future values of external variables from linear or growth trend, as in the selected option of preference menu, unless the future assumed values are specified in "Data" sheet.

Once all forecasts are made, all equations, which are defined and solved in "Model" are put into the cells of forecasts. The equations in simulation are referring variables within the same simulation sheet, the changes in assumptions of external variables could directly reflect in the whole model in the simulation sheet.

8.2 Simulation sheet and the example

A Simulation sheet consists of

1) Free columns
2) Code names
3) Actual values
4) Simulated Forecasts
5) Summary
6) Equation

The first columns "A:J" are the free area. Other columns from K and the after are reserved for Simple E. until all equations are set through *Simulation* flow. The column K shows the same code name as that in model sheet except for the variable in functional form with operators. In such exceptional cases, *Simple E.* converts parts of these characters such as '+', '-', '*', '/', '^', '(', and ')' into "_".

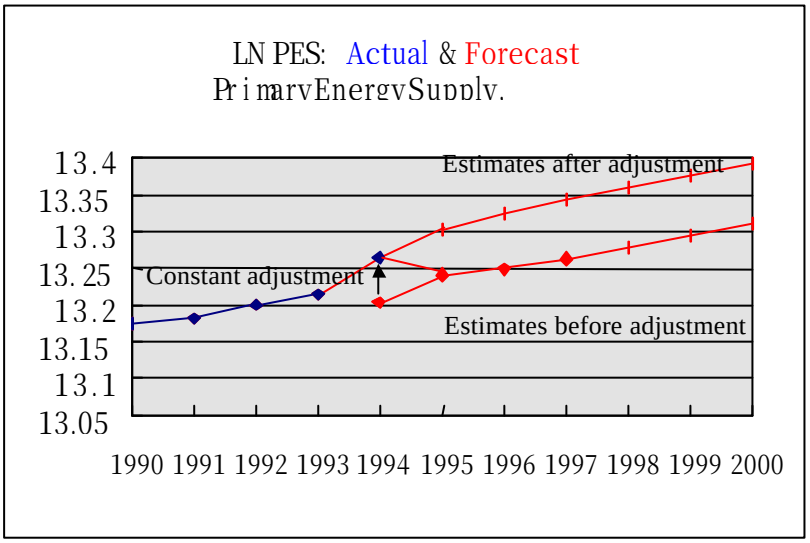
The simulation forecasts or the cells with formulas are shown with the red color font. The cells of forecasts contain estimated or defined equations. If the forecasts are simple extrapolations of trends calculated by *SimpleE.*, then the font color is set to

magenta. These cells of magenta color cells doesn't contain equations.

Once the forecast result of a model is set in simulation sheet, chart(s) of the variable(s) with actual and forecast values can be created instantly by clicking  button of *Simple E.* toolbar. As the next picture shows, a user can compare the actual value and the forecast graphically.

8.3 Constant Adjustment

If the last actual value should be equal to the estimation of the model, the value of the constant can be adjusted using the option $CA in the *type option* column of model sheet. This function cannot be applied to the model defined by "=" or "$EQ".



8.4 Summary of Simulation

The next example shows four lines of simulation summary. The upper three lines are example of the simulation summary of internal variables and the last line is the example of that of external variable.

47 48 49 50 51 52 53 54 55 56 57 58 59

1. Y; Definition; R%2.6; M%-2.2; G%(4.09/1.76); [Y=PC+GC+I] & [Linear Trend, Constant Adjusted]
2. PC; AR.997; R%2.8; M%-2.3; G%(3.88/1.61); [PC=8300(4.6)-0.04924(-0.43)*LAG1.Y+1.072(5.5)*LAG1.PC] & [Linear Trend, Constant Adjusted]
3. I; AR.986; R%3.4; M%-2.2; G%(3.92/2); [I=-10402(-4)+0.3198(47)*Y+0.3614(3.4)*(LAG1.Y-LAG2.Y)] & [Linear Trend, Constant Adjusted]

GC; Linear Trend, Constant Adjusted; G%(3.68/1.86)

The contents of each line can include following items.

1. Model ID (not available for external variables)
2. Code Name
3. Type of Simulation (omitted for regression models)
4. AR => Adjusted R-Square (Coefficient of determination) for regression models
5. R% => Root Mean Square % Error: Magnitude of Total Error
6. M% => Mean % Error: Magnitude of Bias
7. G% => Growth Rates (%) (Actual Part / Simulation Part) The growth trend is instantaneous. It is calculated as the coefficient of TIME or "b" of the semi-log model: Y=a + b * Log(TIME)
8. Equation of each model—For regression model, the figures in each equation are regression coefficients and their t-values in parentheses.

8.5 Model Error: R% & M%

The actual values are already in "Simulation.Actuals" and "Simulation" sheet. To make comparison, the actual values of past several periods of all internal variables have to be replaced with the estimated model equations. A spreadsheet like *Excel* makes this type of comparison easy. In simulation sheet, just copy all implemented equations of internal variables into the corresponding cells of test periods. Then compare both values using graph  .

As an alternative way, the following steps will be useful from *Simple E*.

1. Turn the font color of all cells that you want to test to red.
2. Click button  .

The function calculates (R%) *root mean square % error* and (M%) *mean % error*.[2]

$$R = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(\frac{Y_t^s - Y_t^a}{Y_t^a}\right)^2} \qquad M = \frac{1}{T}\sum_{t=1}^{T}\frac{Y_t^s - Y_t^a}{Y_t^a}$$

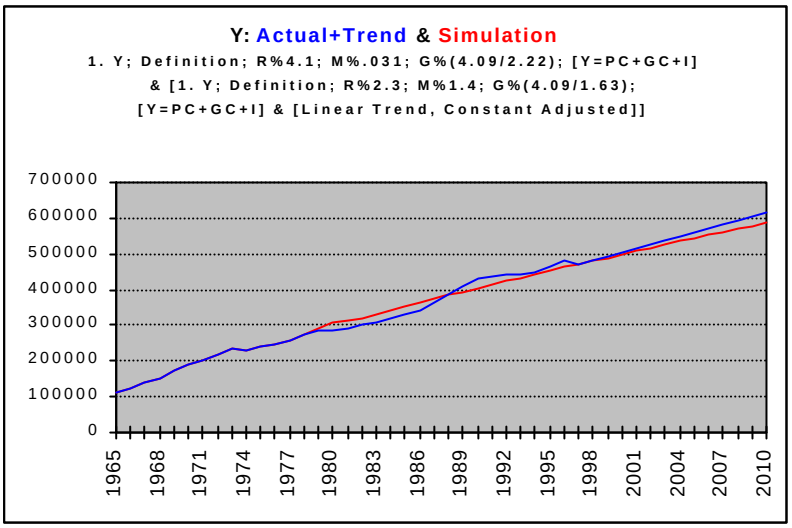
Where Y_t^s = Simulated value of period t

Y_t^a = Actual value of period t

T = Number of periods in the simulation

[2] For details, see Chapter 12, Robert S.Pindyck and Daniel L.Rubinfeld, *Econometric Models & Economic Forecasts*(New York: McGrow-Hill,1991)

If you select the cell of simulation summary and click  , then you can get a graph like next example.



Note:

Root mean square % error and mean % error can be calculated by changing the font color of the cells of past actual to red and click re-calculation button  . The result will be displayed in the summary cell of the selected simulation model. By selecting this cell of summary, the graph will display the result. See figure 6b.

9. Useful tips

9.1 *Simple E.* Toolbar buttons

1) *Simple E.* Main-Menu
This shows *Simple E.* Main-Menu

2) Synchronize: Synchronize the variable of the row for all windows
Select a variable from the active sheet of data, model, or simulation, and click this button. Then the same variable in other sheets of data, model, or simulation will be selected. It means you can reach to the same variable in all these sheets without search.

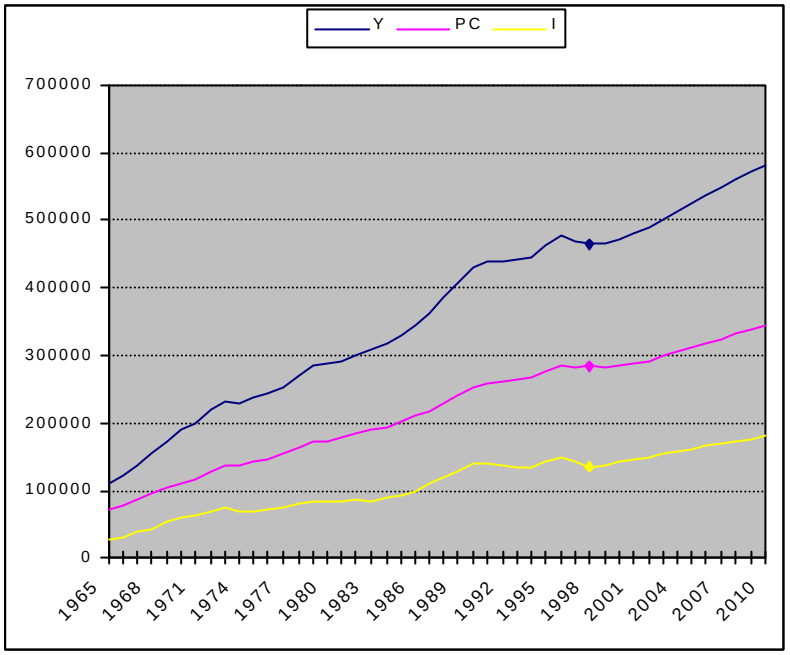
For example, you are working on the model of GDP in model sheet and your selection in the row of GDP of model sheet. To jump to the variable of GDP in other sheet, for example data sheet, just click this button. If you go to data sheet, the variable GDP is already selected.

3) Graph: Create graph(s) of the variable(s) on the selected row(s)
In Data sheet, it shows the graph(s) of the variable(s) of the selected row(s). In data sheet or model sheet a selection of multiple area shows selected variable in one graph.

Note:
Multiple selections of areas in graph function

1) If selected rows can be separated to multiple selections of areas, the selected all variables will be included into one graph (Figure 9.1).
2) If more than one variables are selected as one selection, graphs with one-graph-one-variable will be created as in the V1.0. Especially in "Simulation" sheet, if the selection was the code column "K", other sheets will be searched, if available, to combine the same variable of other sheets.

Figure 9.1 Different variables in one graph



4) Re-Calculate Row(s) and Link Single Flows: Reset and Re-calculate the equation(s) of the variable(s) of the selected row(s)

This function corresponds to *Solve* flow and *Simulate* flow for only selected variable. If the checkbox of *Link Single Flows* of Main menu is on, the recalculation can be linked to succeeding flows. That is, if variable(s) are selected from datasheet, the program will find out directly related model(s) in the model sheet; then, flows of data check, solve, and simulation on the model(s) will follow. If selected in the model sheet, all flows on only the selected model(s) will follow. If activated from simulation sheet, only simulation flow will follow on the selected variable(s).

5) Information

A click of this button shows the related information of the selected variable of the selected sheet. In the data sheet, a click of this button with multiple selections of variables will show the coefficients between the first selection and the others.

In the colored part of the model audit area of model sheet (Figure 9.2), a simplified model structure on the selected model will be searched and displayed in a message box (Figure 9.3). Beyond the colored area of the model audit in the right side, the model structure will be set below the cells of the selected cell (Figure 9.4).

Figure 9.2 “Model” sheet (Example): Model Audit from column “AI”

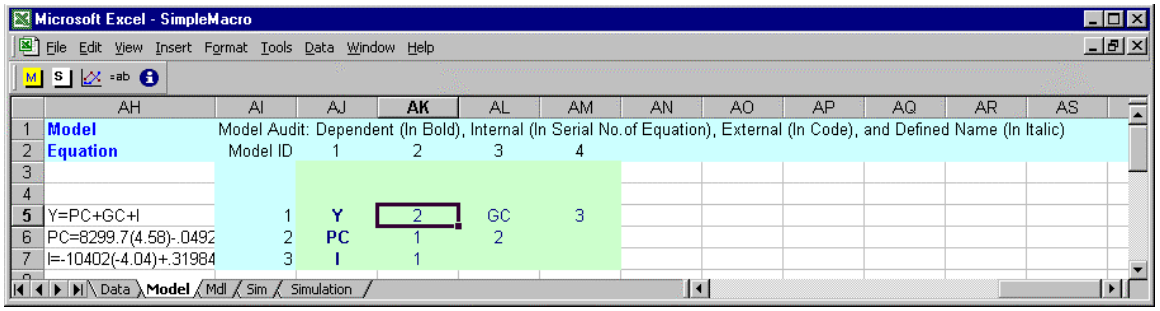


Figure 9.3 “Model” sheet (Example): Message box of structure tree of a selected model

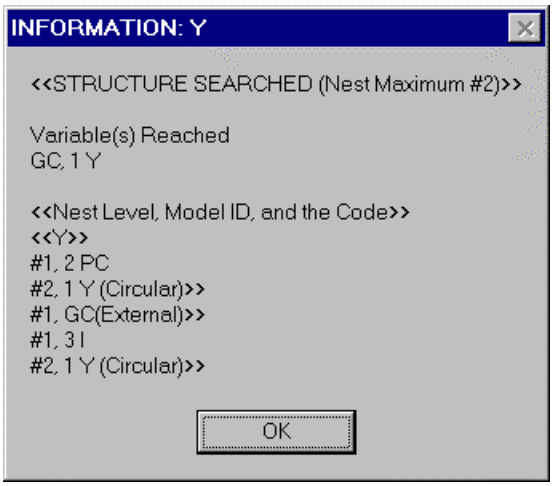
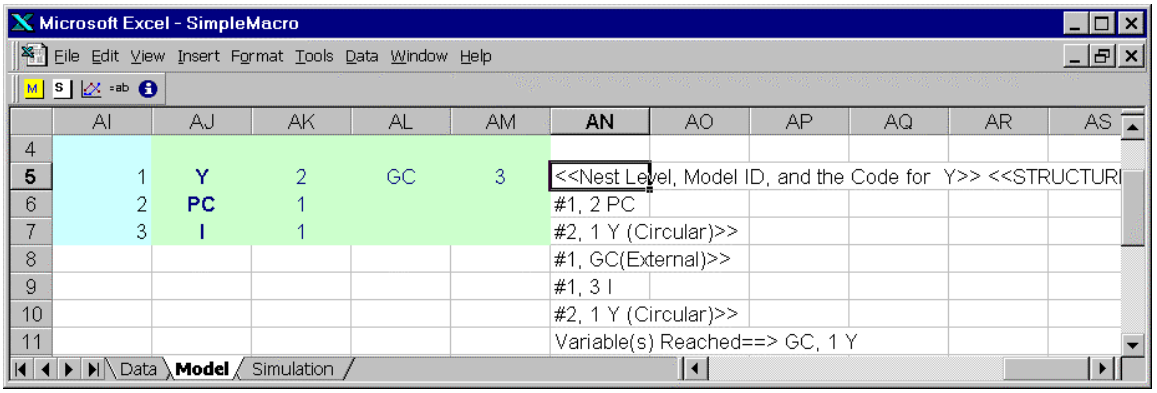


Figure 9.4 “Model” sheet (Example): Structure tree in "Model Audit" area



9.2 Main Control of Main Menu

1) Suppress Screen Updating

The screen updating can be suppressed by checking the checkbox of *Suppress Screen Updating*. This will speed up the whole flow. However, the changing process of the flows cannot be seen until the end of all selected flows.

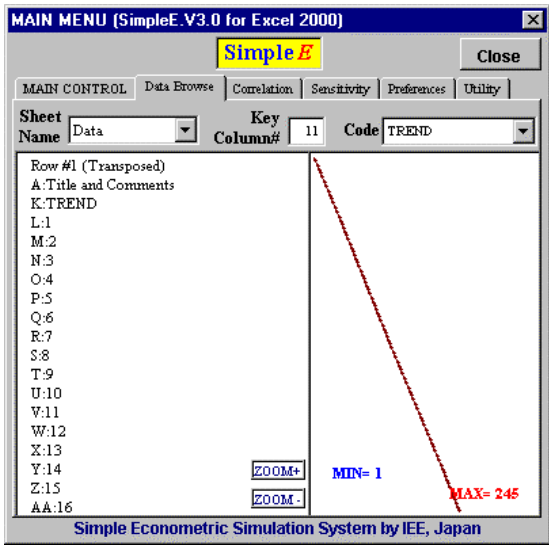
2) Additional Datasheets

In addition to the first data sheet (#0), up to three additional datasheets can be attached with one set of model and simulation sheet.

10. Main Menu Additional Pages

In addition to the page of 1) Main Control, Main Menu contains other 7 pages of 2) Data Browse, 3) Correlation Matrix, 4) Sensitivity, 5) Preferences (Datasheet), 6) Preferences (Model sheet), 7) Preferences (Simulation sheet) and 8) Utility.

10.1 Data Browse

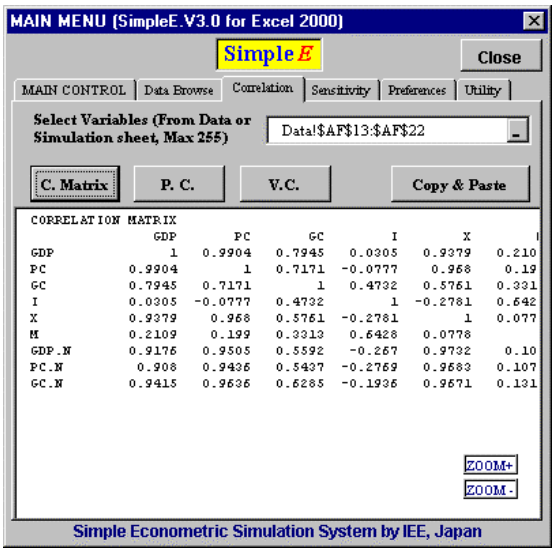


Data Browse is prepared to browse the contents of a worksheet (primarily datasheet or simulation sheet) by row wise without going to that worksheet.

Sheet Name is the name of the sheet to browse. Key Column is the column of code name, by which the contents of the row will be retrieved. The contents of the corresponding row will be displayed in transposed format. It assumes the data in value begins from the next column of the key column. If the row contains the data in value, then, the data will be displayed graphically with the numbers of the minimum and the maximum.

By putting the cursor in the code input box and using arrow key up and down, the data in each row can be browsed graphically fast and easily.

10.2 Correlation Matrix

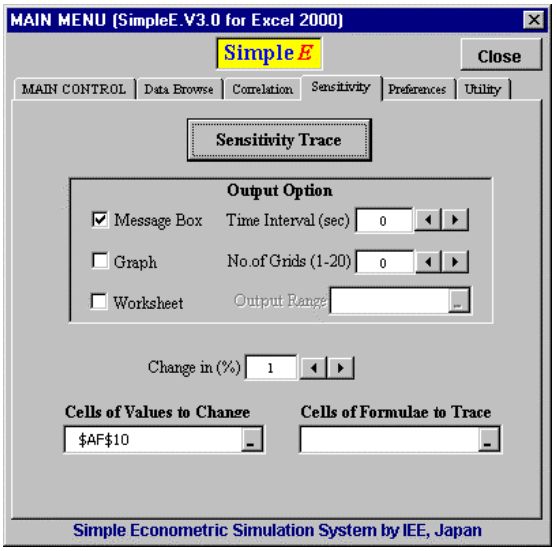


This page is prepared to calculate correlation matrix and the related values for the data in data sheet and simulation sheet.

Just select the rows of variables of either data sheet or simulation sheet. The button "C.Matrix" is for the calculation of the correlation matrix. The "P.C." button is for the calculation of principal components and their, eigen-value, and eigen-vector as well as correlation matrix. The "V.C." button is for the calculation of variance-covariance matrix.

The results will be displayed in the box below. The "Copy & Paste" button can be used to copy the contents of the results and paste them to a new worksheet.

10.3 Sensitivity

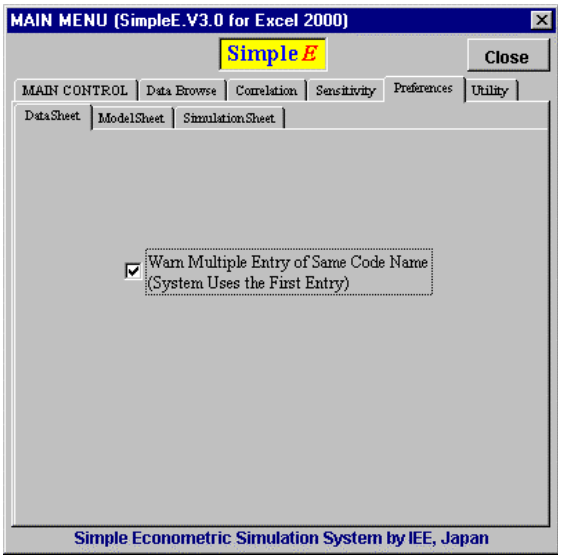


This page is prepared to trace changes in the simulation results in response to the changes in assumptions. Largely there two ways to use this function. One without output and the other with output.

1. Without output. Clear all check boxes of 1) Message Box, 2) Graph, and 3) Worksheet. Set the cells (contains no formula) of values to change. Then click the "Sensitivity Trace." The program will change the selected value based on the Change in %, Time Interval, and the No. of Grids selected. If the value is linked or referred to in other cells, then these linked value will change in response to the changes of the selected cell values.
2. Output. Select the cells of formulas to trace. Then, check 1) Message Box, 2) Graph, or 3) Worksheet. The 3) Worksheet selection requires its output range.

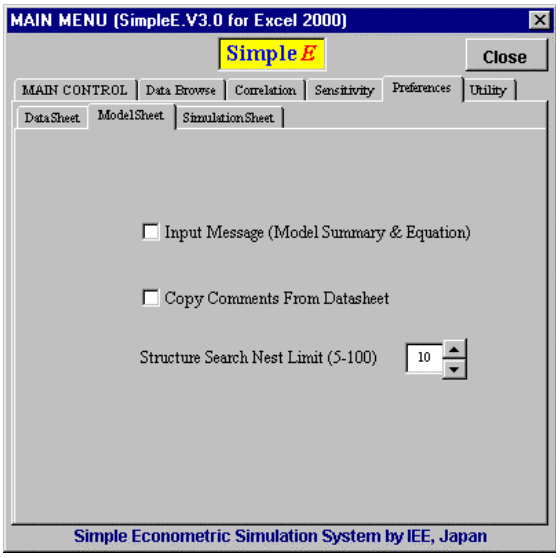
10.4 Preferences

1) Datasheet



In this page the option is “Warn Multiple Entry of Same Code Name.” If checked, the “Check” flow check the code name used in model sheet whether it is unique in the datasheet or not.

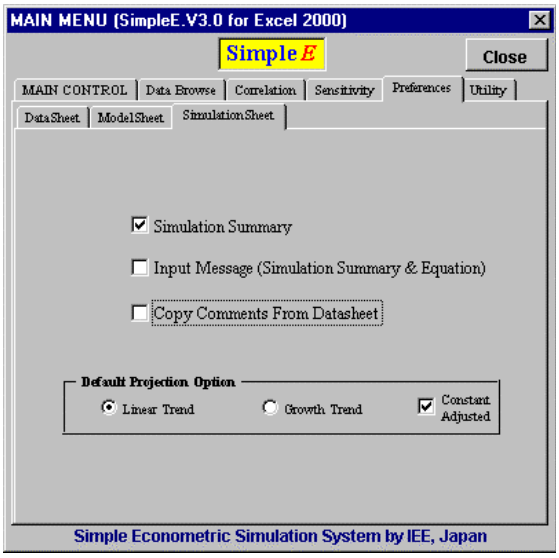
2) Modelsheet



The first option enables the results in model sheet to be set in the form of input message for each row of model specification area.

The second option makes the program to check the title of comments area ("A2:J2") of both datasheet and model sheet. If there are the same title in the model sheet, which is the same as that in datasheet, then the contents of the cell of the corresponding variable will be copied to the cell of the same title column and the row of the same variable (internal variable).

3) Simulation sheet

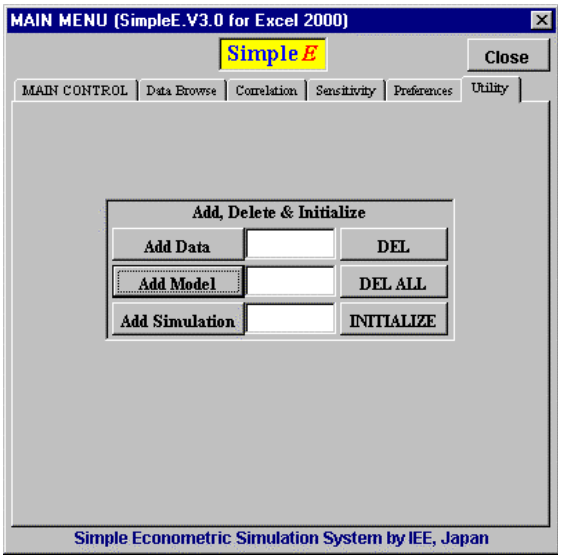


The first option enables the program to set simulation summary of each row at the end of the each simulation column.

The second and the third are the functions of the same as those in model sheet.

The fourth is the projection option. The default projection can be either linear trend or growth trend. In addition, constant adjustment can be selected.

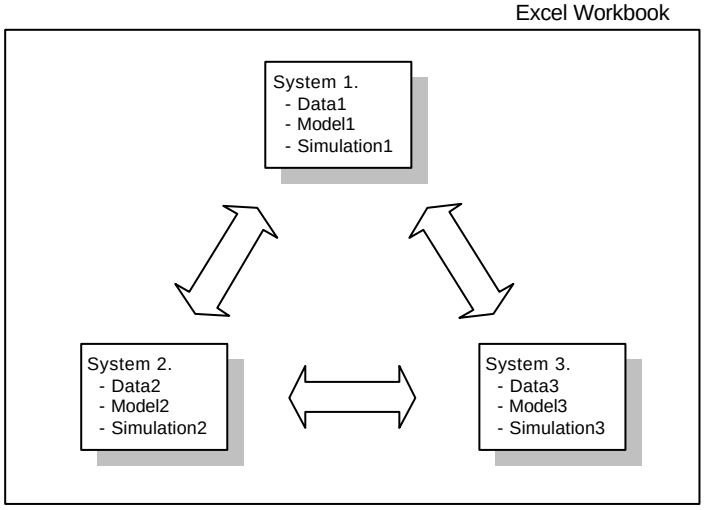
10.5 Utility



1) Simple E. Worksheets Add
    a. Add Data: set the name of new data sheet to be added on the right side box and click here to add new data sheet.
    b. Add Model: set the name of new model sheet to be added on the right side box and click here to add new model sheet.
    c. Add Simulation: set the name of new simulation sheet to be added on the right side box and click here to add new simulation sheet.

The multiple sets of data, model and simulation enable one workbook to contain interlinked multiple systems as shown below.

Multiple Systems: Inter-linked systems in one workbook



2) Simple E. Worksheets Delete
    a. DEL: Delete active sheet and the related Simple E. sheets
    b. DEL ALL: Delete All Simple E. sheets.
    c. INITIALIZE: Initialize headers and predefined names of all Simple E worksheets.

11. List of Options and Functions in Main Menu

3) Page 1: Main Control
    a. Main Flow Control
        i. Check
        ii. Solve
        iii. Simulate
        iv. Check & Solve
        v. Solve and Simulate
        vi. All Through
        vii. Link Single Flows
        viii. Suppress ScreenUpdating
    b. Worksheet Name Option
        i. Data sheet (#0)
        ii. Model sheet
        iii. Simulation Sheet
    c. Additional Data Sheets
        i. Data sheet #1
        ii. Data sheet #2
        iii. Data sheet #3
    d. Simple E. Workfile Creation
        i. Add to New Workbook
        ii. Add to Active Workbook
4) Page 2: Data Browse
    a. Sheet Name
    b. Code Column
    c. Header Row
    d. Row
5) Page 3: Correlation Mtx
    a. Select Variables in Data sheet or Simulation sheet
    b. Correlation Matrix
    c. Correlation M. & Principal Components
    d. Variance-Covariance Matrix (/N)
    e. Copy and Paste to New Worksheet
6) Page 4: Sensitivity
    a. Sensitivity Trace
    b. Output Option

i. Message Box
ii. Graph
iii. Worksheet

c. Change Option
i. Change %
ii. No. of Grids
iii. Time Interval (sec)

d. Cells of Values to Change
e. Cells of Formulae to Change
f. Output Range

7) Page 5: Preferences
a. Data Sheet
i. Warn multiple entry of a same code

b. Model Sheet
i. Input Message
ii. Copy Comments
iii. Structure Search Nest Limit

c. Simulation Sheet
i. Simulation Summary
ii. Input Message
iii. Copy Comments
iv. Estimation method for the projection of external variable
1. Linear Trend
2. Growth Trend
3. Constant Adjusted

8) Page 6: Utility
a. Simple E. Worksheets Add
i. Add Data
ii. Add Model
iii. Add Simulation

b. Simple E. Worksheets Delete
i. Delete active sheet and the related Simple E. sheets
ii. Delete All Simple E. sheets.
iii. Initialize

O-2

Operation Manual
of
Large Scale Solver LP

JICA Study Team

The Institute of Energy Economics, Japan

Please refer to the “Solver User ’s Guide”

by Frontline Systems, Inc.

O-3

Operation Manual
of
Database

JICA Study Team

The Institute of Energy Economics, Japan

O-3 Database Manual

Table of Contents

1 Database File List

1.1 File List

The Database has one pare of Microsoft Excel files for each category. One is a file, which is using physical unit, kton/GWh and the other file is using unified unit, kiloton oil equivalent, "ktoe".

These two files are defined 5 categories as below.

(1) Original Past Trend Files

Eg_OEP_DBAL_v22.xls (kton / GWh)
Eg_OEP_DBAL_u22.xls (ktoe)

Eg: Egypt
OEP: Organization of Energy Planning
DBAL: Detail Balance
v: Value, Physical unit, kton/GWh
u: Unified unit, ktoe

All files using Physical Unit (kton, GWh) are hereafter called as "v" file
All files using Unified Unit (ktoe) are hereafter called as "u" file

(2) Modified Past Trend Files for the Model building

Eg_OEP_DBAL_v30.xls (kton / GWh)
Eg_OEP_DBAL_u30.xls (ktoe)

Adding assumption to Coal and Coke Flow because of lack of some data

(3) Original Projection Data Files for Data Linkage

By Demand Forecasting Model

Eg_OEP_DBAL_vf_FMT.xls (kton / GWh)
Eg_OEP_DBAL_uf_FMT.xls (ktoe)

By LP Supply Model

Eg_OEP_DBAL_vf_LPT.xls (kton / GWh)
Eg_OEP_DBAL_uf_LPT.xls (ktoe)

(4) Future Projection Data Files by Final Model (Simple E)

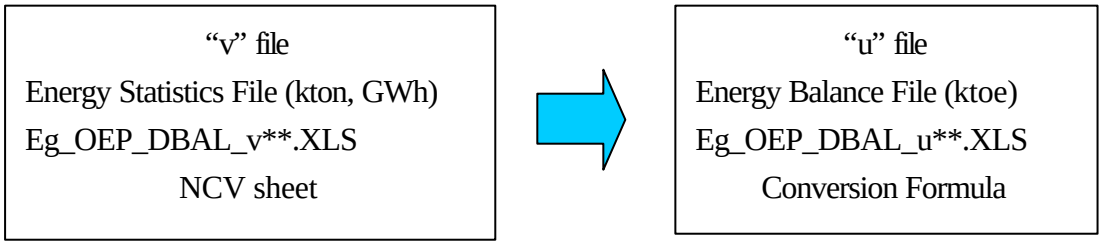
Eg_OEP_DBAL_vf_FM**.xls (kton / GWh) Eg_OEP_DBAL_uf_FM**.xls (ktoe)

(5) Future Projection Data Files by LP Supply Model

Eg_OEP_DBAL_vf_LP**.xls (kton / GWh) Eg_OEP_DBAL_uf_LP**.xls (ktoe)

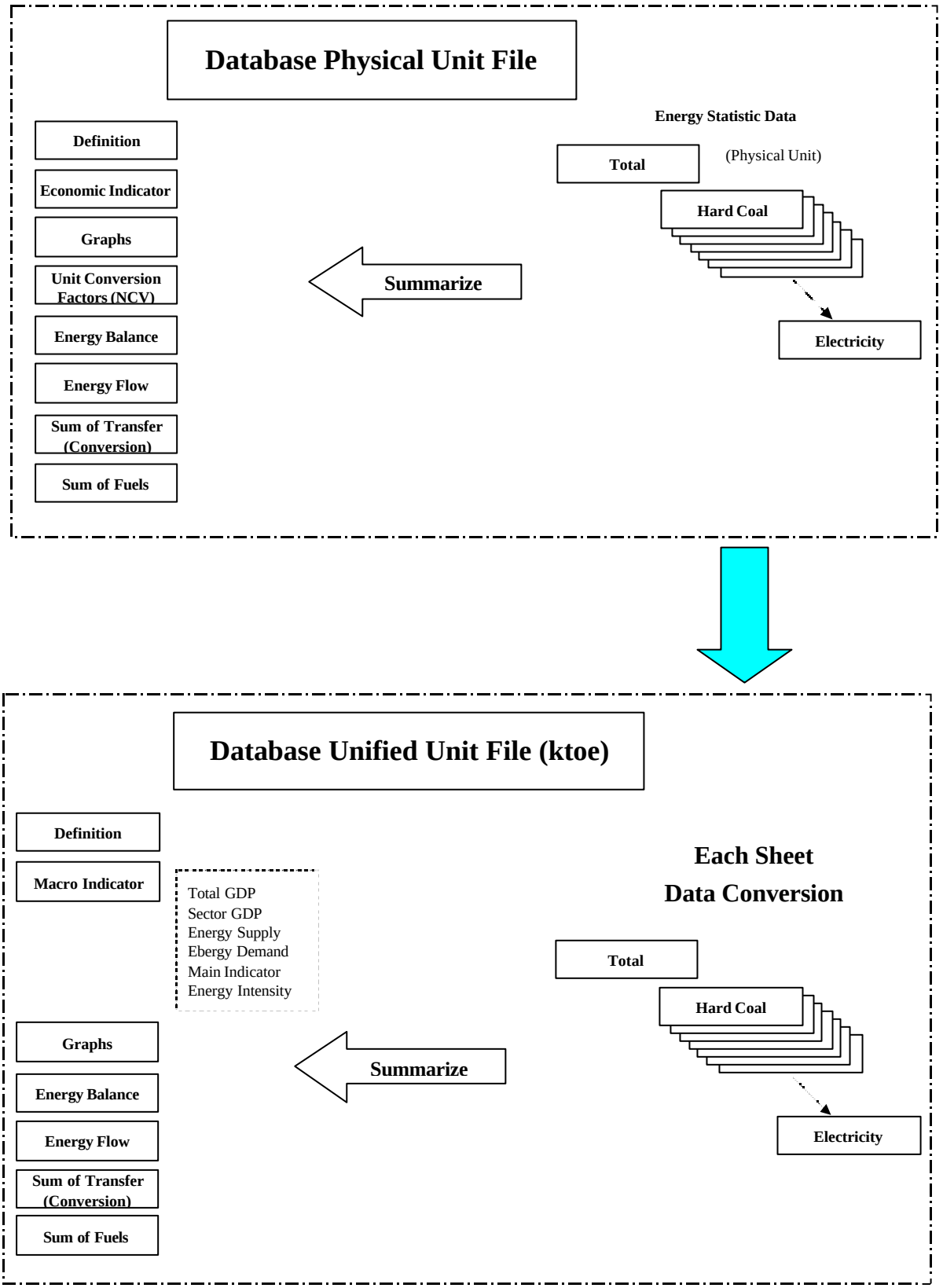
1.2 Pair of Files

The Data Conversion to Physical unit to Unified unit, ktoe, is calculated by formulas in "u" file, by the flow from "v" files to "u" files, by using Net Calorific Value of Egypt in "v" file.



This means "Pare of Files" for one Database.

1.3 Configuration of Pair of Files



2 Components of files

2.1 Sheet List of Database Files

Each sheet definition is described in the following table. Database files have these Excel sheets

Table 2.1 Excel Sheet Definition in Database

Sheet Nam	Definition
Dif	Sheet and Flow Item Definition
IND	Main Economical Indicators
Graph	Graph en-bedded sheet
EB	Energy Balance Table
Flow	Energy Flow by Energy Balance sheet
Transfer	Transformation intensity, Efficiency
Fuels	Fuels of each node of Energy Flow
Total	Energy Total
Hard_C	Hard Coal for fuel
Coke_C	Coking Coal for Coke Oven
COC	Coke Oven Coke
GWG	Gas Works Gas for Town Gas
COG	Coke Oven Gas
BFG	Blust Furnace Gas
OxG	Oxygen Steel Furnace Gas
Renew	Combustible Renewable, Waste and Solar Heating
Bio	Solid Biomass and Animal Products
NG	Natural Gas
Crude Oil	Crude Oil
NGL	Natural Gas Liquids: Condensate
Ref_Gas	Refinery Gas: Top Gas from Refinery
LPG	Liquefied Petroleum Gases
Gasoline	Motor Gasoline
Jet	Kerosene type Jet Fuel
Kero	Kerosene
Diesel	Gas/Diesel Oil
Res_FO	Residual Fuel Oil: Mazut
Naphtha	Naphtha
Lub	Lubricants
Bitu	Bitumen
P_Coke	Petroleum Coke
P_Non	Non-specified Petroleum Products
Hydro	Hydro Generation
Wind	Wind Generation
Solar	Solar Generation
Elec	Electricity

2.2 Terms Definition of Energy Flow in Database Files

Each flow item is defined in the table below; the basic format is IEA Database and is specialized for OEP. These items are used for column items in each data sheet of the Database files.

Table 2.2 Energy Flow Items Definition

Flow Definition

Item	
Indigenous Production	Energy which is produced from its own natural resources
Partners Share	Partner Share of indigenous production by contract including net expenses
From Partners	Primary energy bought from Partners
Import	Import of commodities
Export	Export of commodities
International Marine Bunkers/Aviation	Marine Bunkers and Fuels for International Aviation
Stock Changes	Difference between Initial Stock minus Final Stock
Total Primary Energy Supply	
Transfers	Transfer such as Gas Processing to produce LPG
Statistical Differences	Difference between TFC from supply side and that of demand side
Transformation Sector	Total of Transformation Sector input/output
Public Electricity Plants	Public Electricity Generation
Autoproducer Electricity Plants	Electricity Generation by Private Sector
Coke Ovens	Coke Oven
Gas Works	Civil Gas Producing
For Blast Furnace Gas	Blust Furnace in iron/steel industry
Petrochemicals for Raw Materials/Energy	Throughput to Petrochemical Industries as Raw Materials
Oil Refineries	Throughput to Refinery
Liquefaction	Liquefaction of Natural Gas
Non-specified (Transformation)	Other Category of Transformation
Energy Sector Use	Total of Energy Use in Transformation Sector
Coal Mines	Coal Mine Own Use
Oil and Gas Extraction	Injection of Oil/Gas Field
Coke Ovens use	Coke Oven Own Use
Gas Works use	Gas Works Own Use
Oil Refineries use	Oil Refinery Own Use
Own Use in Electricity	Electricity Own Use
Used for Pumped Storage	Used Electricity for Pumped Storage Hydro Generation
Nuclear Industry	Energy Use in Nuclear Industries
Non-specified (Energy)	Non-specified Own Use in Transformation Sector
Distribution Losses	Electricity Distribution Losses
Total Final Consumption (Supply)	TFC calculated from Supply Side
Total Final Consumption	TFC calculated by Demand Side
Industry Sector	Energy Consumption in Industry Sector
Iron and Steel	Energy Consumption in Iron and Steel Industry
Chemical and Petrochemical	Energy Consumption in Chemical and Petrochemical Industry
Non-Ferrous Metals	Energy Consumption in Non-Ferrous Metal Industry
Non-Metallic Minerals	Energy Consumption in Non-Metallic Minerals Industry
Transport Equipment	Energy Consumption in Transport Equipment Industry
Machinery	Energy Consumption in Machinery Industry
Mining and Quarrying	Energy Consumption in Mining and Quarrying Industry
Food and Tobacco	Energy Consumption in Food and Tobacco Industry
Paper	Energy Consumption in Paper Industry
Construction	Energy Consumption in Construction Industry
Textile and Leather	Energy Consumption in Textile and Leather Industry
Non-specified (Industry)	Energy Consumption in Non-Specified Industry
Transport Sector	Energy Consumption in Transportation Sector
Others (Transport)	Energy Consumption in Other transportation Sub-sector
Domestic Air Transport	Energy Consumption in Domestic Air Transport Sub-sector
Road	Energy Consumption in Road Transport Sub-sector
Rail	Energy Consumption in Rail Transport Sub-sector
Pipeline Transport	Energy Consumption in Pipeline Transport Sub-sector
River	Energy Consumption in River Transport Sub-sector
Internal Navigation	Energy Consumption in Internal Navigation Transport Sub-sector
Non-specified (Transport)	Energy Consumption in Non-specified Transport Sub-sector
Other Sectors	Energy Consumption in Other Sectors
Agriculture	Energy Consumption in Agriculture Sectors
Public Utility	Energy Consumption in Public Utility Sectors
Commercial	Energy Consumption in Commercial Sectors
Residential	Energy Consumption in Residential Sectors
Government	Energy Consumption in Government Sectors
Non-specified (Other)	Energy Consumption in Non-specified Sectors
Non-Energy Use	Non Energy Use

3 Explanation of Each Sheet

Trends of several main data are prepared as embedded graphs on “Graph” sheet.

3.1 Graph List on “Graph” sheet in “u” file

(1) Macro Indicator

- Sector GDP (bar chart)
- Energy Intensity by Sector (line graph)
- Energy Intensity per GDP, capita (line graph)
- Electricity Consumption (line graph)

(2) Summary of Energy Flow

- Trend of Primary Energy Supply (line graph)
- Trend of Primary Energy Supply with Partners Share (line graph)
- Trend of Domestic Primary Energy Supply (line graph)
- Final Energy Consumption by Sector (line graph)
- Final Energy Consumption by Sector (bar chart)
- Final Energy Consumption by Sector (share bar chart)
- Energy Consumption of Branch Sector in Industry (bar chart)
- Crude Oil Production & Partners Share (line graph)

(3) Primary Energy

- Primary Energy Production by Fuels (bar chart)
- Import by Fuels (bar chart)
- Export by Fuels (bar chart)
- Primary Energy Supply by Fuels (bar chart)
- Primary Energy Supply by Fuels (share bar chart)

(4) Refinery

- Petroleum Products from Refinery (bar chart)
- Petroleum Products from Refinery (share bar chart)

(5) Electricity

- Fuel Use in Electricity (bar chart)
- Fuel Use in Electricity (share bar chart)
- Efficiency of Thermal Generation (Gross) (line graph)
- Electricity Generation by Type (bar chart)

(6) Final Consumption

Total Final Consumption by Fuels (bar chart)

Total Final Consumption by Fuels (share bar chart)

Energy Consumption in Industry Sector by Fuels (bar chart)

Energy Consumption in Industry Sector by Fuels (share bar chart)

Energy Consumption in Transportation Sector by Fuels (bar chart)

Energy Consumption in Transportation Sector by Fuels (share bar chart)

Energy Consumption in Residential Sector by Fuels (bar chart)

Energy Consumption in Residential Sector by Fuels (share bar chart)

Energy Consumption in Agriculture Sector by Fuels (bar chart)

Energy Consumption in Agriculture Sector by Fuels (share bar chart)

3.2 Graph List on "Graph" sheet in "v" file

These graphs are only for checking miss-input of source data

Indigenous Production (line graph)

Import (line graph)

Export (line graph)

TPES: Total Primary Energy Supply (line graph)

TFC: Total Final Energy Consumption (line graph)

Energy Consumption in Industry Sector (line graph)

Energy Consumption in Transportation Sector (line graph)

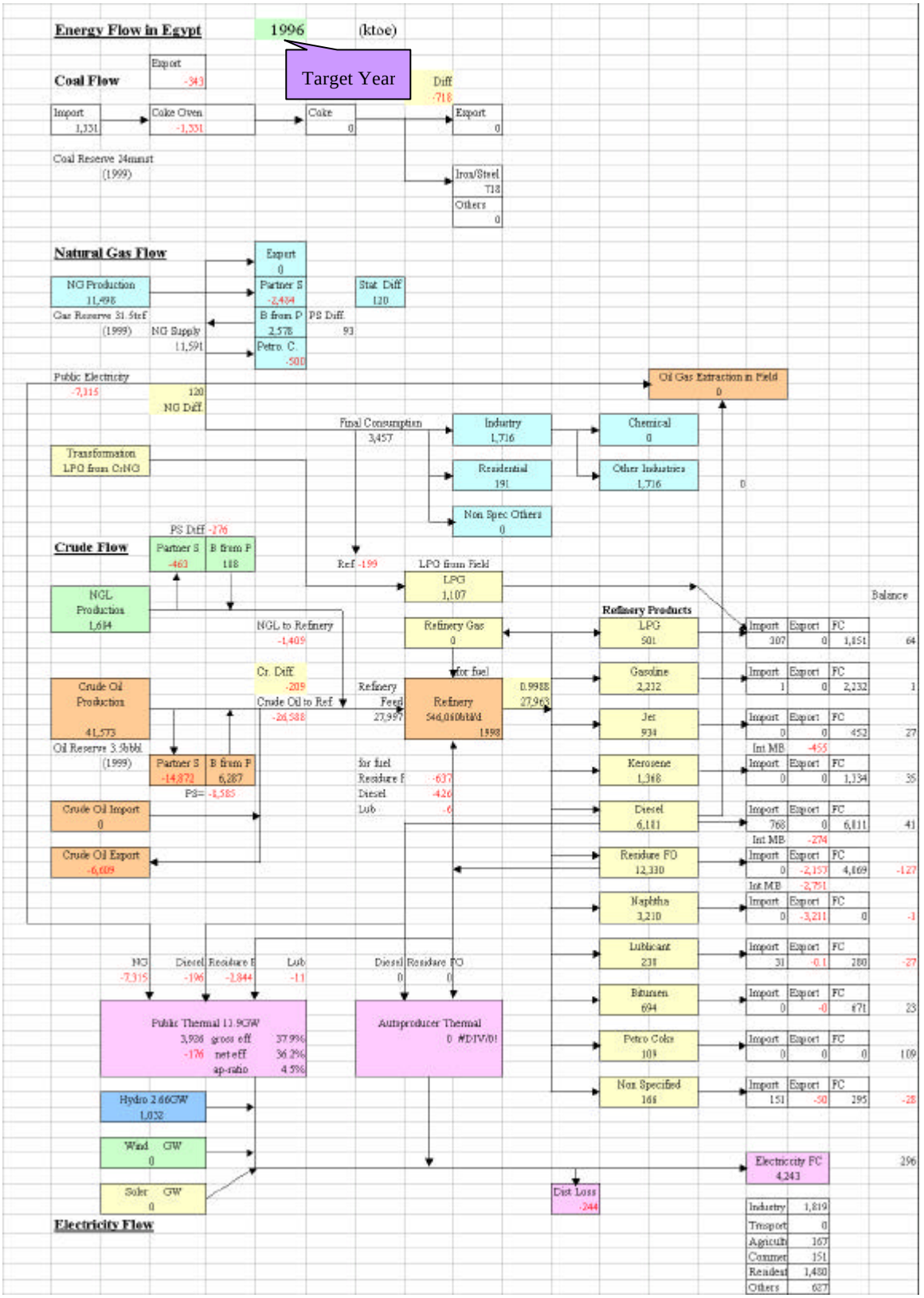
Energy Consumption in Agriculture Sector (line graph)

Energy Consumption in Residential Sector (line graph)

3.3 “Flow” sheet

Energy Flow of the specified year is prepared on this sheet as below example of “u” file.

These data are referred from “EB” sheet by inputting target year in cell C3 on “EB” sheet.



3.4 “IND” sheet

(1) “v” file

There are Macro Indicators from IEA Database (1999) for reference in “v” file on this sheet.

(2) “u” file

This sheet is the data table of GDP, population and some typically-calculated indicators. The table items are as below.

Table 3.1 Macro Indicator Items in “u” file

Items
Macro Economic Data (million LE)
TOTAL GDP (FACTOR COST)
GDP Adjusted agriculture GDP
GDP Adjusted industry GDP
GDP Adjusted petroleum GDP
GDP Adjusted electricity GDP
GDP Adjusted construction GDP
GDP Adjusted transportation GDP
GDP Adjusted commercial GDP
GDP Adjusted government GDP
GDP Adjusted others GDP
Population (1,000persons)
Energy Supply
Energy Indigenous Production (ktoe)
TPES (ktoe)
Crude Oil Domestic Supply (ktoe)
Electricity Generation (GWh)
Electricity Consumption (GWh)
Energy Consumption (ktoe)
Industry
Agriculture
Transportation
Commercial
Public Utility
Goverbment Use
Non-Energy Use
Main Indicator
TPES/GDP (ktoe/million LE)
TPES/Population (toe per capita)
Energy production/TPES
Oil Supply/GDP (toe per thousand LE)
Oil Supply/Population (toe per capita)
Electricity Consumption/GDP (kWh per LE)
Electricity Consumption/Population (kWh per capita)
Sectoral Energy Intensity (ktoe/million LE)
Industry
Agriculture
Transportation
Commercial
Government

3.5 "NCV" sheet in "v" file

The Net Calorific Values of Egypt are defined in this sheet. These are used to obtain unified unit, "ktoe" from physical unit, "kton, GWh". Examples of Net Calorific Value is listed in the following table. This sheet is prepared only in "v" files.

Average Net Calorific Value
toe/ton

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Hard Coal	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Brown Coal	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Coking Coal	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Other Bituminous Coal and Anthracite	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Sub-Bituminous Coal	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lignite	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Coke Oven Coke	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Natural Gas	1.111	1.111	1.111	1.111	1.111	1.111	1.111	1.111	1.111
Crude Oil	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
Natural Gas Liquids	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103
Refinery Feedstocks	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103
Additives/Blending Components	0	0	0	0	0	0	0	0	0
Input of Origin not Crude or NGL	0	0	0	0	0	0	0	0	0
Refinery Gas	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
Ethane	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
Liquefied Petroleum Gases	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
Motor Gasoline	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103
Aviation Gasoline	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103
Gasoline type Jet Fuel	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103
Kerosene type Jet Fuel	1.086	1.086	1.086	1.086	1.086	1.086	1.086	1.086	1.086
Kerosene	1.086	1.086	1.086	1.086	1.086	1.086	1.086	1.086	1.086
Gas/Diesel Oil	1.066	1.066	1.066	1.066	1.066	1.066	1.066	1.066	1.066
Residual Fuel Oil	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Naphtha	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103	1.103
White Spirit	1.086	1.086	1.086	1.086	1.086	1.086	1.086	1.086	1.086
Lubricants	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Bitumen	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Paraffin Waxes	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
Petroleum Coke	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Non-specified Petroleum Products	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972	0.972
kcal/ton_oil_equivalent	10000	10000	10000	10000	10000	10000	10000	10000	10000
Elec	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086

3.6 “EB” sheet

The Energy Balance Table is prepared as illustrated in the following example. This table is automatically calculated from each fuel sheet of Database file by using “HLOOKUP” Excel function.

Egypt Energy Balance (KTOE)	2004												
Item	Hard_C	NG	Crude	Crude_Oil	NGL	Ref_Gas	LPG	Gasoline	Jet	Kero	Diesel	Res_FO	Naphtha
Indigenous Production	32	20,884	43,733	41,656	2,077	0	0	0	0	0	0	0	0
Partners Share	0	-8,682	-17,166	-15,125	-2,040	0	0	0	0	0	0	0	0
From Partners	0	8,682	10,598	8,557	2,040	0	0	0	0	0	0	0	0
Import	0	0	0	0	0	0	1,450	165	0	0	3,011	0	0
Export	-32	0	-1,033	-1,033	0	0	0	0	-368	-835	0	-2,966	-4,081
International Marine Bunkers/Aviation	0	0	0	0	0	0	0	0	-394	0	-259	-2,284	0
Stock Changes	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Primary Energy Supply	0	20,884	36,132	34,055	2,077	0	1,450	165	-762	-835	2,752	-5,250	-4,081
Transfers	0	0	0	0	0	0	1,612	0	0	0	0	0	0
Statistical Differences	0	0	0	0	0	0	0	0	0	0	0	0	0
Transformation Sector	0	-13,904	-36,132	-34,055	-2,077	0	610	3,023	1,267	1,447	7,939	10,100	4,081
Public Electricity Plants	0	-12,908	0	0	0	0	0	0	0	0	-86	-5,330	0
Autoproducer Electricity Plants	0	0	0	0	0	0	0	0	0	0	0	0	0
Coke Ovens	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Works	0	0	0	0	0	0	0	0	0	0	0	0	0
For Blast Furnace Gas	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrochemicals for Raw Materials/Energy	0	-996	0	0	0	0	0	0	0	0	0	0	0
Oil Refineries	0	0	-36,132	-34,055	-2,077	0	610	3,023	1,267	1,447	8,024	15,431	4,081
Liquefaction	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-specified (Transformation)	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy Sector Use	0	-656	0	0	0	0	0	0	0	0	-610	-407	0
Coal Mines	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil and Gas Extraction	0	0	0	0	0	0	0	0	0	0	0	0	0
Coke Ovens use	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Works use	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil Refineries use	0	-656	0	0	0	0	0	0	0	0	-610	-407	0
Own Use in Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0
Used for Pumped Storage	0	0	0	0	0	0	0	0	0	0	0	0	0
Nuclear Industry	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-specified (Energy)	0	0	0	0	0	0	0	0	0	0	0	0	0
Distribution Losses	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Final Consumption (Supply)	0	6,324	0	0	0	0	3,671	3,188	506	612	10,081	4,444	0
Total Final Consumption	0	6,324	0	0	0	0	3,671	3,188	506	612	10,081	4,444	0
Industry Sector	0	3,602	0	0	0	0	322	0	0	3	3,054	3,646	0
Iron and Steel	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical and Petrochemical	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metals	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Metallic Minerals	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0
Machinery	0	0	0	0	0	0	0	0	0	0	0	0	0
Mining and Quarrying	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Tobacco	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0
Textile and Leather	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-specified (Industry)	0	3,602	0	0	0	0	322	0	0	3	3,054	3,646	0
Transport Sector	0	0	0	0	0	0	0	3,188	506	0	7,018	798	0
Others (Transportation)	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic Air Transport	0	0	0	0	0	0	0	0	506	0	0	0	0
Road	0	0	0	0	0	0	0	0	0	0	0	0	0
Rail	0	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Transport	0	0	0	0	0	0	0	0	0	0	0	0	0
River	0	0	0	0	0	0	0	0	0	0	0	0	0
Internal Navigation	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-specified (Transport)	0	0	0	0	0	0	0	3,188	0	0	7,018	798	0
Other Sectors	0	615	0	0	0	0	3,350	0	0	609	9	0	0
Agriculture	0	0	0	0	0	0	0	0	0	61	9	0	0
Public Utility	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	0	615	0	0	0	0	3,350	0	0	548	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-specified (Other)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Energy Use	0	2,107	0	0	0	0	0	0	0	0	0	0	0

3.7 “Fuel” sheet

“Fuel” sheet is the data table summarizing fuels at each energy flow for utilizing these data.

Data Flow points are:

Indigenous Production

Partners Share

From Partners

Import

Export

International Marine Bunkers/Aviation Jet

Total Primary Energy Supply

Transfer, Public Electricity, Coke Oven, Petrochemicals

Total Final Consumption

Industry Sector

Transport Sector

Agriculture Sector

Residential Sector

Commercial Sector

Table Example:

	1997	1998	1999	2000	2001	2002	2003	2004	2005
TPES									
Hard_C	0	0	0	0	0	0	0	0	0
Coke_C	1,321	0	1,110	1,363	1,361	1,359	1,358	1,358	1,358
COC	-325	0	-325	-325	-325	-325	-325	-325	-325
GWG	0	0	0	0	0	0	0	0	0
COG	0	0	0	0	0	0	0	0	0
BFG	0	0	0	0	0	0	0	0	0
OxG	0	0	0	0	0	0	0	0	0
Renew	93	93	93	94	294	294	295	295	0
Bio	13	13	17	18	18	20	20	21	0
NG	11,719	13,189	13,258	13,669	14,126	14,638	15,205	15,830	16,588
Crude	28,782	29,071	30,135	30,110	30,092	30,083	30,079	30,082	30,091
Crude_Oil	27,236	27,400	27,227	27,458	27,617	27,708	27,738	27,709	27,626
NGL	1,546	1,671	2,908	2,652	2,475	2,375	2,342	2,374	2,465
Ref_Gas	0	0	0	0	0	0	0	0	0
LPG	599	825	800	978	1,154	1,335	1,523	1,724	1,939
Gasoline	126	133	-66	3	68	130	188	240	291
Jet	-510	-559	-515	-507	-498	-491	-483	-475	-467
Kero	-35	-13	-244	-352	-452	-544	-628	-704	-771
Diesel	780	1,449	1,367	1,953	2,609	3,346	4,163	5,067	6,069
Res_FO	-3,898	-3,533	-4,024	-3,524	-2,979	-2,383	-2,271	-2,284	-2,287
Naphtha	-3,245	-3,358	-3,392	-3,392	-3,392	-3,392	-3,392	-3,392	-3,392
Lub	48	35	83	107	134	165	201	241	286
Bitu	0	-3	116	142	167	191	213	233	252
P_Coke	0	0	0	0	0	0	0	0	0
P_Non	152	145	179	185	191	197	203	210	218
Hydro	1,051	1,290	1,314	1,337	1,359	1,380	1,400	1,419	1,437
Elec	0	0	0	0	0	0	0	0	0
Total	36,672	38,779	39,911	41,897	44,005	46,114	47,925	49,835	51,287

LP Model and Environmental Model utilize this table.

3.8 “Transfer” sheet

“Transfer” sheet is the data table summarizing transformation (energy conversion) sector to obtain refinery producing intensity, thermal efficiency of power generation and electricity distribution loss. Table Example is as below.

TRANS FORMATION SECTOR										
COUNTRY: EGYPT										
Units: KTOE										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Transfer										
Natural Gas Liquids	0	0	0	0	0	0	0	0	0	0
Liquefied Petroleum Gases	1,107	1,106	1,130	1,192	1,275	1,359	1,444	1,530	1,618	1,707
Refineries										
In let										
Crude	27,997	28,782	29,071	30,970	32,380	33,766	35,351	37,132	39,116	41,322
Crude Oil	26,588	27,236	27,400	29,190	30,519	31,825	33,319	34,998	36,868	38,947
Natural Gas Liquids	1,409	1,546	1,671	1,780	1,861	1,941	2,032	2,134	2,248	2,375
Petroleum Products										
Refinery Gas	0	0	0	0	0	0	0	0	0	0
Liquefied Petroleum Gases	501	519	491	523	546	570	596	626	660	697
Motor Gasoline	2,335	2,335	2,432	2,591	2,709	2,825	2,958	3,106	3,272	3,457
Kerosene type Jet Fuel	934	951	1,020	1,086	1,136	1,184	1,240	1,302	1,372	1,449
Kerosene	1,368	1,250	1,164	1,240	1,297	1,352	1,416	1,487	1,566	1,655
Gas/Diesel Oil	6,181	6,561	6,456	6,878	7,191	7,499	7,851	8,246	8,687	9,177
Residual Fuel Oil	12,330	12,912	12,415	13,226	13,828	14,420	15,097	15,858	16,705	17,647
Naphtha	3,210	3,423	3,284	3,498	3,657	3,814	3,993	4,194	4,418	4,667
Lubricants	238	249	259	275	288	300	314	330	348	368
Bitumen	694	784	927	988	1,033	1,077	1,128	1,184	1,248	1,318
Petroleum Coke	109	116	121	129	135	141	148	155	163	173
Non-specified Petroleum Prod	166	165	176	188	196	205	215	225	237	251
Products Total	28,066	29,265	28,745	30,823	32,017	33,368	34,955	36,716	38,678	40,859
Material Balance Differences	-69	-482	326	347	363	379	396	416	439	463
Intensity of Refinery										
Refinery Gas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Liquefied Petroleum Gases	0.018	0.018	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
Motor Gasoline	0.083	0.081	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084
Kerosene type Jet Fuel	0.033	0.033	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Kerosene	0.049	0.043	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Gas/Diesel Oil	0.221	0.228	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222
Residual Fuel Oil	0.440	0.449	0.427	0.427	0.427	0.427	0.427	0.427	0.427	0.427
Naphtha	0.115	0.119	0.113	0.113	0.113	0.113	0.113	0.113	0.113	0.113
Lubricants	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
Bitumen	0.025	0.027	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
Petroleum Coke	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Non-specified Petroleum Prod	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
	1.002	1.017	0.989	0.989	0.989	0.989	0.989	0.989	0.989	0.989
Own Use in Refinery										
Refinery Gas	0	0	0	0	0	0	0	0	0	0
Residual Fuel Oil	-637	-577	-543	-538	-521	-502	-483	-464	-444	-424
Own Use Total	-637	-577	-543	-538	-521	-502	-483	-464	-444	-424
Electricity										
Natural Gas	7,315	7,228	7,675	8,953	9,768	10,750	11,887	13,185	14,649	16,291
Gas/Diesel Oil	196	222	129	120	112	105	98	91	86	81
Residual Fuel Oil	2,844	3,986	4,208	3,997	4,288	4,644	5,059	5,531	6,061	6,652
Fuel Total	10,355	11,436	12,012	13,070	14,167	15,498	17,044	18,807	20,796	23,023
Thermal Generation (Gross)	3,926	4,310	4,553	4,960	5,370	5,881	6,467	7,137	7,891	8,736
Efficiency (Gross)	37.9%	37.7%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%	37.9%
Hydro	1,032	1,051	1,290	1,314	1,337	1,359	1,380	1,400	1,419	1,437
Wind	0	0	0	0	0	0	0	0	0	0
Solar	0	0	0	0	0	0	0	7	7	0
Total Electricity (Gross)	4,958	5,361	5,843	6,274	6,713	7,240	7,847	8,537	9,310	10,174
Own Use in Electricity	-176	-193	-215	-226	-237	-250	-266	-283	-302	-322
Distribution Loss	-540	-612	-765	-813	-861	-919	-986	-1,062	-1,146	-1,239
Total Loss in Electricity	-716	-805	-980	-1,039	-1,098	-1,170	-1,252	-1,344	-1,447	-1,561
Ap Ratio	3.54%	3.60%	3.68%	3.60%	3.53%	3.46%	3.38%	3.31%	3.24%	3.17%
Distribution Loss Ratio	10.89%	11.41%	13.09%	12.96%	12.83%	12.70%	12.57%	12.44%	12.31%	12.18%
Total Loss Ratio	14.43%	15.01%	16.76%	16.56%	16.36%	16.16%	15.95%	15.75%	15.55%	15.34%

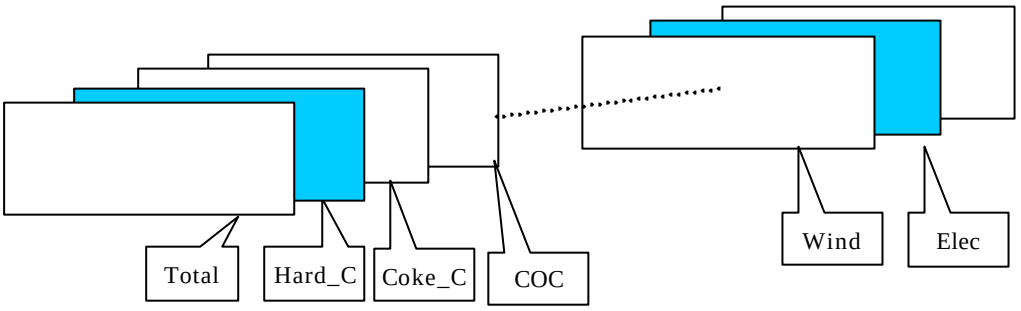
3.9 “Total” sheet

“Total” sheet is total summation of each fuel by yearly series that has the same format as each fuel sheet.

To make total summation of each cell in each sheet on Total sheet, with an example of cell Q6.

Q6 = SUM(Hard_C:Elec!Q6)
This formula is equal to
=Hard_C!Q6+Coak_C!Q6+COC!Q6+……+Wind!Q6+Elec!Q6

Summation of Cell Q6 in all sheets between “Hard_C” (colored) sheet and “Elec” sheet (colored).



3.10 Fuel Each Sheet

There are 28 sheet of fuel in Database files. These sheet have absolutely the same format to make getting Energy Balance Table and adding new fuel sheets easy.
Sheet list is shown in **2.1**, and Item definition is explained in **2.2**. The time series of each sheet is between FY 1981 and FY 2005.

4. Operation of the Database

The operation of pare of files, "v" file and "u" file, must be under the same folder to obtain easy inter relation between two files.

4.1 To convert physical unit to Unified unit, "ktoe"

"u" file has reference formulas to "v" file for making the conversion from physical unit in "v" file to kiloton oil equivalent unit, "ktoe".

The conversion is easily calculated automatically when pare of files are opened. Also, it is calculated to select "Yes" when the recalculation message is appeared during opening "u" file without "v" file open.

4.2 To make Energy Balance Table

Input the target year at the cell C3 on the EB sheet in Database files. Energy Balance of specified year is calculated on the EB sheet. Also, Energy Flow of the year is shown on Flow sheet at the same time.

4.3 Print

The Database Files have the default print area on the entire sheet. To get printing of each sheet, just select "File", "Print" and "Yes" in Microsoft Excel command.

All the sheet are printed by select "File", "Print", "All book" and "Yes", then the print of all sheet will be started for the default print area setting.

After changing the print area of some sheet by some reason, it will be needed to set again the same print area as default one, otherwise default print area will be lost.

By using the short cut key below under the file open, the full sheet printing is easily operated.

1) Select "Ctrl P"
2) Select " Alt E"
3) Then "Yes"

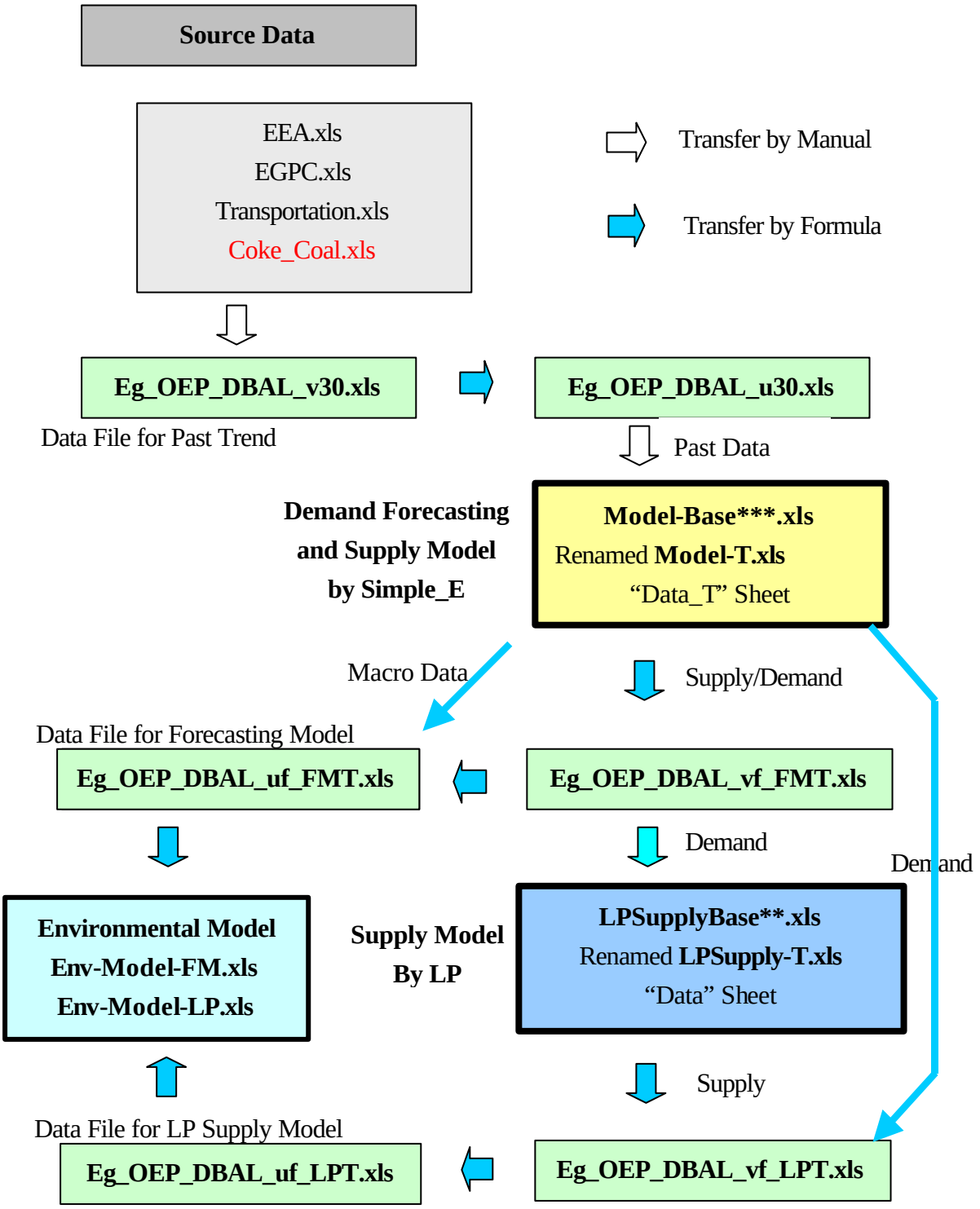
Then, 49 pages print is started when the default print areas of each sheet are kept.

5 Data Linkage

5.1 Data Transfer Flow

All Data are basically transferred with this Flow. White arrow means Data transfer by manual, and Colored arrow means Automatic Data transfer by several formulas.

Figure 6.5.1 Data Linkage between each Files



5.2 The Inter-reference of Each File

(1) Eg_OEP_DBAL_vf_FMT.xls refers Model-T.xls

This file has direct linkage formulas to **Data_T** sheet in **Model-T.xls**, that gives Demand side data and Supply side data to this "v" file.

(2) Eg_OEP_DBAL_uf_FMT.xls refers Eg_OEP_DBAL_vf_FMT.xls and Model-T.xls

This file has direct linkage formulas to each energy sheet in **Eg_OEP_DBAL_vf_FMT.xls** to make data conversion from physical unit to kiloton oil equivalent unit, "ktoe", and has direct linkage formula to **Data_T** sheet in **Model-T.xls** to obtain the Macro Economic data.

(3) Eg_OEP_DBAL_vf_LPT.xls refers Model-T.xls and LPSupply-T.xls

This file has direct linkage formulas to, **Data_T** sheet in **Model-T.xls** to obtain Demand side data, and has direct linkage formulas to, **Data** sheet in **LPSupply-T.xls** to get Supply side data.

(4) Eg_OEP_DBAL_uf_LPT.xls refers Eg_OEP_DBAL_vf_LPT.xls

This file has direct linkage formulas to each energy sheet in **Eg_OEP_DBAL_vf_FMT.xls** to make the data conversion from physical unit to "ktoe".

(5) LPSupply-T.xls refers Eg_OEP_DBAL_vf_FMT.xls

IDB sheet in **LPSupply-T.xls** has direct linkage formula to **Fuel** sheet in **Eg_OEP_DBAL_vf_FMT.xls** to make the data transfer from Database to the **LP Model**.

(6) Env-Model-FMT.xls refers Eg_OEP_DBAL_uf_FMT.xls

Several sheets in **Env-Model-FMT.xls** has direct linkage formulas to **EB** sheet, **Fuel** sheet and **Transfer** sheet in **Eg_OEP_DBAL_uf_FMT.xls** to make the data transfer from the Database for obtaining the result of the **Demand Forecasting Model**.

(6) Env-Model-LPT.xls refers Eg_OEP_DBAL_uf_LPT.xls

Several sheets in **Env-Model-LPT.xls** has direct linkage formulas to **EB** sheet, **Fuel** sheet and **Transfer** sheet in **Eg_OEP_DBAL_uf_LPT.xls** to make the data transfer from the Database for obtaining the result of the **LP Model**.

5.3 Method of Data Linkage (Linkage Operation)

To make linkage at the same time whenever the Model calculate some result, open the Database files in the same folder where the model files exist and are opened. The file name of All Model must be kept, such as the Forecasting Model is **"Model-T.xls"** and the LP Model must be **"LPSupply-T.xls"**, during operation, because the Database files has direct linkage formulas referring these file name. All File name must be strictly kept with **"T"** suffix, as the box below, otherwise the inter-relation between files will not be effective.

```
/Folder
        Eg_OEP_DBAL_vf_FMT.xls    (kton/GWh)
        Eg_OEP_DBAL_uf_FMT.xls    (ktoe)
        Eg_OEP_DBAL_vf_LPT.xls    (kton/GWh)
        Eg_OEP_DBAL_uf_LPT.xls    (ktoe)
        Model-T.xls
        LPSupply-T.xls
```

5.4 Operation of Data Linkage (Batch Operation)

(1) File Allocation

Two Models, two Environmental Model and Energy Balance Data files are put in the "Original" folder in "Model" folder. Files allocation is shown as box below.

```
/Model
    /Original
        Eg_OEP_DBAL_vf_FMT.xls    (kton/GWh)
        Eg_OEP_DBAL_uf_FMT.xls    (ktoe)
        Eg_OEP_DBAL_vf_LPT.xls    (kton/GWh)
        Eg_OEP_DBAL_uf_LPT.xls    (ktoe)
        Model-T.xls
        LPSupply-T.xls
        Env-Model-FMT.xls
        Env-Model-LPT.xls
```

(2) Method of Data Linkage (Batch Operation)

Make new folder with the following way. The new folder name should be suitable case study code--for example " Scenario-1".

/Model
    /Original
    /Base Case (New Folder for example)

Open the folder, "/Model/Original" and select four files shown in red in the following box.

/Model
    /Original
        Eg_OEP_DBAL_vf_FMT.xls (kton/GWh)
        Eg_OEP_DBAL_uf_FMT.xls (ktoe)
        Eg_OEP_DBAL_vf_LPT.xls (kton/GWh)
        Eg_OEP_DBAL_uf_LPT.xls (ktoe)
        Env-Model-FMT.xls
        Env-Model-LPT.xls
        Model-T.xls
        LPSupply-T.xls

Copy, not move, those four files to the new folder-- "Base Case", for example.

/Model
    /Original
    /Base Case (New Folder for example)
        Eg_OEP_DBAL_vf_FMT.xls
        Eg_OEP_DBAL_uf_FMT.xls
        Eg_OEP_DBAL_vf_LPT.xls
        Eg_OEP_DBAL_uf_LPT.xls
        Env-Model-FMT.xls
        Env-Model-LPT.xls

Copy two files of Models--“Forecasting Model” and “LP Supply Model”, in this case. Forecasting Model version is “****”, and LP Supply Model version is “****”.

/Model
- /Original
- /Base Case (Folder Name for example)
  - Eg_OEP_DBAL_vf_FMT.xls
  - Eg_OEP_DBAL_uf_FMT.xls
  - Eg_OEP_DBAL_vf_LPT.xls
  - Eg_OEP_DBAL_uf_LPT.xls
  - Env-Model-FMT.xls
  - Env-Model-LPT.xls
  - Model-****.xls
  - LPSupply-****.xls

Rename these two model files as follows

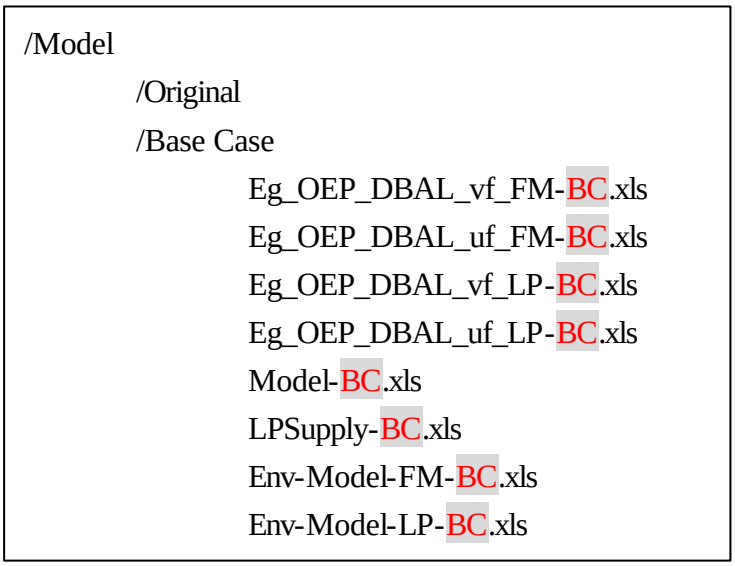
/Model
- /Original
- /Base Case
  - Eg_OEP_DBAL_vf_FMT.xls
  - Eg_OEP_DBAL_uf_FMT.xls
  - Eg_OEP_DBAL_vf_LPT.xls
  - Eg_OEP_DBAL_uf_LPT.xls
  - Env-Model-FMT.xls
  - Env-Model-LPT.xls
  - Model-T.xls
  - LPSupply-T.xls

Open all files at once.

When some recalculation message appears, in that case, select “No”, which means no recalculation at this moment to make files opening quickly.

In case of saving this Case Study data as specified filename, save all files as new name such as the following blocks while all files are opened, according to the Data Flow--the first from the two Model file, the second from “v” file, third from “u” file and the two Environmental

Model finally. All the inter-relation between those files will be automatically changed and kept. “BC” means Base Case in this case. After that, you can delete old name files with “T” suffix in this folder. When overwriting message appears during closing of those new named files, select “Yes”. Do not rename any file while it is not opened to avoid destroying inter-relation between these files.



And the original files have been kept in the “Original” folder.