**2.5 Simulation sheet**

In the simulation sheet, the input actual values and the future forecasting values are shown. The all kinds of the results from the model are arranged and displayed in the simulation sheet. The contents are as follows;

**(1) Regarding actual data**

· The actual data are input from 1990 to 2003 or 2004, those do not have any calculation expression in the simulation sheet.

· In the model, the variable names described in data sheet appeared in the same line number position in the simulation sheet as ones in data sheet.

· The comment area in data sheet, model sheet, simulation sheet and growth rate sheet are filled out with the same comments and variable names.

**(2)Regarding forecasting**

· In the simulation sheet, the values with black color are the actual and exogenous values that are described in data sheet. The values with red color are ones forecasted by SimpleE.

· In the simulation sheet, the forecasting years are from 20004 or 2005 to 2025. The forecasted values are red.

· The forecasted values have the expressions that calculated the values. The expressions are described in Model sheet.

· The actual values and forecasted values are referred by the Growth sheet, Adjust sheet and Summary sheet.

Table 2-5-1 Simulation sheet(1)

| H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic data | Exchange rate | Dn/US$ | ECEXC | 5,588.0 | 11,000.0 | 14,500.0 | 16,077.0 | 17,621.0 | 19,313.0 | 21,168.0 | 21,168.0 |
| Population | Country number | Million persons | POPNUM | 66.0 | 72.0 | 77.6 | 83.1 | 87.6 | 92.5 | 97.7 | 101.4 |
| | Growth rate | G% | POPNGR | | 1.7 | 1.4 | 1.4 | 1.1 | 1.1 | 1.1 | 0.8 |
| | Urban number | Million persons | POPUBN | 12.9 | 14.9 | 18.8 | 21.9 | 24.2 | 26.9 | 29.8 | 32.6 |
| | Urban population share | S% | POPUGR | 19.5 | 20.7 | 24.2 | 26.3 | 27.7 | 29.1 | 30.6 | 32.1 |
| Household | County Number | Million HH | HHNUM | 13.3 | 15.0 | 16.9 | 18.3 | 19.7 | 21.2 | 22.8 | 24.6 |
| | Growth rate | G% | HHNGR | | 2.0 | 1.2 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| | Urban number | Million HH | HHUBN | 2.6 | 3.1 | 4.1 | 4.8 | 5.5 | 6.2 | 7.0 | 7.9 |
| | Urban HH rate | S% | HHUGR | 19.5 | 20.7 | 24.2 | 26.3 | 27.7 | 29.1 | 30.6 | 32.1 |
| Labor number | Agriculture | Million persons | LABAGR | 21.2 | 23.1 | 24.3 | 23.7 | 25.3 | 27.2 | 29.1 | 30.2 |
| | Manufacturing & Mining | Million persons | LABMAN | 2.6 | 2.8 | 3.4 | 5.1 | 5.7 | 6.4 | 7.1 | 7.6 |
| | Services & Others | Million persons | LABOTH | 5.6 | 7.1 | 9.0 | 13.6 | 15.1 | 16.5 | 18.3 | 19.8 |
| | Unemployed | Million persons | LABUNE | 1.0 | 1.5 | 1.7 | 0.7 | 0.8 | 0.9 | 0.9 | 1.0 |
| | Total | Million persons | LABTOT | 30.4 | 34.5 | 38.4 | 43.1 | 46.8 | 50.9 | 55.4 | 58.7 |
| | Labor force share to Pop | % | LABSHP | 46.0 | 47.9 | 49.5 | 51.9 | 53.5 | 55.1 | 56.7 | 57.9 |
| Labor shares | Agriculture & Forestry | S% | LASAGR | 69.7 | 67.0 | 63.3 | 54.9 | 54.0 | 53.4 | 52.5 | 51.5 |
| | Manufacturing & Mining | S% | LASMAN | 8.6 | 8.1 | 8.9 | 11.8 | 12.2 | 12.5 | 12.8 | 13.0 |
| | Services & Others | S% | LASOTH | 18.4 | 20.6 | 23.4 | 31.6 | 32.2 | 32.5 | 33.0 | 33.8 |
| | Unemployed | S% | LASUNE | 3.3 | 4.3 | 4.4 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| | Total | S% | LASTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| GDP | nGDP at current price | Billion Dn | GDNOM | 41,955 | 228,892 | 441,646 | 793,661 | 1,597,030 | 3,213,595 | 6,466,498 | 12,715,025 |
| | Growth rate | G% | GDNGR | | 28.2 | 10.4 | 14.5 | 15.0 | 15.0 | 15.0 | 14.5 |
| | uGDP on US $ base | Million US$ | GDDOL | 7,508 | 20,808 | 30,458 | 49,366 | 90,632 | 166,395 | 305,485 | 600,672 |
| | Growth rate | G% | GDDGR | | 27.8 | 3.1 | 12.4 | 4.9 | 4.9 | 4.9 | 14.5 |
| | uGDP per capita on US$ base | US$ per capita | GDPDOL | 113.7 | 289.0 | 392.3 | 594.2 | 1,034.4 | 1,798.8 | 3,128.2 | 5,925.4 |
| | Growth rate | G% | GDPDGR | | 25.7 | 1.7 | 10.8 | 3.8 | 3.8 | 3.8 | 13.6 |
| | rGDP at 1994 price | Billion Dn | RGDP | 131,968 | 195,567 | 273,666 | 391,898 | 589,279 | 886,074 | 1,332,351 | 1,957,661 |
| | Growth rate | G% | RGDPGR | | 9.5 | 6.8 | 8.0 | 8.5 | 8.5 | 8.5 | 8.0 |
| | GDP deflator 1994 price | 1994=100 | GDFLT | 31.8 | 117.0 | 161.4 | 202.5 | 271.0 | 362.7 | 485.3 | 649.5 |
| | Growth rate | G% | GDFGR | | 17.0 | 3.4 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| | rGross Domestic Savings | Billion Dn | GDSAV | 3,834 | 35,594 | 74,230 | 110,515 | 166,177 | 249,873 | 375,723 | 552,060 |
| | Share to GDP | % | GDSHA | 2.9 | 18.2 | 27.1 | 28.2 | 28.2 | 28.2 | 28.2 | 28.2 |
| | Elasticity to Private Con | | GDEVPC | | 1.6 | 1.4 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| | rLabor productivity in Manufacturing | 1000 Dn /persons | LAPMAN | 4,489 | 5,926 | 7,457 | 9,238 | 12,795 | 17,694 | 24,470 | 33,939 |
| | Growth rate | G% | LAPMGR | | 5.7 | 4.7 | 5.7 | 6.7 | 6.7 | 6.7 | 6.8 |

## Table 2-5-2 Simulation sheet (2)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | | | | | | | | | | | | |
| 56 | nGDE at the curren | Final consumption | Billion Dn | NGEFC | 40,736 | 187,233 | 321,853 | 546,854 | 1,012,307 | 1,886,763 | 3,537,875 | 6,620,791 |
| 57 | | Gross fixed capital formation | Billion Dn | NGEGF | 6,025 | 62,131 | 130,771 | 270,572 | 538,950 | 1,087,736 | 2,208,234 | 4,376,115 |
| 58 | | Exports of goods and services | Billion Dn | NGEEX | 15,120 | 75,106 | 243,049 | 527,850 | 1,227,388 | 2,710,139 | 5,815,659 | 11,888,851 |
| 59 | | Import of goods and services | Billion Dn | NGEIM | 18,996 | 95,925 | 253,927 | 555,356 | 1,184,571 | 2,473,379 | 5,097,115 | 10,172,190 |
| 60 | | Statistical discrepancy | Billion Dn | NGESD | -930 | 347 | -100 | 3,741 | 2,956 | 2,336 | 1,846 | 1,458 |
| 61 | | Total | Billion Dn | NGETOT | 41,955 | 228,892 | 441,646 | 793,661 | 1,597,030 | 3,213,595 | 6,466,498 | 12,715,025 |
| 62 | | | | | | | | | | | | |
| 63 | rGDE at 1994 price | Final consumption | Billion Dn | RGEFC | 128,134 | 159,973 | 199,436 | 270,028 | 373,526 | 520,231 | 728,940 | 1,019,366 |
| 64 | | Gross fixed capital formation | Billion Dn | RGEGF | 18,951 | 53,085 | 81,032 | 133,604 | 198,864 | 299,918 | 454,982 | 673,766 |
| 65 | | Exports of goods and services | Billion Dn | RGEEX | 47,559 | 64,171 | 150,605 | 260,644 | 452,887 | 747,258 | 1,198,253 | 1,830,459 |
| 66 | | Import of goods and services | Billion Dn | RGEIM | 59,751 | 81,959 | 157,346 | 274,226 | 437,088 | 681,977 | 1,050,205 | 1,566,155 |
| 67 | | Statistical discrepancy | Billion Dn | RGESD | -2,925 | 296 | -62 | 1,847 | 1,091 | 644 | 380 | 225 |
| 68 | | Total | Billion Dn | RGETOT | 131,968 | 195,567 | 273,666 | 391,898 | 589,279 | 886,074 | 1,332,351 | 1,957,661 |
| 69 | | | | | | | | | | | | |
| 70 | Shares of rGDE | Final consumption | % | RREFC | 97.1 | 81.8 | 72.9 | 68.9 | 63.4 | 58.7 | 54.7 | 52.1 |
| 71 | | Gross fixed capital formation | % | RREGF | 14.4 | 27.1 | 29.6 | 34.1 | 33.7 | 33.8 | 34.1 | 34.4 |
| 72 | | Exports of goods and services | % | RREEX | 36.0 | 32.8 | 55.0 | 66.5 | 76.9 | 84.3 | 89.9 | 93.5 |
| 73 | | Import of goods and services | % | RREIM | 45.3 | 41.9 | 57.5 | 70.0 | 74.2 | 77.0 | 78.8 | 80.0 |
| 74 | | Statistical discrepancy | % | RRESD | -2.2 | 0.2 | 0.0 | 0.5 | 0.2 | 0.1 | 0.0 | 0.0 |
| 75 | | Total | % | RRETOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 76 | | | | | | | | | | | | |
| 77 | nGDP at the curren | Agriculture & Forestry | Billion Dn | NGPAGR | 16,252 | 62,219 | 108,356 | 159,060 | 252,877 | 389,608 | 592,925 | 870,173 |
| 78 | | Manufacturing & Mining | Billion Dn | NGPMAN | 9,513 | 65,820 | 162,220 | 332,454 | 749,882 | 1,641,862 | 3,550,861 | 7,417,944 |
| 79 | | Commercial & Trade | Billion Dn | NGPTRA | 5,460 | 37,491 | 62,836 | 108,866 | 214,121 | 425,929 | 836,893 | 1,595,053 |
| 80 | | Transport and communications | Billion Dn | NGPTRN | 1,449 | 9,117 | 17,341 | 29,488 | 57,997 | 115,368 | 226,682 | 432,038 |
| 81 | | Service & Others | Billion Dn | NGPSER | 9,281 | 54,245 | 90,893 | 163,793 | 322,153 | 640,827 | 1,259,137 | 2,399,818 |
| 82 | | Total | Billion Dn | NGPTOT | 41,955 | 228,892 | 441,646 | 793,661 | 1,597,030 | 3,213,595 | 6,466,498 | 12,715,025 |
| 83 | | | | | | | | | | | | |
| 84 | rGDP at 1994 price | Agriculture & Forestry | Billion Dn | RGPAGR | 51,120 | 53,160 | 67,143 | 78,541 | 93,308 | 107,425 | 122,166 | 133,976 |
| 85 | | Manufacturing & Mining | Billion Dn | RGPMAN | 29,923 | 56,237 | 100,520 | 164,160 | 276,695 | 452,705 | 731,616 | 1,142,099 |
| 86 | | Commercial & Trade | Billion Dn | RGPTRA | 17,174 | 32,033 | 38,936 | 53,756 | 79,007 | 117,440 | 172,433 | 245,581 |
| 87 | | Transport and communications | Billion Dn | RGPTRN | 4,558 | 7,790 | 10,745 | 14,561 | 21,400 | 31,810 | 46,705 | 66,518 |
| 88 | | Service & Others | Billion Dn | RGPSER | 29,193 | 46,347 | 56,322 | 80,879 | 118,870 | 176,693 | 259,431 | 369,486 |
| 89 | | Total | Billion Dn | RGPTOT | 131,968 | 195,567 | 273,666 | 391,898 | 589,279 | 886,074 | 1,332,351 | 1,957,661 |
| 90 | | | | | | | | | | | | |
| 91 | Shares of rGDP | Agriculture & Forestry | S% | SHPAGR | 38.7 | 27.2 | 24.5 | 20.0 | 15.8 | 12.1 | 9.2 | 6.8 |
| 92 | | Manufacturing & Mining | S% | SHPMAN | 22.7 | 28.8 | 36.7 | 41.9 | 47.0 | 51.1 | 54.9 | 58.3 |
| 93 | | Commercial & Trade | S% | SHPTRA | 13.0 | 16.4 | 14.2 | 13.7 | 13.4 | 13.3 | 12.9 | 12.5 |
| 94 | | Transport and communications | S% | SHPTRN | 3.5 | 4.0 | 3.9 | 3.7 | 3.6 | 3.6 | 3.5 | 3.4 |
| 95 | | Service & Others | S% | SHPSER | 22.1 | 23.7 | 20.6 | 20.6 | 20.2 | 19.9 | 19.5 | 18.9 |
| 96 | | Total | S% | SHPTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 97 | | | | | | | | | | | | |
| 98 | Sector growth rate | Agriculture & Forestry | | RRPAGR | | 0.8 | 4.8 | 3.4 | 3.5 | 3.0 | 3.0 | 2.5 |
| 99 | | Manufacturing & Mining | | RRPMAN | | 13.4 | 12.3 | 10.5 | 11.0 | 10.5 | 10.5 | 10.0 |
| 100 | | Commercial & Trade | | RRPTRA | | 13.3 | 4.0 | 7.7 | 8.0 | 8.4 | 8.4 | 8.0 |
| 101 | | Transport and communications | | RRPTRN | | 11.3 | 6.6 | 7.7 | 8.0 | 8.4 | 8.4 | 8.0 |
| 102 | | Service & Others | | RRPSER | | 9.7 | 4.0 | 7.7 | 8.0 | 8.4 | 8.4 | 8.0 |
| 103 | | Total | | RRPTOT | | 8.2 | 7.0 | 8.0 | 8.5 | 8.5 | 8.5 | 8.0 |
| 104 | | | | | | | | | | | | |

Table 2-5-3 Simulation sheet (3)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 105 | Elasticity | Agriculture & Forestry | | ELAAGR | | 0.1 | 0.7 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 |
| 106 | | Manufacturing & Mining | | ELAMAN | | 1.6 | 1.8 | 1.3 | 1.3 | 1.2 | 1.2 | 1.3 |
| 107 | | Commercial & Trade | | ELATRA | | 1.6 | 0.6 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 |
| 108 | | Transport and communications | | ELATRN | | 1.4 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 |
| 109 | | Service & Others | | ELASER | | 1.2 | 0.6 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 |
| 110 | | Total | | ELATOT | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 111 | | | | | | | | | | | | | |
| 112 | | | | | | | | | | | | | |
| 113 | rGDP by Elasticity | Agriculture & Forestry | | WRKAGR | | 49,416.5 | 68,224.2 | 78,502 | 93,420 | 107,688 | 122,744 | 134,911 |
| 114 | | Manufacturing & Mining | | WRKMAN | | 59,620.5 | 99,032.2 | 164,079 | 277,028 | 453,810 | 735,079 | 1,150,075 |
| 115 | | Commercial & Trade | | WRKTRA | | 34,856.7 | 39,530.7 | 53,730 | 79,102 | 117,727 | 173,249 | 247,296 |
| 116 | | Transport and communications | | WRKTRN | | 8,097.6 | 10,607.8 | 14,553 | 21,426 | 31,888 | 46,926 | 66,983 |
| 117 | | Service & Others | | WRKSER | | 45,280.6 | 56,799.6 | 80,838 | 119,013 | 177,124 | 260,659 | 372,067 |
| 118 | | Total | | WRKTOT | | 197,271.8 | 274,194.5 | 391,702 | 589,989 | 888,236 | 1,338,658 | 1,971,332 |
| 119 | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | |
| 121 | | | | | | | | | | | | | |

## Table 2-5-4 Simulation sheet (4)

| # | Category | Description | Ref | Code | J | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 122 | Conversion factor to Standard Oil | Standard Oil(10000Kcal/kg) | 10000 | COFASCO | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 123 | | Coal(5600Kcal/kg) | 5600 | COFACOA | | 0.560 | 0.560 | 0.560 | 0.560 | 0.560 | 0.560 | 0.560 | 0.560 |
| 124 | | Gasoline(10500Kcal/kg) | 10500 | COFAGAS | | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 |
| 125 | | Kerosene (10320Kcal/kg) | 10320 | COFAKER | | 1.032 | 1.032 | 1.032 | 1.032 | 1.032 | 1.032 | 1.032 | 1.032 |
| 126 | | Diesel (10150Kcal/kg) | 10150 | COFADIE | | 1.015 | 1.015 | 1.015 | 1.015 | 1.015 | 1.015 | 1.015 | 1.015 |
| 127 | | Petroluem Products | 11500 | COFAPET | | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 | 1.050 |
| 128 | | Fuel oil (9910Kcal/Kg) | 9910 | COFAFUE | | 0.991 | 0.991 | 0.991 | 0.991 | 0.991 | 0.991 | 0.991 | 0.991 |
| 129 | | Natural gas (9000Kcal/m3) | 9000 | COFANAG | | 0.900 | 0.900 | 0.900 | 0.900 | 0.900 | 0.900 | 0.900 | 0.900 |
| 130 | | Renewable energy (3302Kcal/Kg) | 3302 | COFAREW | | 0.330 | 0.330 | 0.330 | 0.330 | 0.330 | 0.330 | 0.330 | 0.330 |
| 131 | | Electricity (860Kcal/KVh) | 860 | COFAELE | | 0.086 | 0.086 | 0.086 | 0.086 | 0.086 | 0.086 | 0.086 | 0.086 |
| 132 | | | | | | | | | | | | | |
| 133 | Power efficiency | Power from Thermal(Coal) | 35.0% | COPOCOA | | 2.279 | 2.279 | 2.279 | 2.279 | 2.279 | 2.279 | 2.279 | 2.279 |
| 134 | | Power from Thermal(FO) | 35.0% | COPOFOT | | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 | 4.033 |
| 135 | | Power from Gasturbine(FO) | 48.0% | COPOFOE | | 5.531 | 5.531 | 5.531 | 5.762 | 5.762 | 5.762 | 5.762 | 5.762 |
| 136 | | Power from Gasturbine(GAS) | 48.0% | COPOGAE | | 5.023 | 5.023 | 5.023 | 5.233 | 5.233 | 5.233 | 5.233 | 5.233 |
| 137 | | Power from Gas steam | 40.0% | COPODAS | | 4.186 | 4.186 | 4.186 | 4.186 | 4.186 | 4.186 | 4.186 | 4.186 |
| 138 | | Power from Diesel | 36.0% | COPODIE | | 4.249 | 4.249 | 4.249 | 4.249 | 4.249 | 4.249 | 4.249 | 4.249 |
| 139 | | | | | | | | | | | | | |
| 140 | Energy price | WTI crude oil price | | EPRCWTI | US$/bbl | 24.5 | 18.4 | 30.3 | 50.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 141 | | Crude oil Price in Vietnam | | EPRCRD | 1000Dn/bbl | 137.0 | 202.5 | 439.4 | 803.9 | 704.8 | 772.5 | 846.7 | 846.7 |
| 142 | | NG price in Vietnam | | EPRNG | $/MMBTU | 0.0 | 0.0 | 3.8 | 6.5 | 5.8 | 6.4 | 7.0 | 7.8 |
| 143 | | Gasoline price in Vietnam | | EPRGAS | Dong/kg | 840.0 | 4,533.3 | 6,400.0 | 10,262.0 | 10,400.5 | 12,245.4 | 14,417.8 | 15,940.5 |
| 144 | | Kerosene price in Vietnam | | EPRKER | Dong/kg | | 3,312.9 | 4,662.6 | 7,476.2 | 7,577.0 | 8,921.1 | 10,503.8 | 11,613.1 |
| 145 | | Diesel price in Vietnam | | EPRDIE | Dong/kg | 630.0 | 2,940.0 | 3,640.0 | 6,524.3 | 6,612.3 | 7,785.2 | 9,166.4 | 10,134.5 |
| 146 | | Fuel oil price in Vietnam | | EPRFO | Dong/kg | 732.4 | 1,082.6 | 2,349.1 | 3,870.9 | 3,923.1 | 4,619.0 | 5,438.5 | 6,012.8 |
| 147 | | Electricity for Agriculture use | | EPRELA | Dn/KVh | 450.4 | 535.0 | 570.0 | 934.9 | 1,078.0 | 1,354.9 | 1,703.1 | 2,064.2 |
| 148 | | Electricity for Residential use | | EPRELR | Dn/KVh | 386.8 | 480.0 | 607.0 | 1,201.2 | 1,383.2 | 1,736.3 | 2,179.7 | 2,638.6 |
| 149 | | Electricity for Industry use | | EPRELI | Dn/KVh | 657.0 | 750.0 | 850.0 | 876.2 | 1,007.6 | 1,263.3 | 1,584.0 | 1,915.0 |
| 150 | | Electricity for Commercial use | | EPRELC | Dn/KVh | 922.0 | 1,150.0 | 1,300.0 | 1,867.4 | 2,144.9 | 2,686.0 | 3,363.6 | 4,061.5 |
| 151 | | | | | | | | | | | | | |
| 152 | G.R of Eneergy price | WTI crude oil price | | GRPRWTI | % | | 7.0 | 57.4 | 25.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 153 | | Crude oil Price in Vietnam | | GRPRCRD | % | | 7.3 | 68.6 | 27.3 | 9.6 | 9.6 | 9.6 | 0.0 |
| 154 | | NG price in Vietnam | | GRPRNG | % | | 0.0 | 2.0 | 25.5 | 2.0 | 2.0 | 2.0 | 2.0 |
| 155 | | Gasoline price in Vietnam | | GRPRGAS | % | | 24.4 | 11.6 | 20.8 | 8.7 | 8.7 | 8.7 | 2.0 |
| 156 | | Kerosene price in vietnam | | GRPRKER | % | | 24.4 | 2.7 | 20.8 | 8.7 | 8.7 | 8.7 | 2.0 |
| 157 | | Diesel price in Vietnam | | GRPRDIE | % | | 0.1 | 0.1 | 20.8 | 8.7 | 8.7 | 8.7 | 2.0 |
| 158 | | Fuel oil price in Vietnam | | GRPRFO | % | | 7.3 | 68.6 | 20.8 | 8.7 | 8.7 | 8.7 | 2.0 |
| 159 | | Electricity for Agriculture use | | GRPRAGR | % | | 2.9 | 3.6 | 14.8 | 7.9 | 7.9 | 7.9 | 3.9 |
| 160 | | Electricity for Residential use | | GRPRELR | % | | 2.1 | 5.8 | 14.8 | 7.9 | 7.9 | 7.9 | 3.9 |
| 161 | | Electricity for Industry use | | GRPRELI | % | | 1.4 | 19.4 | 14.7 | 7.9 | 7.9 | 7.9 | 3.9 |
| 162 | | Electricity for Commercial use | | GRPRELC | % | | 4.5 | 4.0 | 14.7 | 7.9 | 7.9 | 7.9 | 3.8 |
| 163 | | | | | | | | | | | | | |

## Table 2-5-5 Simulation sheet (5)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 164 | Agriculture.Forestry | Energy conservation rate | S% | PAENCOR | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 94.9 | 90.1 | 85.6 |
| 165 | | Technical Improvement | % | PAENTEC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.0 | -1.0 | -1.0 |
| 166 | | Elasticity to Energy price | | PAENEVP | | -1.9 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 167 | | Energy intensity to GDP | TOE/Bil Don 1994 | PAENEFF | 1.7 | 1.8 | 1.5 | 1.3 | 1.0 | 0.7 | 0.5 | 0.3 |
| 168 | | Energy demand before E.save | KTOE | PAENDEM | 225.3 | 346.8 | 400.8 | 503.5 | 575.7 | 644.8 | 716.9 | 774.6 |
| 169 | | Energy demand after E.save | KTOE | PAENDEA | 225.3 | 346.8 | 400.8 | 503.5 | 575.7 | 612.1 | 646.1 | 663.3 |
| 170 | | Electricity ratio | S% | PAENELR | 7.2 | 6.0 | 9.2 | 11.0 | 13.0 | 13.0 | 13.0 | 13.0 |
| 171 | | Power demand (kTOE) | KTOE | PAENELT | 16.3 | 20.8 | 36.8 | 56.6 | 74.8 | 79.6 | 84.0 | 86.2 |
| 172 | | Power demand (GWh) | GWh | PAENELE | 189.8 | 241.3 | 428.3 | 657.7 | 870.3 | 925.3 | 976.7 | 1,002.7 |
| 173 | | | | | | | | | | | | | |
| 174 | | Coal demand | KTOE | PADMCOA | 64.0 | 76.0 | 24.0 | 27.2 | 30.5 | 32.4 | 34.2 | 35.1 |
| 175 | | LPG demand | KTOE | PADMLPG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 176 | | Gasoline demand | KTOE | PADMGAS | 45.0 | 67.0 | 79.0 | 89.2 | 99.9 | 106.3 | 112.2 | 115.1 |
| 177 | | Jetfuel demand | KTOE | PADMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 178 | | Kerosene demand | KTOE | PADMKER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 179 | | Diesel demand | KTOE | PADMDIE | 97.0 | 178.0 | 244.0 | 314.3 | 352.2 | 374.5 | 395.3 | 405.8 |
| 180 | | Fuel oil demand | KTOE | PADMFUL | 3.0 | 5.0 | 17.0 | 16.3 | 18.3 | 19.4 | 20.5 | 21.1 |
| 181 | | Natural gas demand | KTOE | PADMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 182 | | Renewable energy demand | KTOE | PADMREW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 183 | | Total | KTOE | PADMTOT | 209.0 | 326.0 | 364.0 | 447.0 | 500.9 | 532.6 | 562.1 | 577.1 |
| 184 | | | | | | | | | | | | | |
| 185 | | Coal demand | S% | PASMCOA | 30.6 | 23.3 | 6.6 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 |
| 186 | | LPG demand | S% | PASMLPG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 187 | | Gasoline demand | S% | PASMGAS | 21.5 | 20.6 | 21.7 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 188 | | Jetfuel demand | S% | PASMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 189 | | Kerosene demand | S% | PASMKER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 190 | | Diesel demand | S% | PASMDIE | 46.4 | 54.6 | 67.0 | 70.3 | 70.3 | 70.3 | 70.3 | 70.3 |
| 191 | | Fuel oil demand | S% | PASMFUL | 1.4 | 1.5 | 4.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| 192 | | Natural gas demand | S% | PASMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 193 | | Renewable energy demand | S% | PASMREW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 194 | | Total | S% | PASMTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 195 | | | | | | | | | | | | | |

## Table 2-5-6 Simulation sheet (6)

| F | H | I | J | TREND/TIME | 1<br>1990 | 6<br>1995 | 11<br>2000 | 16<br>2005 | 21<br>2010 | 26<br>2015 | 31<br>2020 | 36<br>2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 196 | Industry | Energy conservation rate | S% | MANNCOR | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 90.4 | 81.7 | 75.4 |
| 197 | | Technical Improvement | % | MANNTEC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.0 | -1.0 | -1.0 |
| 198 | | Elasticity to Energy price | | MANNEVP | | 0.8 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | -0.3 |
| 199 | | Energy intensity to GDP | TOE/Bil Don | MANNEFF | 34.2 | 30.6 | 28.5 | 28.8 | 28.9 | 26.6 | 24.7 | 23.6 |
| 200 | | Energy demand before E.save | KTOE | MANNDEM | 4,510.3 | 5,991.3 | 7,803.6 | 11,281.9 | 17,042.6 | 26,052.8 | 40,330.6 | 61,343.6 |
| 201 | | Energy demand after E.save | KTOE | MANNDEA | 4,510.3 | 5,991.3 | 7,803.6 | 11,281.9 | 17,042.6 | 23,550.4 | 32,954.8 | 46,235.6 |
| 202 | | Electricity ratio | S% | MANNELR | 5.5 | 6.6 | 10.0 | 15.7 | 21.0 | 26.0 | 31.0 | 34.0 |
| 203 | | Power demand (kTOE) | KTOE | MANNELT | 247.3 | 397.3 | 781.6 | 1,798.1 | 3,579.0 | 6,123.1 | 10,216.0 | 15,720.1 |
| 204 | | Power demand (GWh) | GWh | MANNELE | 2,875.6 | 4,619.4 | 9,088.4 | 20,908.6 | 41,615.8 | 71,198.9 | 118,790.6 | 182,791.8 |
| 205 | | | | | | | | | | | | | |
| 206 | | Coal demand | KTOE | MANMCOA | 1,020.0 | 1,938.0 | 2,339.0 | 3,698.7 | 5,250.8 | 6,796.6 | 8,868.1 | 11,901.0 |
| 207 | | LPG demand | KTOE | MANMLPG | 0.0 | 2.0 | 33.0 | 107.9 | 195.4 | 322.9 | 537.7 | 920.9 |
| 208 | | Gasoline demand | KTOE | MANMGAS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 209 | | Jetfuel demand | KTOE | MANMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 210 | | Kerosene demand | KTOE | MANMKER | 4.0 | 6.0 | 9.0 | 13.2 | 18.8 | 24.3 | 91.0 | 61.0 |
| 211 | | Diesel demand | KTOE | MANMDIE | 233.0 | 284.0 | 591.0 | 834.6 | 1,184.9 | 1,533.7 | 2,001.1 | 2,685.5 |
| 212 | | Fuel oil demand | KTOE | MANMFUL | 211.0 | 446.0 | 823.0 | 1,658.6 | 2,967.7 | 4,939.3 | 7,438.5 | 11,470.2 |
| 213 | | Natural gas demand | KTOE | MANMNG | 0.0 | 22.0 | 18.0 | 22.3 | 40.4 | 66.8 | 111.2 | 190.5 |
| 214 | | Renewable energy demand | KTOE | MANMREV | 2,795.0 | 2,896.0 | 3,209.0 | 3,148.6 | 3,810.2 | 3,746.9 | 3,683.7 | 3,295.7 |
| 215 | | Total | KTOE | MANMTOT | 4,263.0 | 5,594.0 | 7,022.0 | 9,483.8 | 13,463.7 | 17,427.3 | 22,738.8 | 30,515.5 |
| 216 | | | | | | | | | | | | | |
| 217 | | Coal demand | S% | MASMCOA | 23.9 | 34.6 | 33.3 | 39.0 | 39.0 | 39.0 | 39.0 | 39.0 |
| 218 | | LPG demand | S% | MASMLPG | 0.0 | 0.0 | 0.5 | 1.1 | 1.5 | 1.9 | 2.4 | 3.0 |
| 219 | | Gasoline demand | S% | MASMGAS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 220 | | Jetfuel demand | S% | MASMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 221 | | Kerosene demand | S% | MASMKER | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 | 0.2 |
| 222 | | Diesel demand | S% | MASMDIE | 5.5 | 5.1 | 8.4 | 8.8 | 8.8 | 8.8 | 8.8 | 8.8 |
| 223 | | Fuel oil demand | S% | MASMFUL | 4.9 | 8.0 | 11.7 | 17.5 | 22.0 | 28.3 | 32.7 | 37.6 |
| 224 | | Natural gas demand | S% | MASMNG | 0.0 | 0.4 | 0.3 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 |
| 225 | | Renewable energy demand | S% | MASMREV | 65.6 | 51.8 | 45.7 | 33.2 | 28.3 | 21.5 | 16.2 | 10.8 |
| 226 | | Total | S% | MASMTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 227 | | | | | | | | | | | | | |

## Table 2-5-7 Simulation sheet (7)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 228 | Transportation | Energy conservation rate | S% | TRENCOR | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 98.3 | 96.7 | 95.7 |
| 229 | | Technical Improvement | % | TRENTEC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 230 | | Elasticity to Energy price | | TRENEVP | | -1.4 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 |
| 231 | | Energy intensity to GDP | TOE/Bil Don | TRENEFF | 10.7 | 12.9 | 13.7 | 20.0 | 23.2 | 22.1 | 18.8 | 14.8 |
| 232 | | Energy demand before E.save | KTOE | TRENDEM | 1,408.0 | 2,516.0 | 3,743.0 | 7,845.0 | 13,692.0 | 19,931.3 | 25,839.3 | 30,219.1 |
| 233 | | Energy demand after E.save | KTOE | TRENDEA | 1,408.0 | 2,516.0 | 3,743.0 | 7,845.0 | 13,692.0 | 19,599.0 | 24,984.6 | 28,924.5 |
| 234 | | Electricity ratio | S% | TRENELR | 0.4 | 0.4 | 0.6 | 0.6 | 1.0 | 1.3 | 1.7 | 2.0 |
| 235 | | Power demand(kTOE) | KTOE | TRENELT | 5.0 | 9.0 | 21.0 | 29.0 | 132.5 | 257.1 | 413.7 | 578.5 |
| 236 | | Power demand(GWh) | GWh | TREENELI | 58.1 | 104.7 | 244.2 | 337.2 | 1,540.2 | 2,989.1 | 4,810.4 | 6,726.6 |
| 237 | | | | | | | | | | | | |
| 238 | | Coal demand | KTOE | TREMCOA | 14.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 239 | | LPG demand | KTOE | TREMLPG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 240 | | Gasoline demand | KTOE | TREMGAS | 601.0 | 884.0 | 1,388.0 | 3,262.1 | 5,654.3 | 8,230.0 | 10,614.6 | 12,429.7 |
| 241 | | Jetfuel demand | KTOE | TREMJET | 100.0 | 206.0 | 217.0 | 449.1 | 779.1 | 1,004.5 | 1,153.5 | 1,202.8 |
| 242 | | Kerosene demand | KTOE | TREMKER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 243 | | Diesel demand | KTOE | TREMDIE | 659.0 | 1,338.0 | 1,960.0 | 3,760.2 | 6,522.1 | 9,336.3 | 11,912.0 | 13,801.7 |
| 244 | | Fuel oil demand | KTOE | TREMFUL | 34.0 | 86.0 | 178.0 | 344.7 | 598.0 | 771.1 | 885.4 | 923.3 |
| 245 | | Natural gas demand | KTOE | TREMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 246 | | Renewable energy demand | KTOE | TREMREV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 247 | | Total | KTOE | TREMTOT | 1,408.0 | 2,516.0 | 3,743.0 | 7,816.0 | 13,559.5 | 19,341.9 | 24,570.9 | 28,346.0 |
| 248 | | | | | | | | | | | | |
| 249 | | Coal demand | S% | TRSMCOA | 1.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 250 | | LPG demand | S% | TRSMLPG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 251 | | Gasoline demand | S% | TRSMGAS | 42.7 | 35.1 | 37.1 | 41.7 | 41.7 | 42.6 | 43.2 | 43.9 |
| 252 | | Jetfuel demand | S% | TRSMJET | 7.1 | 8.2 | 5.8 | 5.7 | 5.7 | 5.2 | 4.7 | 4.2 |
| 253 | | Kerosene demand | S% | TRSMKER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 254 | | Diesel demand | S% | TRSMDIE | 46.8 | 53.2 | 52.4 | 48.1 | 48.1 | 48.3 | 48.5 | 48.7 |
| 255 | | Fuel oil demand | S% | TRSMFUL | 2.4 | 3.4 | 4.8 | 4.4 | 4.4 | 4.0 | 3.6 | 3.3 |
| 256 | | Natural gas demand | S% | TRSMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 257 | | Renewable energy demand | S% | TRSMREV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 258 | | Total | S% | TRSMTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 259 | | | | | | | | | | | | |

## Table 2-5-8 Simulation sheet (8)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|------|------|------|------|------|------|------|------|------|
| 260 | Commercials & Ser | Energy conservation rate | S% | COMNCOR | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 91.9 | 84.5 | 78.8 |
| 261 | | Technical Improvement | % | COMNTEC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.0 | -1.0 | -1.0 |
| 262 | | Elasticity to Crude oil price | | COMNEVP | | 2.1 | 0.1 | 0.0 | 0.0 | -0.2 | -0.2 | -0.2 |
| 263 | | Energy intensity to GDP | TOE/Bil Don | COMNEFF | 2.2 | 3.1 | 3.9 | 3.9 | 4.2 | 4.0 | 3.7 | 3.4 |
| 264 | | Energy demand before E.save | KTOE | COMNDEM | 295.1 | 614.1 | 1,054.2 | 1,537.5 | 2,449.6 | 3,838.0 | 5,824.5 | 8,466.9 |
| 265 | | Energy demand after E.save | KTOE | COMNDEA | 295.1 | 614.1 | 1,054.2 | 1,537.5 | 2,449.6 | 3,528.8 | 4,924.0 | 6,670.1 |
| 266 | | Electricity ratio | S% | COMNELR | 3.8 | 7.7 | 8.8 | 12.3 | 15.9 | 20.7 | 26.9 | 35.0 |
| 267 | | Power demand (kTOE) | KTOE | COMNELT | 11.1 | 47.1 | 93.2 | 173.9 | 390.5 | 731.1 | 1,326.0 | 2,334.5 |
| 268 | | Power demand (GWh) | GWh | COMNELE | 128.9 | 547.5 | 1,083.7 | 2,022.0 | 4,540.7 | 8,501.6 | 15,418.3 | 27,145.6 |
| 269 | | | | | | | | | | | | |
| 270 | | Coal demand | KTOE | COMMCOA | 19.0 | 140.0 | 276.0 | 354.9 | 536.0 | 728.2 | 936.5 | 1,128.5 |
| 271 | | LPG demand | KTOE | COMMLPG | 0.0 | 5.0 | 89.0 | 147.6 | 222.9 | 302.8 | 389.4 | 469.2 |
| 272 | | Gasoline demand | KTOE | COMMGAS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 273 | | Jetfuel demand | KTOE | COMMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 274 | | Kerosene demand | KTOE | COMMKER | 147.0 | 205.0 | 228.0 | 301.3 | 454.9 | 618.1 | 794.9 | 957.9 |
| 275 | | Diesel demand | KTOE | COMMDIE | 87.0 | 158.0 | 239.0 | 396.4 | 598.6 | 813.3 | 1,045.9 | 1,260.3 |
| 276 | | Fuel oil demand | KTOE | COMMFUL | 31.0 | 59.0 | 129.0 | 163.4 | 246.8 | 335.3 | 431.2 | 519.6 |
| 277 | | Natural gas demand | KTOE | COMMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 278 | | Renewable energy demand | KTOE | COMMREV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 279 | | Total | KTOE | COMMTOT | 284.0 | 567.0 | 961.0 | 1,363.6 | 2,059.1 | 2,797.7 | 3,598.0 | 4,335.5 |
| 280 | | | | | | | | | | | | |
| 281 | | Coal demand | S% | COSMCOA | 6.7 | 24.7 | 28.7 | 26.0 | 26.0 | 26.0 | 26.0 | 26.0 |
| 282 | | LPG demand | S% | COSMLPG | 0.0 | 0.9 | 9.3 | 10.8 | 10.8 | 10.8 | 10.8 | 10.8 |
| 283 | | Gasoline demand | S% | COSMGAS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 284 | | Jetfuel demand | S% | COSMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 285 | | Kerosene demand | S% | COSMKER | 51.8 | 36.2 | 23.7 | 22.1 | 22.1 | 22.1 | 22.1 | 22.1 |
| 286 | | Diesel demand | S% | COSMDIE | 30.6 | 27.9 | 24.9 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 |
| 287 | | Fuel oil demand | S% | COSMFUL | 10.9 | 10.4 | 13.4 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| 288 | | Natural gas demand | S% | COSMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 289 | | Renewable energy demand | S% | COSMREV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 290 | | Total | S% | COSMTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 291 | | | | | | | | | | | | |

## Table 2-5-9 Simulation sheet (9)

| | I | TIME | J | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Residentials | Energy conservation rate | RESNCOR | S% | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 93.5 | 87.4 | 82.3 |
| | Technical Improvement | RESNTEC | % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.0 | -1.0 | -1.0 |
| | Elasticity to Energy price | RESNEVP | % | | -1.0 | -0.1 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 |
| | Energy intensity to GDP | RESNEFF | TOE/Bil Don | 76.9 | 56.4 | 46.9 | 39.3 | 32.4 | 26.0 | 21.6 | 18.7 |
| | Energy demand before E.save | RESNDEM | KTOE | 10,146.9 | 11,027.8 | 12,846.8 | 15,393.0 | 19,068.0 | 24,593.8 | 32,902.8 | 44,545.0 |
| | Energy demand after E.save | RESNDEA | KTOE | 10,146.9 | 11,027.8 | 12,846.8 | 15,393.0 | 19,068.0 | 22,998.4 | 28,772.5 | 36,670.0 |
| | Electricity ratio | RESNELR | S% | | 4.2 | 7.4 | 11.3 | 16.0 | 20.7 | 25.3 | 30.0 |
| | Power demand (KTOE) | RESNELT | KTOE | 238.9 | 461.8 | 944.8 | 1,734.9 | 3,053.1 | 4,754.8 | 7,290.1 | 11,001.0 |
| | Power demand (GWh) | RESENELI | GWh | 2,778.0 | 5,369.4 | 10,985.6 | 20,173.5 | 35,501.0 | 55,288.2 | 84,769.0 | 127,918.7 |
| | | | | | | | | | | | |
| | Coal demand | REDMCOA | KTOE | 207.0 | 449.0 | 584.0 | 1,106.3 | 1,809.7 | 2,225.7 | 2,749.7 | 3,645.0 |
| | LPG demand | REDMLPG | KTOE | 0.0 | 29.0 | 146.0 | 678.6 | 1,597.8 | 1,824.4 | 2,492.0 | 3,208.6 |
| | Gasoline demand | REDMGAS | KTOE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Jetfuel demand | REDMJET | KTOE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Kerosene demand | REDMKER | KTOE | 61.0 | 87.0 | 138.0 | 167.3 | 196.2 | 223.5 | 263.2 | 314.5 |
| | Diesel demand | REDMDIE | KTOE | 11.0 | 20.0 | 32.0 | 24.4 | 28.6 | 32.6 | 38.3 | 45.8 |
| | Fuel oil demand | REDMFUL | KTOE | 3.0 | 5.0 | 20.0 | 12.2 | 14.3 | 16.3 | 19.2 | 22.9 |
| | Natural gas demand | REDMNG | KTOE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1,824.4 | 4,296.5 | 7,700.7 |
| | Renewable energy demand | REDMREV | KTOE | 9,626.0 | 9,976.0 | 10,982.0 | 11,669.3 | 12,368.3 | 12,099.2 | 11,616.7 | 10,740.6 |
| | Total | REDMTOT | KTOE | 9,908.0 | 10,566.0 | 11,902.0 | 13,658.1 | 16,014.9 | 18,243.7 | 21,482.3 | 25,669.0 |
| | | | | | | | | | | | |
| | Coal demand | RESMCOA | S% | 2.1 | 4.2 | 4.9 | 8.1 | 11.3 | 12.2 | 12.8 | 14.2 |
| | LPG demand | RESMLPG | S% | 0.0 | 0.3 | 1.2 | 5.0 | 10.0 | 10.0 | 11.6 | 12.5 |
| | Gasoline demand | RESMGAS | S% | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Jetfuel demand | RESMJET | S% | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Kerosene demand | RESMKER | S% | 0.6 | 0.8 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| | Diesel demand | RESMDIE | S% | 0.1 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| | Fuel oil demand | RESMFUL | S% | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Natural gas demand | RESMNG | S% | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 20.0 | 30.0 |
| | Renewable energy demand | RESMREV | S% | 97.2 | 94.4 | 92.3 | 85.4 | 77.2 | 66.3 | 54.1 | 41.8 |
| | Total | RESMTOT | S% | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

## Table 2-5-10 Simulation sheet (10)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 324 | Others | Energy conservation rate | S% | NONNCOF | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 93.5 | 87.4 | 82.3 |
| 325 | | Technical Improvement | % | NONNTEC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.0 | -1.0 | -1.0 |
| 326 | | Elasticity to Energy price | | NONNEVP | | 5.1 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 |
| 327 | | Energy intensity to GDP | TOE/Bil Don | NONNEFF | 0.1 | 0.1 | 0.2 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 |
| 328 | | Energy demand before E.save | KTOE | NONNDEM | 13.3 | 27.2 | 48.8 | 136.9 | 211.5 | 323.7 | 492.3 | 728.7 |
| 329 | | Energy demand after E.save | KTOE | NONNDEA | 13.3 | 27.2 | 48.8 | 153.8 | 211.5 | 302.7 | 430.5 | 599.8 |
| 330 | | Electricity ratio | S% | NONNELR | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 331 | | Power demand (kTOE) | KTOE | NONNELT | 13.3 | 27.2 | 48.8 | 136.2 | 211.5 | 302.7 | 430.5 | 599.8 |
| 332 | | Power demand (GWh) | GWh | NONNELE | 154.9 | 315.8 | 567.4 | 1,583.3 | 2,459.6 | 3,519.6 | 5,006.2 | 6,974.8 |
| 333 | | | | | | | | | | | | |
| 334 | | Coal demand | KTOE | NONMCOA | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 335 | | LPG demand | KTOE | NONMLPG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 336 | | Gasoline demand | KTOE | NONMGAS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 337 | | Jetfuel demand | KTOE | NONMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 338 | | Kerosene demand | KTOE | NONMKER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 339 | | Diesel demand | KTOE | NONMDIE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 340 | | Fuel oil demand | KTOE | NONMFUL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 341 | | Natural gas demand | KTOE | NONMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 342 | | Renewable energy demand | KTOE | NONMREV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 343 | | Total | KTOE | NONMTOT | 0.0 | 0.0 | 0.0 | 17.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| 344 | | | | | | | | | | | | |
| 345 | | Coal demand | S% | NOSMCOA | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 346 | | LPG demand | S% | NOSMLPG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 347 | | Gasoline demand | S% | NOSMGAS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 348 | | Jetfuel demand | S% | NOSMJET | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 349 | | Kerosene demand | S% | NOSMKER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 350 | | Diesel demand | S% | NOSMDIE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 351 | | Fuel oil demand | S% | NOSMFUL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 352 | | Natural gas demand | S% | NOSMNG | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 353 | | Renewable energy demand | S% | NOSMREV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 354 | | Total | S% | NOSMTOT | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 355 | | | | | | | | | | | | |

## Table 2-5-11 Simulation sheet (11)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 356 | Power demand in fi | Agriculture.Forestry.Fishery | GWh | PWDMPA | 189.8 | 241.3 | 428.3 | 657.7 | 896.4 | 953.1 | 1,006.0 | 1,032.8 |
| 357 | | manufacturing | GWh | PWDMMN | 2,875.6 | 4,619.4 | 9,088.4 | 20,908.6 | 42,864.2 | 73,334.8 | 122,354.3 | 188,275.6 |
| 358 | | Transportation | GWh | PWDMTR | 58.1 | 104.7 | 244.2 | 337.2 | 1,586.4 | 3,078.7 | 4,954.7 | 6,928.4 |
| 359 | | Commercials.Banking...Services. | GWh | PWDMCM | 128.9 | 547.5 | 1,083.7 | 2,022.0 | 4,676.9 | 8,756.7 | 15,880.8 | 27,960.0 |
| 360 | | Residentials | Gwh | PWDMRE | 2,778.0 | 5,369.4 | 10,985.6 | 20,173.5 | 36,566.0 | 56,946.9 | 87,312.1 | 131,756.2 |
| 361 | | Other | GWh | PWDMNO | 154.9 | 315.8 | 567.4 | 1,583.3 | 2,533.4 | 3,625.2 | 5,156.4 | 7,184.1 |
| 362 | | Total | GWh | PWDMTO | 6,185.3 | 11,198.1 | 22,397.6 | 45,682.3 | 89,123.3 | 146,695.5 | 236,664.4 | 363,137.1 |
| 363 | | | | | | | | | | | | |
| 364 | Energy Demand | Coal demand | KTOE | DEDCOA | 1,324.0 | 2,605.0 | 3,223.0 | 5,187.1 | 7,627.0 | 9,783.0 | 12,588.6 | 16,709.6 |
| 365 | | LPG demand | KTOE | DEDLPG | 0.0 | 36.0 | 268.0 | 934.0 | 2,016.2 | 2,450.0 | 3,419.0 | 4,598.8 |
| 366 | | Gasoline demand | KTOE | DEDGAS | 646.0 | 951.0 | 1,467.0 | 3,351.3 | 5,754.2 | 8,336.2 | 10,726.8 | 12,544.9 |
| 367 | | Jetfuel demand | KTOE | DEDJET | 100.0 | 206.0 | 217.0 | 449.1 | 779.1 | 1,004.5 | 1,153.5 | 1,202.8 |
| 368 | | Kerosene demand | KTOE | DEDKER | 212.0 | 298.0 | 375.0 | 481.8 | 669.9 | 865.9 | 1,149.1 | 1,333.4 |
| 369 | | Diesel demand | KTOE | DEDDIE | 1,087.0 | 1,978.0 | 3,066.0 | 5,329.8 | 8,686.4 | 12,090.3 | 15,392.7 | 18,199.1 |
| 370 | | Fuel oil demand | KTOE | DEDFUE | 282.0 | 601.0 | 1,167.0 | 2,195.2 | 3,845.1 | 6,081.4 | 8,794.8 | 12,957.1 |
| 371 | | Petroleum total | KTOE | DEDSTO | 2,327.0 | 4,070.0 | 6,560.0 | 12,741.2 | 21,750.8 | 30,828.4 | 40,635.9 | 50,836.1 |
| 372 | | Natural gas demand | KTOE | DEDNG | 0.0 | 22.0 | 18.0 | 22.3 | 40.4 | 1,891.2 | 4,407.7 | 7,891.2 |
| 373 | | Renewable energy demand | KTOE | DEDREW | 12,659.9 | 13,333.8 | 15,135.8 | 14,817.9 | 16,178.5 | 15,846.0 | 15,300.4 | 14,036.2 |
| 374 | | Power | KTOE | DEDPOW | 531.9 | 963.0 | 1,926.2 | 3,928.7 | 7,664.6 | 12,615.8 | 20,353.1 | 31,229.8 |
| 375 | | Total(Coal+Petro+Renew+Power) | KTOE | DEDTOT | 16,842.8 | 20,971.8 | 26,845.0 | 36,697.2 | 53,261.3 | 70,964.4 | 93,285.7 | 120,702.9 |
| 376 | | | | | | | | | | | | |
| 377 | Power supply | Power distribution loss | S% | PWGELOF | 25.4 | 21.7 | 15.0 | 11.5 | 10.3 | 9.3 | 8.5 | 7.5 |
| 378 | | Power distribution loss (GWh) | GWh | PWLOSSG | 2,204.5 | 3,178.6 | 3,727.3 | 5,873.8 | 9,667.9 | 13,980.7 | 20,236.7 | 27,116.0 |
| 379 | | Own use in Power sector(GWh) | GWh | PWOWNG | 289.4 | 271.2 | 430.3 | 644.1 | 1,090.8 | 1,682.9 | 2,608.0 | 3,908.6 |
| 380 | | Power distribution loss (KTOE) | KTOE | PWLOSST | 189.6 | 273.4 | 320.5 | 505.1 | 831.4 | 1,202.3 | 1,740.4 | 2,332.0 |
| 381 | | Own use in Power sector(KTOE) | KTOE | PWOWNT | 24.9 | 23.3 | 37.0 | 55.4 | 93.8 | 144.7 | 224.3 | 336.1 |
| 382 | | | | | | | | | | | | |
| 383 | | Power from Hydro | GWh | PWGEHYD | 5,368.7 | 10,581.8 | 14,550.7 | 20,056.0 | 28,281.7 | 45,933.1 | 59,270.2 | 59,270.2 |
| 384 | | Power from Fossil | GWh | PWGEFOS | 3,310.6 | 4,066.0 | 10,375.3 | 31,943.6 | 67,450.7 | 105,913.0 | 147,626.8 | 253,704.2 |
| 385 | | Power foreign trade balance | GWh | PWGEBAL | 0.0 | 0.0 | 0.0 | 0.0 | 2,452.8 | 7,757.0 | 24,528.0 | 28,575.1 |
| 386 | | Power from Renewable energy | GWh | PWGENEV | 0.0 | 0.0 | 0.0 | 200.6 | 1,696.9 | 2,756.0 | 3,556.2 | 3,556.2 |
| 387 | | Power from Nuclear | GWh | PWGENCL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 24,528.0 | 49,056.0 |
| 388 | | Total of power generation | GWh | PWGETOT | 8,679.3 | 14,647.7 | 24,926.0 | 52,200.2 | 99,882.1 | 162,359.0 | 259,509.2 | 394,161.7 |
| 389 | | | | | | | | | | | | |
| 390 | | Power from Thermal(Coal) | GWh | PWGECOA | 2,023.8 | 1,618.1 | 2,620.9 | 7,372.4 | 29,755.5 | 46,725.5 | 66,872.6 | 88,317.6 |
| 391 | | Power from Thermal(FO) | GWh | PWGEFOT | 988.1 | 1,020.4 | 1,302.7 | 2,130.0 | 2,411.8 | 2,625.0 | 2,415.1 | 3,189.6 |
| 392 | | Power from Gasturbine(FO) | GWh | PWGEFOE | 53.0 | 257.0 | 1,509.0 | 1,434.8 | 1,624.5 | 1,768.2 | 1,626.8 | 2,148.5 |
| 393 | | Power from Gasturbine(GAS) | GWh | PWGEGAE | 6.0 | 747.8 | 4,056.0 | 17,597.2 | 29,798.8 | 50,592.9 | 72,846.8 | 154,943.3 |
| 394 | | Power from Gas steam | GWh | PWGEGAS | 0.0 | 0.0 | 300.0 | 3,368.1 | 3,813.5 | 4,150.7 | 3,818.8 | 5,043.5 |
| 395 | | Power from Diesel | GWh | PWGEDIE | 410.8 | 131.7 | 237.5 | 41.2 | 46.6 | 50.7 | 46.7 | 61.6 |
| 396 | | Power from Fossil | GWh | PWGEFTT | 3,481.7 | 3,775.0 | 10,026.1 | 31,943.6 | 67,450.7 | 105,913.0 | 147,626.8 | 253,704.2 |
| 397 | | | | | | | | | | | | |

Table 2-5-12 Simulation sheet (12)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 398 | Power resources | Coal consumption for Thermal | KTOE | PWCCCOA | 888.0 | 710.0 | 1,150.0 | 1,811.5 | 7,311.4 | 11,481.1 | 16,431.6 | 21,700.9 |
| 399 | | FO consumption for Thermal | KTOE | PWCCFOT | 245.0 | 253.0 | 323.0 | 523.4 | 592.6 | 645.0 | 593.4 | 783.7 |
| 400 | | FO consumption for Gasturbine | KTOE | PWCCFOE | 9.6 | 46.5 | 272.8 | 246.8 | 279.4 | 304.1 | 279.8 | 369.5 |
| 401 | | NG & AG consumption for Turbine | KTOE | PWCCGAT | 1.2 | 148.9 | 807.4 | 3,026.7 | 5,125.4 | 8,702.0 | 12,529.6 | 26,650.3 |
| 402 | | NG & AG consumption for Gas steam | KTOE | PWCCGAE | 0.0 | 0.0 | 71.7 | 724.1 | 819.9 | 892.4 | 821.0 | 1,084.3 |
| 403 | | Diesel consumption for Diesel engin | KTOE | PWCCDIE | 96.7 | 31.0 | 55.9 | 9.8 | 11.1 | 12.1 | 11.2 | 14.7 |
| 404 | | Total | KTOE | PWCCTOT | 1,240.5 | 1,189.3 | 2,680.8 | 6,342.3 | 14,139.8 | 22,036.8 | 30,666.6 | 50,603.5 |
| 405 | | | | | | | | | | | | |
| 406 | | Power from Thermal(Coal) | S% of KTOE | PWSCCOA | 58.1 | 42.9 | 26.1 | 23.1 | 44.1 | 44.1 | 45.3 | 34.8 |
| 407 | | Power from Thermal(FO) | S% of KTOE | PWSCFOT | 28.4 | 27.0 | 13.0 | 6.7 | 3.6 | 2.5 | 1.6 | 1.3 |
| 408 | | Power from Gasturbine(FO) | S% of KTOE | PWSCFOE | 1.5 | 6.8 | 15.1 | 4.5 | 2.4 | 1.7 | 1.1 | 0.8 |
| 409 | | Power from Gasturbine(GAS) | S% of KTOE | PWSCGAT | 0.2 | 19.8 | 40.5 | 55.1 | 44.2 | 47.8 | 49.3 | 61.1 |
| 410 | | Power from Gas steam | S% of KTOE | PWSCGAE | 0.0 | 0.0 | 3.0 | 10.5 | 5.7 | 3.9 | 2.6 | 2.0 |
| 411 | | Power from Diesel | S% of KTOE | PWSCDIE | 11.8 | 3.5 | 2.4 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| 412 | | Power from Fossil | S% of KTOE | PWSCTOT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 413 | | | | | | | | | | | | |
| 414 | Evaluation factors | Energy demand per capita | KOE/persons | EDPERCA | 255.1 | 291.3 | 345.8 | 441.7 | 607.9 | 767.2 | 955.3 | 1,190.7 |
| 415 | | Energy demand per uGDP | KOE/US$ | EDPERGD | 2.2 | 1.0 | 0.9 | 0.7 | 0.6 | 0.4 | 0.3 | 0.2 |
| 416 | | Power demand per capita | KWh/person | POPERCA | 93.7 | 155.5 | 288.5 | 549.9 | 1,017.1 | 1,585.9 | 2,423.5 | 3,582.2 |
| 417 | | Power demand per uGDP | KWh/US$ | POPERGD | 0.82 | 0.54 | 0.74 | 0.93 | 0.98 | 0.88 | 0.77 | 0.60 |
| 418 | | | | | | | | | | | | |
| 419 | LF | | | PINLOADF | | 56.5 | 62.7 | 64.200 | 65.800 | 67.400 | 69.000 | 69.000 |
| 420 | Pmax | Peak demand (Total gen / (365*24)/LF | MW | PINPMAX | | 2796 | 4893 | 9,492 | 17,865 | 28,570 | 44,894 | 68,765 |
| 421 | | | | | | | | | | | | |
| 422 | | | | | | | | | | | | |

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## Table 2-5-13 Simulation sheet (13)

| F | H | I | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 423 | Coal total demand | Final demand | KTOE | COACDEM | 1,324.0 | 2,605.0 | 3,223.0 | 5,187.1 | 7,627.0 | 9,783.0 | 12,588.6 | 16,709.6 |
| 424 | | Consumption in Power sector | KTOE | COACPOW | 888.0 | 710.0 | 1,150.0 | 1,811.5 | 7,311.4 | 11,481.1 | 16,431.6 | 21,700.9 |
| 425 | | Domestic total | KTOE | COACDTC | 2,212.0 | 3,315.0 | 4,373.0 | 6,998.6 | 14,938.3 | 21,264.1 | 29,020.1 | 38,410.5 |
| 426 | | | | | | | | | | | | |
| 427 | LPG demand | Final demand | KTOE | LPGCDEM | 0.0 | 36.0 | 268.0 | 934.0 | 2,016.2 | 2,450.0 | 3,419.0 | 4,598.8 |
| 428 | | Consumption in Power sector | KTOE | LPGCPOW | 0.0 | 5.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 429 | | Domestic total | KTOE | LPGCTOT | 0.0 | 41.0 | 278.0 | 934.0 | 2,016.2 | 2,450.0 | 3,419.0 | 4,598.8 |
| 430 | | | | | | | | | | | | |
| 431 | Gasoline demand | Final demand | KTOE | GASCDEM | 646.0 | 951.0 | 1,467.0 | 3,351.3 | 5,754.2 | 8,336.2 | 10,726.8 | 12,544.9 |
| 432 | | Consumption in Power sector | KTOE | GASCPOW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 433 | | Domestic total | KTOE | GASCTOT | 646.0 | 951.0 | 1,467.0 | 3,351.3 | 5,754.2 | 8,336.2 | 10,726.8 | 12,544.9 |
| 434 | | | | | | | | | | | | |
| 435 | Jetfuel demand | Final demand | KTOE | JETCDEM | 100.0 | 206.0 | 217.0 | 449.1 | 779.1 | 1,004.5 | 1,153.5 | 1,202.8 |
| 436 | | Consumption in Power sector | KTOE | JETCPOW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 437 | | Domestic total | KTOE | JETCTOT | 100.0 | 206.0 | 217.0 | 449.1 | 779.1 | 1,004.5 | 1,153.5 | 1,202.8 |
| 438 | | | | | | | | | | | | |
| 439 | Kerosene demand | Final demand | KTOE | KERCDEM | 212.0 | 298.0 | 375.0 | 481.8 | 669.9 | 865.9 | 1,149.1 | 1,333.4 |
| 440 | | Consumption in Power sector | KTOE | KERCPOW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 441 | | Domestic total | KTOE | KERCTOT | 212.0 | 298.0 | 375.0 | 481.8 | 669.9 | 865.9 | 1,149.1 | 1,333.4 |
| 442 | | | | | | | | | | | | |
| 443 | Diesel demand | Final demand | KTOE | DIECDEM | 1,087.0 | 1,978.0 | 3,066.0 | 5,329.8 | 8,686.4 | 12,090.3 | 15,392.7 | 18,199.1 |
| 444 | | Consumption in Power sector | KTOE | DIECPOW | 410.8 | 131.7 | 237.5 | 9.8 | 11.1 | 12.1 | 11.2 | 14.7 |
| 445 | | Domestic total | KTOE | DIECTOT | 1,497.8 | 2,109.7 | 3,303.5 | 5,339.7 | 8,697.5 | 12,102.5 | 15,403.8 | 18,213.8 |
| 446 | | | | | | | | | | | | |
| 447 | Fuel oil demand | Final demand | KTOE | FULCDEM | 282.0 | 601.0 | 1,167.0 | 2,195.2 | 3,845.1 | 6,081.4 | 8,794.8 | 12,957.1 |
| 448 | | Consumption in Power sector | KTOE | FULCPOW | 254.6 | 299.5 | 595.8 | 770.2 | 872.0 | 949.1 | 873.2 | 1,153.3 |
| 449 | | Domestic total | KTOE | FULCTOT | 536.6 | 900.5 | 1,762.8 | 2,965.4 | 4,717.2 | 7,030.5 | 9,668.1 | 14,110.4 |
| 450 | | | | | | | | | | | | |
| 451 | NG & AG demand | Final demand | KTOE | NAGCDEM | 0.0 | 22.0 | 18.0 | 22.3 | 40.4 | 1,891.2 | 4,407.7 | 7,891.2 |
| 452 | | Consumption in Power sector | KTOE | NAGCPOW | 0.0 | 0.0 | 71.7 | 3,750.8 | 5,945.3 | 9,594.4 | 13,350.7 | 27,734.6 |
| 453 | | Domestic total | KTOE | NAGCTOT | 0.0 | 22.0 | 89.7 | 3,773.2 | 5,985.7 | 11,485.5 | 17,758.4 | 35,625.8 |
| 454 | | | | | | | | | | | | |
| 455 | Renewable & Other | Final demand | KTOE | OTHCDEM | 12,659.9 | 13,333.8 | 15,135.8 | 14,817.9 | 16,178.5 | 15,846.0 | 15,300.4 | 14,036.2 |
| 456 | | Consumption in Power sector | KTOE | OTHCPOW | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 457 | | Domestic total | KTOE | OTHCTOT | 12,659.9 | 13,333.8 | 15,135.8 | 14,817.9 | 16,178.5 | 15,846.0 | 15,300.4 | 14,036.2 |
| 458 | | | | | | | | | | | | |
| 459 | Energy Demand | Domestic final demand | KTOE | EGSCDFD | 16,310.9 | 20,030.8 | 24,936.8 | 32,768.6 | 45,596.7 | 58,348.6 | 72,932.5 | 89,473.2 |
| 460 | | Consumption in Power sector | KTOE | EGSCPOW | 2,015.1 | 2,056.2 | 3,316.3 | 6,342.3 | 14,139.8 | 22,036.8 | 30,666.6 | 50,603.5 |
| 461 | | Domestic Energy Demand | KTOE | EGSCTOT | 18,326.0 | 22,087.0 | 28,253.1 | 39,110.9 | 59,736.5 | 80,385.3 | 103,599.2 | 140,076.7 |
| 462 | | | | | | | | | | | | |

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## Table 2-5-14 Simulation sheet (14)

| | | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| < Central region > | | | | | | | | | | | |
| (1) Census | Population | Milliom | CPOP | 9,632.5 | 11,011.2 | 12,280.3 | 13,132.7 | 13,850.5 | 14,622.0 | 15,436.4 | 16,024.0 |
| | G.R. of Population | G% | CPOPX | | 2.6 | 1.9 | 1.4 | 1.1 | 1.1 | 1.1 | 0.8 |
| | | | | | | | | | | | |
| (3) GDP nominal | NGDP | Million Dong | CGNTL | 3,646.2 | 21,004.0 | 42,093.1 | 76,355.6 | 154,258.8 | 314,614.5 | 650,341.6 | ######### |
| | Industry | Million Dong | CGNIN | 628.5 | 4,476.8 | 10,338.1 | 21,330.6 | 50,208.6 | 114,147.0 | 266,375.8 | 594,068.9 |
| | Commercial | Million Dong | CGNCO | 1,467.2 | 8,627.0 | 15,578.1 | 29,741.5 | 60,090.5 | 126,439.0 | 261,051.4 | 550,359.4 |
| | Agriculture | Million Dong | CGNAG | 1,550.5 | 7,900.2 | 16,176.9 | 25,283.6 | 43,959.7 | 74,028.5 | 122,914.5 | 198,123.5 |
| | | | | | | | | | | | |
| | Share of NGDP | % | CGNTLX | 8.7 | 9.2 | 9.5 | 9.6 | 9.7 | 9.8 | 10.1 | 10.6 |
| | Share of Industry | % | CGNINX | 6.0 | 6.5 | 6.6 | 6.7 | 7.0 | 7.4 | 8.0 | 8.9 |
| | Share of Commercial | % | CGNCOX | 8.1 | 8.6 | 8.5 | 9.3 | 9.6 | 9.9 | 10.4 | 10.9 |
| | Share of Agriculture | % | CGNAGX | 11.6 | 13.2 | 15.8 | 16.5 | 18.1 | 19.6 | 21.0 | 22.4 |
| | | | | | | | | | | | |
| (4) RGDP 1994 pric | RGDP | Million Dong | CGRTL | 11,469.0 | 17,946.0 | 26,083.0 | 37,703.2 | 56,919.1 | 86,747.6 | 133,995.8 | 206,705.1 |
| | Industry | Million Dong | CGRIN | 1,977.0 | 3,825.0 | 6,406.0 | 10,532.7 | 18,526.2 | 31,473.4 | 54,883.8 | 91,465.4 |
| | Commercial | Million Dong | CGRCO | 4,615.0 | 7,371.0 | 9,653.0 | 14,685.9 | 22,172.5 | 34,862.6 | 53,786.8 | 84,735.7 |
| | Agriculture | Million Dong | CGRAG | 4,877.0 | 6,750.0 | 10,024.0 | 12,484.6 | 16,220.5 | 20,411.6 | 25,325.2 | 30,504.0 |
| | | | | | | | | | | | |
| | G.R. of RGDP | % | CGRTLX | | 19.9 | 7.9 | 8.2 | 8.7 | 8.9 | 9.2 | 9.3 |
| | G.R. of Industry | % | CGRINX | | 22.0 | 11.9 | 11.2 | 12.0 | 11.2 | 11.8 | 10.8 |
| | G.R. of Commercial | % | CGRCOX | | 22.3 | 7.2 | 8.0 | 8.6 | 9.5 | 9.1 | 9.5 |
| | G.R. of Agriculture | % | CGRAGX | | 16.3 | 6.1 | 5.7 | 5.4 | 4.7 | 4.4 | 3.8 |
| | | | | | | | | | | | |
| | GDP E.V. to RGDP | | CEVTLX | | 2.1 | 1.2 | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 |
| | Industry E.V. to RGDP | | CEVINX | | 2.3 | 1.8 | 1.4 | 1.4 | 1.3 | 1.4 | 1.4 |
| | Commercial E.V. to RGDP | | CEVCOX | | 2.3 | 1.1 | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 |
| | Agriculture E.V. to RGDP | | CEVAGX | | 1.7 | 0.9 | 0.7 | 0.6 | 0.7 | 0.6 | 0.5 |
| | | | | | | | | | | | |
| (5) Power demand | C-total | GWh | CWDTOT | 434 | 1,010 | 2,272 | 4,601 | 8,713 | 14,123 | 22,939 | 36,609 |
| | Agriculture.Forestry.Fishery | GWh | CWDMAG | 11 | 27 | 60 | 101 | 155 | 181 | 206 | 226 |
| | Industry & Construction | GWh | CWDMIN | 179 | 284 | 669 | 1,709 | 3,495 | 6,045 | 10,450 | 17,161 |
| | Commercials & Services. | GWh | CWDMCO | 30 | 69 | 158 | 179 | 472 | 914 | 1,689 | 3,020 |
| | Office & Residentials | Gwh | CWDMRE | 207 | 613 | 1,349 | 2,379 | 4,215 | 6,447 | 9,827 | 15,097 |
| | Others | GWh | CWDMOT | 7 | 18 | 38 | 233 | 375 | 535 | 768 | 1,104 |
| | | | | | | | | | | | |
| (6) Power demand | C-total | GWh | CADTOT | 434 | 1,010 | 2,272 | 4,609 | 8,899 | 14,544 | 23,715 | 37,879 |
| Adjusted | Agriculture.Forestry.Fishery | GWh | CADMAG | 11 | 27 | 60 | 104 | 163 | 191 | 218 | 239 |
| | Industry & Construction | GWh | CADMIN | 179 | 284 | 669 | 1,713 | 3,521 | 6,113 | 10,605 | 17,473 |
| | Commercials & Services. | GWh | CADMCO | 30 | 69 | 158 | 178 | 467 | 907 | 1,684 | 3,033 |
| | Office & Residentials | Gwh | CADMRE | 207 | 613 | 1,349 | 2,384 | 4,251 | 6,524 | 9,976 | 15,357 |
| | Others | GWh | CADMOT | 7 | 18 | 38 | 230 | 497 | 809 | 1,233 | 1,776 |

## Table 2-5-15 Simulation sheet (15)

< Southern region

| | | J | TIME | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Census | Population | Milliom | SPOP | 24.5 | 23.2 | 28.4 | 30.4 | 32.0 | 33.8 | 35.7 | 37.1 |
| | Population share | S% | SPOPX | | -1.45 | 1.77 | 1.40 | 1.07 | 1.09 | 1.09 | 0.75 |
| (3) GDP nominal | NGDP | Million Dong | SGNTL | 22,771 | 125,434 | 242,530 | 428,825 | 858,103 | 1,713,297 | 3,410,472 | 6,561,808 |
| | Industry | Million Dong | SGNIN | 6,621 | 43,468 | 99,458 | 194,350 | 427,207 | 899,029 | 1,896,239 | 3,712,732 |
| | Commercial | Million Dong | SGNCO | 9,661 | 53,972 | 96,708 | 163,138 | 317,240 | 639,077 | 1,246,533 | 2,451,186 |
| | Agriculture | Million Dong | SGNAG | 6,489 | 27,995 | 46,365 | 71,336 | 113,656 | 175,191 | 267,700 | 397,890 |
| | Share of NGDP | % | SGNTLX | 54.3 | 54.8 | 54.9 | 54.2 | 54.0 | 53.5 | 52.9 | 52.0 |
| | Share of Industry | % | SGNINX | 62.7 | 63.4 | 63.6 | 60.9 | 59.4 | 58.0 | 56.8 | 55.4 |
| | Share of Commercial | % | SGNCOX | 53.6 | 53.8 | 52.9 | 51.2 | 50.6 | 50.0 | 49.4 | 48.7 |
| | Share of Agriculture | % | SGNAGX | 48.6 | 46.6 | 45.3 | 46.5 | 46.7 | 46.4 | 45.8 | 45.0 |
| (4) RGDP 1994 pric | RGDP | Million Dong | SGRTL | 71,625 | 107,172 | 150,284 | 211,747 | 316,627 | 472,402 | 702,690 | 1,010,285 |
| | Industry | Million Dong | SGRIN | 20,825 | 37,139 | 61,629 | 95,967 | 157,633 | 247,886 | 390,699 | 571,628 |
| | Commercial | Million Dong | SGRCO | 30,388 | 46,114 | 59,925 | 80,555 | 117,057 | 176,211 | 256,834 | 377,395 |
| | Agriculture | Million Dong | SGRAG | 20,412 | 23,919 | 28,730 | 35,225 | 41,937 | 48,305 | 55,157 | 61,261 |
| | G.R. of RGDP | % | SGRTLX | | 6.5 | 6.0 | 7.7 | 8.3 | 8.3 | 8.2 | 7.6 |
| | G.R. of Industry | % | SGRINX | | 10.6 | 8.9 | 9.8 | 10.4 | 9.5 | 9.5 | 7.9 |
| | G.R. of Commercial | % | SGRCOX | | 6.5 | 4.3 | 7.3 | 7.8 | 8.5 | 7.8 | 8.0 |
| | G.R. of Agriculture | % | SGRAGX | | 0.5 | 3.6 | 3.9 | 3.6 | 2.9 | 2.7 | 2.1 |
| | GDP E.V. to RGDP | | SEVTLX | | 0.7 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 |
| | Industry E.V. to RGDP | | SEVINX | | 1.1 | 1.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 |
| | Commercial E.V. to RGDP | | SEVCOX | | 0.7 | 0.6 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 |
| | Agriculture E.V. to RGDP | | SEVAGX | | 0.1 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 |
| (5) Power demand | S-total | GWh | SWDTOT | 2,589 | 5,272 | 11,101 | 23,487 | 45,768 | 74,862 | 120,062 | 181,646 |
| | Agriculture.Forestry.Fishery | GWh | SWDMAG | 39 | 37 | 73 | 185 | 237 | 248 | 256 | 258 |
| | Industry & Construction | GWh | SWDMIN | 1,228 | 2,452 | 5,193 | 12,076 | 24,589 | 41,397 | 67,934 | 102,142 |
| | Commercials & Services. | GWh | SWDMCO | 68 | 329 | 649 | 1,329 | 3,032 | 5,609 | 10,046 | 17,422 |
| | Office & Residentials | Gwh | SWDMRE | 1,128 | 2,259 | 4,797 | 8,974 | 16,461 | 25,571 | 38,972 | 57,932 |
| | Others | GWh | SWDMOT | 127 | 195 | 390 | 924 | 1,449 | 2,038 | 2,853 | 3,891 |
| (6) Power demand | S-total | GWh | SADTOT | 2,589 | 5,272 | 11,101 | 23,519 | 46,539 | 76,640 | 123,372 | 186,958 |
| Adjusted | Agriculture.Forestry.Fishery | GWh | SADMAG | 39 | 37 | 73 | 189 | 249 | 262 | 271 | 273 |
| | Industry & Construction | GWh | SADMIN | 1,228 | 2,452 | 5,193 | 12,102 | 24,769 | 41,858 | 68,941 | 103,997 |
| | Commercials & Services. | GWh | SADMCO | 68 | 329 | 649 | 1,322 | 3,000 | 5,566 | 10,021 | 17,498 |
| | Office & Residentials | Gwh | SADMRE | 1,128 | 2,259 | 4,797 | 8,996 | 16,600 | 25,875 | 39,560 | 58,931 |
| | Others | GWh | SADMOT | 127 | 195 | 390 | 910 | 1,921 | 3,079 | 4,580 | 6,260 |

## 2.6 Growth sheet

In growth sheet, the growth rates of the forecasted values and elasticity to real GDP are calculated. Annual growth rates and average growth rates are calculated and elasticity between main variables and real GDP are calculated.

### (1) Annual growth rate

The annual growth rates from 2005 to 2025 are calculated for all variables The expression are follow; .

The annual growth rate = (X / X(1) – 1)*100        X(1): previous value of X

### (2) Average growth rate

The following types of average growth rates are calculated in Growth sheet.

| | |
|---|---|
| Average growth rate from 1995 to 2000 | Shown by 2000 / 1995 |
| Average growth rate from 2000 to 2005 | Shown by 2005 / 2000 |
| Average growth rate from 2005 to 2010 | Shown by 200 / 2005 |
| Average growth rate from 2010 to 2015 | Shown by 2015 / 2010 |
| Average growth rate from 2015 to 2020 | Shown by 2020 / 2015 |
| Average growth rate from 2020 to 2025 | Shown by 2025 / 2020 |
| Average growth rate from 2005 to 2025 | Shown by 2025 / 2005 |

The average annual growth rate = ( (X / X(n) ) ^ (1 / n) - 1)*100    n: Interval years

### (3) Elasticity to real GDP

#### a. Power demand elasticity by sector

Power demand in Agriculture sector to real GDP

Power demand in Industry sector to real GDP

Power demand in Transportation sector to real GDP

Power demand in Commercial sector to real GDP

Power demand in Residential sector to real GDP

Power demand in Other sector to real GDP

#### b. Power and Energy demand elasticity in Whole country

Power demand in whole country to real GDP

Energy demand in whole country to real GDP

Power generation in whole country to real GDP

Power resources for thermal generators to real GDP

**c. Elasticity by energy**

Coal demand to real GDP

LPG demand to real GDP

Gasoline demand to real GDP

Jet-fuel demand to real GDP

Kerosene demand to real GDP

Diesel demand to real GDP

Fuel oil demand to real GDP

NG & AG demand to real GDP

Renewable & Other Energy to real GDP

**d. Power demand elasticity by region**

Power demand in North region to real GDP

Power demand in Center region to real GDP

Power demand in South region to real GDP

## 2.7 ExImport sheet

### (1) Capacity, Operation load and Yields

For calculating import and export of petroleum products, the petroleum product outputs have to be calculated at first. The following table is the input area for the data of refinery plants.

**Table 2-7-1　Capacity, Operation load and Yield table in ExImport sheet**

| | | | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| Capacity | Feed | KTON | 0 | 0 | 0 | 0 | 0 | 6500 | 20500 | 20500 |
| | Crude oil | KTON | 0 | 0 | 0 | 0 | 0 | 6500 | 20500 | 20500 |
| | NGL | KTON | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Operation load | | KTON | 0 | 0 | 0 | 0 | 100 | 100 | 100 | 100 |
| | | KTON | | | | | | | | |
| | | KTON | | | | | | | | |
| Crude oil Yields | Crude oil | KTON/KTO | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 |
| | RF-LPG | KTON/KTO | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 |
| | Gasoline | KTON/KTO | 0.0735 | 0.0735 | 0.0735 | 0.0735 | 0.0735 | 0.0735 | 0.0735 | 0.0735 |
| | Jet fuel | KTON/KTO | 0.0308 | 0.0308 | 0.0308 | 0.0308 | 0.0308 | 0.0308 | 0.0308 | 0.0308 |
| | Kerosene | KTON/KTO | 0.0331 | 0.0331 | 0.0331 | 0.0331 | 0.0331 | 0.0331 | 0.0331 | 0.0331 |
| | Diesel | KTON/KTO | 0.2210 | 0.2210 | 0.2210 | 0.2210 | 0.2210 | 0.2210 | 0.2210 | 0.2210 |
| | Fuel oil | KTON/KTO | 0.4919 | 0.4919 | 0.4919 | 0.4919 | 0.4919 | 0.4919 | 0.4919 | 0.4919 |
| | Naphtha | KTON/KTO | 0.0889 | 0.0889 | 0.0889 | 0.0889 | 0.0889 | 0.0889 | 0.0889 | 0.0889 |
| | Lubricants & additives | KTON/KTO | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 |
| | Bitumen | KTON/KTO | 0.0299 | 0.0299 | 0.0299 | 0.0299 | 0.0299 | 0.0299 | 0.0299 | 0.0299 |
| | Petroleum Coke | KTON/KTO | 0.0117 | 0.0117 | 0.0117 | 0.0117 | 0.0117 | 0.0117 | 0.0117 | 0.0117 |
| NGL Yields | NGL | KTON/KTO | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 |
| | RF-LPG | KTON/KTO | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 |
| | Gasoline | KTON/KTO | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 | 0.1380 |
| | Jet fuel | KTON/KTO | 0.0217 | 0.0217 | 0.0217 | 0.0217 | 0.0217 | 0.0217 | 0.0217 | 0.0217 |
| | Kerosene | KTON/KTO | 0.1771 | 0.1771 | 0.1771 | 0.1771 | 0.1771 | 0.1771 | 0.1771 | 0.1771 |
| | Diesel | KTON/KTO | 0.1341 | 0.1341 | 0.1341 | 0.1341 | 0.1341 | 0.1341 | 0.1341 | 0.1341 |
| | Fuel oil | KTON/KTO | 0.0138 | 0.0138 | 0.0138 | 0.0138 | 0.0138 | 0.0138 | 0.0138 | 0.0138 |
| | Naphtha | KTON/KTO | 0.3774 | 0.3774 | 0.3774 | 0.3774 | 0.3774 | 0.3774 | 0.3774 | 0.3774 |
| | Lubricants & additives | KTON/KTO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | Bitumen | KTON/KTO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | Petroleum Coke | KTON/KTO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

### a. Capacity

The refinery plant capacities are input in the starting year of the operation. In the table, one refinery plant with the capacity of 6500,000ton is installed in 2010. The second refinery plant with the capacity of 6500,000 ton is installed in 2015, The third refinery plant with the capacity of 7000,000 ton is installed in 2020.

### b. Operation load

In the line, operation load of the refinery plant installed are input. In the model, operation load with 100% are input for the three plants.

### c. Crude oil yields

Crude oil yields are input in the lines, the yields of the petroleum products are defined by "Output volume per unit consumption of crude oil". In the table, minus sigh means consumption of crude oil and plus sigh means output of petroleum products.

### d. NGL yields

NGL yields are input in the lines, the yields of the petroleum products are defined by "Output volume per unit consumption of NGL". In the table, minus sigh means consumption of NGL and plus sigh means output of petroleum products.

### (2) Production of petroleum products

Productions of petroleum products are calculated in the table. One of the productions made of crude oil, another made of NGL. The both productions of the petroleum products are summed up as the total production.

**Table 2-7-2 Production of petroleum products table in ExImport sheet**

|  |  |  | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| Production | Crude oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | −6,500.0 | −20,500.0 | −20,500.0 |
| from Crude oil | RF−LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.5 | 197.2 | 197.2 |
|  | Gasoline | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 477.7 | 1,506.6 | 1,506.6 |
|  | Jet fuel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 200.3 | 631.8 | 631.8 |
|  | Kerosene | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 215.2 | 678.6 | 678.6 |
|  | Diesel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1,436.2 | 4,529.6 | 4,529.6 |
|  | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3,197.2 | 10,083.5 | 10,083.5 |
|  | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 578.1 | 1,823.3 | 1,823.3 |
|  | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.4 | 196.7 | 196.7 |
|  | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 194.1 | 612.0 | 612.0 |
|  | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 76.2 | 240.3 | 240.3 |
| Production | NGL | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| from NGL | RF−LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Gasoline | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Jet fuel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Kerosene | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Diesel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Production total | RF−LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.5 | 197.2 | 197.2 |
|  | Gasoline | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 477.7 | 1,506.6 | 1,506.6 |
|  | Jet fuel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 200.3 | 631.8 | 631.8 |
|  | Kerosene | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 215.2 | 678.6 | 678.6 |
|  | Diesel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1,436.2 | 4,529.6 | 4,529.6 |
|  | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3,197.2 | 10,083.5 | 10,083.5 |
|  | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 578.1 | 1,823.3 | 1,823.3 |
|  | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.4 | 196.7 | 196.7 |
|  | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 194.1 | 612.0 | 612.0 |
|  | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 76.2 | 240.3 | 240.3 |
| Consumption | Crude oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6,500.0 | 20,500.0 | 20,500.0 |
|  | NGL | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|  |  | KTON |  |  |  |  |  |  |  |  |
| Other supply | NG−LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 300.0 | 300.0 | 300.0 | 300.0 |
|  |  | KTON |  |  |  |  |  |  |  |  |
|  |  | KTON |  |  |  |  |  |  |  |  |

Crude oil consumption = Capacity * Operation load * Yields.

RF-LPG production = Capacity * Operation load * Yields

The expressions of Gasoline, Jet fuel, Kerosene, Diesel, Fuel oil, Naphtha, Lubricants & additives, Bitumen and Petroleum Coke are the same way to RF-LPG.

NG-LPG in Other supply is LPG from natural gas fields. The values are the input as exogenous.

### (3) Hydro cracking process

It is considered that hydro cracking plant is installed in future. In the model, the procedures are setup as following table.

**Table 2-7-3    Hydro cracking process table in ExImport sheet**

| | | | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| Capacity | Fuel oil | KTON | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | KTON | | | | | | | | |
| | | KTON | | | | | | | | |
| Operation load | | KTON | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | KTON | | | | | | | | |
| | | KTON | | | | | | | | |
| Fuel oil Yields | Fuel oil | KTON/KTO | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 | −1.0000 |
| | LPG | KTON/KTO | 0.0110 | 0.0110 | 0.0110 | 0.0110 | 0.0110 | 0.0110 | 0.0110 | 0.0110 |
| | Gasoline | KTON/KTO | 0.0890 | 0.0890 | 0.0890 | 0.0890 | 0.0890 | 0.0890 | 0.0890 | 0.0890 |
| | Jet fuel | KTON/KTO | 0.1400 | 0.1400 | 0.1400 | 0.1400 | 0.1400 | 0.1400 | 0.1400 | 0.1400 |
| | Diesel | KTON/KTO | 0.4120 | 0.4120 | 0.4120 | 0.4120 | 0.4120 | 0.4120 | 0.4120 | 0.4120 |
| | Fuel oil | KTON/KTO | 0.2660 | 0.2660 | 0.2660 | 0.2660 | 0.2660 | 0.2660 | 0.2660 | 0.2660 |
| | Petroluem coke | KTON/KTO | 0.0090 | 0.0090 | 0.0090 | 0.0090 | 0.0090 | 0.0090 | 0.0090 | 0.0090 |
| Production | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| from Fuel oil | LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Gasoline | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Jet fuel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Diesel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Petroluem coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Consumption | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | KTON | | | | | | | | |
| | | KTON | | | | | | | | |

### a. Capacity

The Hydro cracking plant capacities are input in the starting year of the operation. In the table, the capacity is set with zero as current assumption.

### b. Operation load

In the line, operation load of the hydro cracking plant installed are input. In the model, operation load with 0% are input.

## c. Fuel oil yields

Fuel oil yields are input in the lines, the yields of the petroleum products are defined "Output volume per unit consumption of fuel oil". In the table, minus sigh means consumption of fuel oil and plus sigh means output of petroleum products.

## d. Production

Productions of petroleum products are calculated in the table.

Fuel oil consumption = Capacity * Operation load * Yields.

LPG production = Capacity * Operation load * Yields

The expressions of Gasoline, Jet fuel, Kerosene, Diesel and Petroleum Coke are the same way to LPG.

## (4) Supply and Consumption

The petroleum product supply from refinery and hydro cracking plants is shown in the following table. And also consumption of crude oil, NGL and fuel oil as feed stocks to refinery and hydro cracking plants are shown.

**Table 2-7-4 Supply and Consumption balance in ExImport sheet**

| | | | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| Supply | Crude oil | KTON | | | | | | | | |
| | NGL | KTON | | | | | | | | |
| | LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 300.0 | 362.5 | 497.2 | 497.2 |
| | Gasoline | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 477.7 | 1,506.6 | 1,506.6 |
| | Jet fuel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 200.3 | 631.8 | 631.8 |
| | Kerosene | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 215.2 | 678.6 | 678.6 |
| | Diesel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1,436.2 | 4,529.6 | 4,529.6 |
| | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3,197.2 | 10,083.5 | 10,083.5 |
| | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 578.1 | 1,823.3 | 1,823.3 |
| | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.4 | 196.7 | 196.7 |
| | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 194.1 | 612.0 | 612.0 |
| | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 76.2 | 240.3 | 240.3 |
| Consumption | Crude oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6,500.0 | 20,500.0 | 20,500.0 |
| | NGL | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | LPG | KTON | | | | | | | | |
| | Gasoline | KTON | | | | | | | | |
| | Jet fuel | KTON | | | | | | | | |
| | Kerosene | KTON | | | | | | | | |
| | Diesel | KTON | | | | | | | | |
| | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Naphtha | KTON | | | | | | | | |
| | Lubricants & additives | KTON | | | | | | | | |
| | Bitumen | KTON | | | | | | | | |
| | Petroleum Coke | KTON | | | | | | | | |

**(4) Export and Import balance**

Domestic demand, export and import of petroleum products are shown in the following table.

**Table 2-7-5 Export and Import balance in ExImport sheet**

| | | | 2005 | 2006 | 2007 | 2008 | 2009 | 2004 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| Demand | LPG | KTON | 858.5 | 1,029.9 | 1,210.8 | 1,414.0 | 1,627.6 | 1,853.1 | 4,171.3 | 4,226.8 |
| | Gasoline | KTON | 3,191.7 | 3,650.5 | 4,115.7 | 4,576.8 | 5,032.6 | 5,477.6 | 11,602.0 | 11,924.8 |
| | Jet fuel | KTON | 435.1 | 499.4 | 564.3 | 628.6 | 692.2 | 754.9 | 1,160.2 | 1,165.6 |
| | Kerosene | KTON | 466.9 | 496.5 | 531.5 | 568.5 | 607.7 | 649.1 | 1,247.6 | 1,292.0 |
| | Diesel | KTON | 5,260.8 | 5,901.1 | 6,565.7 | 7,231.4 | 7,900.1 | 8,569.0 | 17,386.5 | 17,944.7 |
| | Fuel oil | KTON | 2,992.3 | 3,373.6 | 3,758.0 | 4,054.7 | 4,409.9 | 4,760.0 | 13,185.3 | 14,238.5 |
| | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 578.1 | 1,823.3 | 1,823.3 |
| | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.4 | 196.7 | 196.7 |
| | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 194.1 | 612.0 | 612.0 |
| | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 76.2 | 240.3 | 240.3 |
| | | KTON | | | | | | | | |
| Export | LPG | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Gasoline | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Jet fuel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Kerosene | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Diesel | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Fuel oil | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | KTON | | | | | | | | |
| Import | LPG | KTON | 858.5 | 1,029.9 | 1,210.8 | 1,414.0 | 1,327.6 | 1,490.5 | 3,674.1 | 3,729.6 |
| | Gasoline | KTON | 3,191.7 | 3,650.5 | 4,115.7 | 4,576.8 | 5,032.6 | 4,999.9 | 10,095.4 | 10,418.2 |
| | Jet fuel | KTON | 435.1 | 499.4 | 564.3 | 628.6 | 692.2 | 554.6 | 528.4 | 533.7 |
| | Kerosene | KTON | 466.9 | 496.5 | 531.5 | 568.5 | 607.7 | 433.9 | 568.9 | 613.4 |
| | Diesel | KTON | 5,260.8 | 5,901.1 | 6,565.7 | 7,231.4 | 7,900.1 | 7,132.7 | 12,856.9 | 13,415.1 |
| | Fuel oil | KTON | 2,992.3 | 3,373.6 | 3,758.0 | 4,054.7 | 4,409.9 | 1,562.8 | 3,101.7 | 4,155.0 |
| | Naphtha | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Lubricants & additives | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Bitumen | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Petroleum Coke | KTON | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | KTON | | | | | | | | |

**a. Domestic demand**

The values of the domestic demand come from Simulation sheet.

**b. Export**

When the petroleum product balance is "Supply is greater than Domestic demand" ,

The balance of " Supply – Domestic demand" is set to "Export".

**c. Import**

When the petroleum products balance is " Supply is less than Domestic demand",

The balance of " Domestic demand – Supply" is set to "Import".

## 2.8 Summary sheet

### (1) Power demand by sector

The power demands by sector are brought from Simulation sheet. The trends of the actual and forecasting values by Agriculture, Manufacturing, Transportation, Commercials & Service, Residential and other sector are displayed in the following table and graph..

**Table 2-8-1 The Summary of Power demand by sector for PDP6th**

| High | | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|------|--|------|------|------|------|------|------|------|------|
| Power | (1)Agriculture | 190 | 241 | 428 | 658 | 896 | 953 | 1,006 | 1,033 |
| Demand | (2)Manufacturing | 2,876 | 4,619 | 9,088 | 20,909 | 42,864 | 73,335 | 122,354 | 188,276 |
| | (3)Transportation | 58 | 105 | 244 | 337 | 1,586 | 3,079 | 4,955 | 6,928 |
| | (4)Commercials & Serv | 129 | 548 | 1,084 | 2,022 | 4,677 | 8,757 | 15,881 | 27,960 |
| | (5)Residentials | 2,778 | 5,369 | 10,986 | 20,174 | 36,566 | 56,947 | 87,312 | 131,756 |
| | (6)Others | 155 | 316 | 567 | 1,583 | 2,533 | 3,625 | 5,156 | 7,184 |
| | Total | 6,185 | 11,198 | 22,398 | 45,682 | 89,123 | 146,695 | 236,664 | 363,137 |
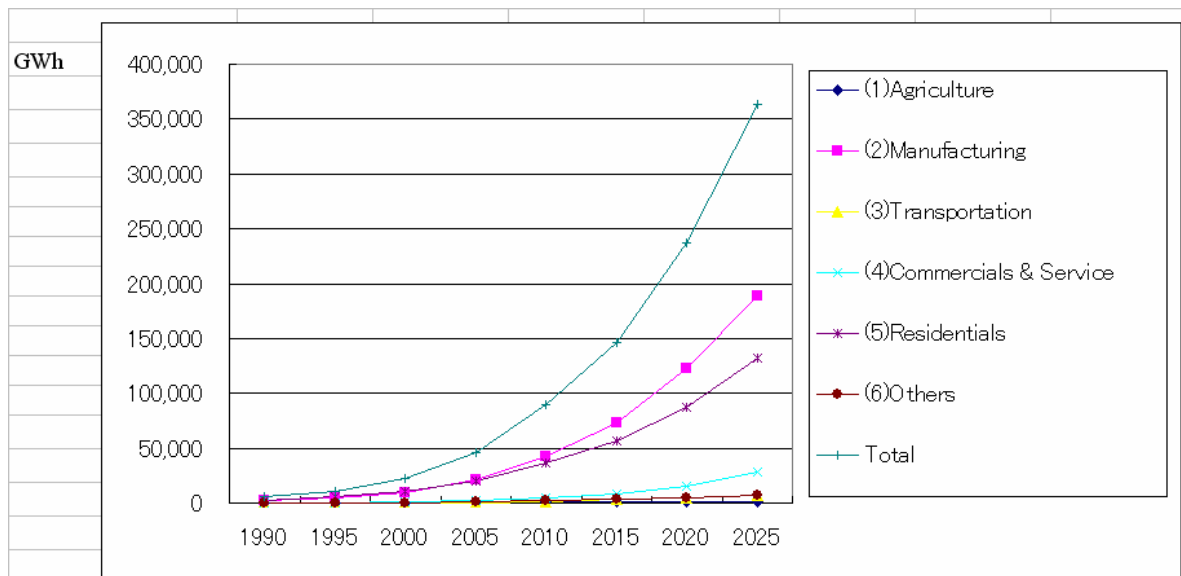


Figure 2-8-1 **Power demand by sector for PDP6th**

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**(2) Comparison of the power demand forecasting**

Several kinds of power demand forecasting are compared in the following table. The forecasting made by JICA, Institute of Energy, PDP5th and PDP5th revised. The forecasting years of JICA and IE are from 2005 to 2025. PDP5th and PDP5th revised are from 2002 to 2020.

**Table 2-8-2 Comparison of the power demand forecasting of PDP6th**

| BASE | | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 |
|------|------|------|------|------|------|------|------|------|------|
| Power | PDP6 | 6,185 | 11,198 | 22,398 | 45,682 | 91,949 | 146,899 | 216,433 | 308,511 |
| Demand | PDP5 | 6,185 | 11,198 | 22,398 | 37,116 | 61,572 | 95,747 | 146,555 | |
| | Revised PDP 5th | 6,185 | 11,198 | 22,398 | 44,944 | 80,486 | 124,203 | 178,568 | |
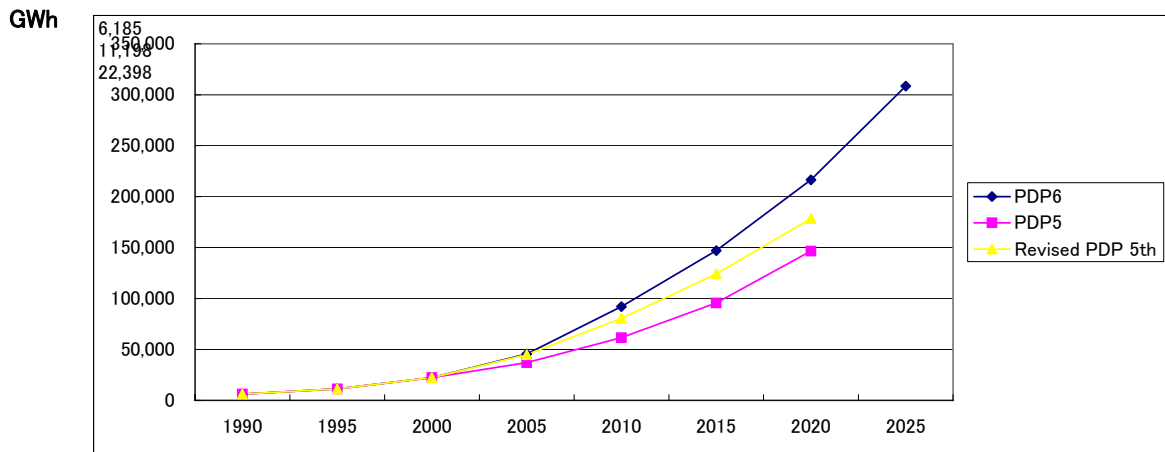


**Figure 2-8-2 Comparison of the power demand forecasting**

**Chapter 3. Functions and operation of daily load curve forecasting model**

**3.1 The function of the sheets**

Daily load curve forecasting model consists of 8 sheets including SimpleE sheets. The functions and its roles are as the following table.

**Table 3-1-1 The functions of the Model**

| Sheet | Functions and roles |
|---|---|
| Data sheet | Input actual values on Economy, Daily load data |
| | Input Social and Economic data in future |
| | Describe variable names and comments. |
| Model sheet | Build regression equations for daily load by region by hour |
| | Evaluate regression equations |
| | Build regression equations for load factor by region |
| Simulation sheet | Show the data used in the model by region by hour |
| | Show the future daily load by region by hour |
| | Show the load factors by region |
| Data Analysis | Calculate daily load by region by type by hour |
| | Calculate yearly daily load |
| | Calculate load factor |
| Whole | Draw daily load curve by type by year in whole country |
| North | Draw daily load curve by type by year in North |
| South | Draw daily load curve by type by year in South |
| Load Factor | Compare the daily load curve and peak demand among organizations |

**3.2 Data sheet**

"Data sheet" is created by SimpleE. The actual values in all kinds of variables and future values in exogenous variables are set in the sheet. There are two kinds of actual data in Data sheet, one is an input data, another is calculation data.

In the model, the actual data for forecasting daily load curve are input in the following table:

**Table 3-2-1 Actual data for forecasting daily load curve**

| Thailand (1-9) | Malaysia (10-14) | Philippines (15-17) | Indonesia (18-25) | Japan (26-43) | Vietnam (44-151) |
|---|---|---|---|---|---|
| 1988/04 | 1993/07 | 1999/03 | 1990/04 | 1967/12 | 1996/01 |
| 1989/04 | 1994/09 | 2000/04 | 1991/04 | 1968/07 | 1996/02 |
| 1990/04 | 1995/05 | 2001/04 | 1992/07 | 1969/08 | 1996/03 |
| 1991/04 | 1996/03 | | 1993/07 | 1970/09 | - |
| 1992/07 | 1997/03 | | 1994/09 | 1971/08 | - |
| 1993/07 | | | 1995/05 | 1972/08 | - |
| 1994/09 | | | 1996/03 | 1973/08 | - |
| 1995/05 | | | 1997/03 | 1974/08 | - |
| 1996/03 | | | | 1975/07 | - |
| | | | | 1976/08 | - |
| | | | | 1978/07 | - |
| | | | | 1979/08 | - |
| | | | | 1980/07 | - |
| | | | | 1981/07 | - |
| | | | | 1982/08 | - |
| | | | | 1983/08 | 2004/10 |
| | | | | 1984/08 | 2004/11 |
| | | | | 1985/08 | 2004/12 |

The data by region, North, Center and South are input. And the social and economic data are classified into the three regions.

The variables are arranged in line with the processing orders. Then calculation of the model is basically performed from the upper variables to below variables. But it is possible that the upper variables are calculated by using the results of the below variables. And if the model contains the simultaneous equations, the SimpleE can solve the equations.

The model has the following blocks as model structures.

**Table 3-2-2 Structures of daily load curve forecasting model**

| CONTENTS | Line number |
|---|---|
| **\<North region \>** | |
| Dummy in North | 5 ～ 10 |
| Economic & Climate Indicators in North | 11 ～ 25 |
| Weekday Data in North | 26 ～ 51 |
| Holiday Data in North | 52 ～ 77 |
| Peak Data in North | 78 ～ 103 |
| **\<Center region \>** | |
| Dummy in North | 106 ～ 110 |
| Economic & Climate Indicators in North | 111 ～ 123 |
| Weekday Data in North | 126 ～ 151 |
| Holiday Data in North | 152 ～ 177 |
| Peak Data in North | 178 ～ 204 |
| **\<South region \>** | |
| Dummy in North | 206 ～ 211 |
| Economic & Climate Indicators in North | 212 ～ 224 |
| Weekday Data in North | 227 ～ 252 |
| Holiday Data in North | 253 ～ 278 |
| Peak Data in North | 279 ～ 305 |
| **\<Load factor \>** | |
| Load factor | 307 ～ 310 |
| Monthly Consumption | 312 ～ 316 |
| Peak demand | 317 ～ 321 |

**(1) Dummy, Social and Economic variables in North**

**a. Dummy variable**

The Thailand dummy variable has "1" at the time of Thailand's data. In the data number from 1 to 9, the Dummy variable is "1" and other terms are "0".

**Table 3-2-3      Variables for Dummy and Economic data**

| | North | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Dummy | Thailand Dummy | | | NTHADUN | 0 | 0 | 0 | 0 | 0 |
| 6 | | Malaysia Dummy | | | NMAYDUN | 0 | 0 | 0 | 0 | 0 |
| 7 | | Phlippines Dummy | | | NPHIDUM | 0 | 0 | 0 | 0 | 0 |
| 8 | | Indonesia Dummy | | | NINDDUN | 0 | 0 | 0 | 0 | 0 |
| 9 | | Japan Dummy | | | NJAPDUN | 0 | 0 | 0 | 0 | 0 |
| 10 | | | | | | | | | | |
| 11 | Economic & Climate Indicators | | | | | | | | | |
| 12 | | Real GDP (1995 constant) | | | | | | | | |
| 13 | | (1) G.R Agricultute | % | NRAGR | | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 14 | | (2) G.R. Industry | % | NRIND | | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 |
| 15 | | (3) G.R. Service | % | NRSER | | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| 16 | | (1) Agricultute | Bill US$ | NGAGR | | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| 17 | | (2) Industry | Bill US$ | NGIND | | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 |
| 18 | | (3) Service | Bill US$ | NGSER | | 3.7 | 3.7 | 3.8 | 3.8 | 3.8 |
| 19 | | (4) GDP Total | Bill US$ | NGDP | | 8.1 | 8.2 | 8.2 | 8.3 | 8.3 |
| 20 | | Population | Mill | NPOP | | 33.3 | 33.3 | 33.3 | 33.4 | 33.4 |
| 21 | | Humidity | % | NHUM | | 81.0 | 73.0 | 84.0 | 84.0 | 80.0 |
| 22 | | Electrified Population | Mill | NELPOP | | 25.1 | 25.2 | 25.3 | 25.3 | 25.4 |
| 23 | | Temperature | Deg | NDEG | | 17.9 | 18.0 | 21.1 | 24.8 | 27.6 |
| 24 | Elastic value to GDP sector | | | | | | | | | |
| 25 | | GDP Total | Bill US$ | NEGDP | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

The Malaysia dummy variable has "1" at the time of Malaysia's data. In the data number from 10 to 15, the Dummy variable is "1" and other terms are "0".

The Philippines' dummy variable has "1" at the time of Philippines' data. In the data number from 16 to 19, the Dummy variable is "1" and other terms are "0".

The Indonesia's dummy variable has "1" at the time of Indonesia's data. In the data number from 20 to 28, the Dummy variable is "1" and other terms are "0".

The Japan's dummy variable has "1" at the time of Japan's data. In the data number from 29 to 57, the Dummy variable is "1" and other terms are "0".

**b. Economic and Climate Indicators in North**

Real GDP and sector GDP are used as exogenous variables, the future values are given by the growth rate. The sector GDP of Agriculture, Industry and Services are calculated by the growth rate.

The data of Population, Electrified population, Humidity and temperature in North are given

and used for forecasting daily load curve.

**(2) Weekday data in North**

The weekday data are hourly average vales in week day, The weekday data do not include the values of Sundays, National holidays and three Peak days in a month. The average hourly data from 1$^{st}$ to 24$^{th}$ clock are prepared not only from Vietnam, but also from Thailand, Malaysia, Philippines, Indonesia and Japan.

**Table 3-2-4　Weekday data in North**

| | North | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 26 | Weekday Data | | | | | | | | | |
| 27 | <1st Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 518.0 | 515.0 | 492.0 | 483.0 | 577.0 |
| 28 | <2nd Hour> | Electricity Consumption | Hourly | MW | NWELEC2 | 506.0 | 513.0 | 482.0 | 475.0 | 562.0 |
| 29 | <3rd Hour> | Electricity Consumption | Hourly | MW | NWELEC3 | 502.0 | 511.0 | 485.0 | 476.0 | 555.0 |
| 30 | <4th Hour> | Electricity Consumption | Hourly | MW | NWELEC4 | 503.0 | 518.0 | 499.0 | 487.0 | 558.0 |
| 31 | <5th Hour> | Electricity Consumption | Hourly | MW | NWELEC5 | 583.0 | 569.0 | 541.0 | 554.0 | 636.0 |
| 32 | <6th Hour> | Electricity Consumption | Hourly | MW | NWELEC6 | 709.0 | 742.0 | 731.0 | 695.0 | 695.0 |
| 33 | <7th Hour> | Electricity Consumption | Hourly | MW | NWELEC7 | 799.0 | 790.0 | 755.0 | 707.0 | 728.0 |
| 34 | <8th Hour> | Electricity Consumption | Hourly | MW | NWELEC8 | 771.0 | 777.0 | 776.0 | 736.0 | 768.0 |
| 35 | <9th Hour> | Electricity Consumption | Hourly | MW | NWELEC9 | 801.0 | 815.0 | 806.0 | 769.0 | 832.0 |
| 36 | <10th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 817.0 | 808.0 | 810.0 | 797.0 | 897.0 |
| 37 | <11th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 841.0 | 820.0 | 848.0 | 823.0 | 959.0 |
| 38 | <12th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 718.0 | 737.0 | 735.0 | 736.0 | 856.0 |
| 39 | <13th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 682.0 | 669.0 | 682.0 | 656.0 | 827.0 |
| 40 | <14th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 715.0 | 712.0 | 716.0 | 718.0 | 851.0 |
| 41 | <15th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 739.0 | 721.0 | 727.0 | 721.0 | 841.0 |
| 42 | <16th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 766.0 | 760.0 | 767.0 | 744.0 | 837.0 |
| 43 | <17th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 969.0 | 912.0 | 952.0 | 906.0 | 917.0 |
| 44 | <18th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 1,272.0 | 1,155.0 | 1,116.0 | 1,069.0 | 1,025.0 |
| 45 | <19th Hour> | Electricity Consumption | Hourly | MW | NWELEC1 | 1,291.0 | 1,338.0 | 1,309.0 | 1,271.0 | 1,289.0 |
| 46 | <20th Hour> | Electricity Consumption | Hourly | MW | NWELEC2 | 1,180.0 | 1,223.0 | 1,193.0 | 1,156.0 | 1,263.0 |
| 47 | <21st Hour> | Electricity Consumption | Hourly | MW | NWELEC2 | 1,026.0 | 1,099.0 | 1,037.0 | 1,012.0 | 1,137.0 |
| 48 | <22rd Hour> | Electricity Consumption | Hourly | MW | NWELEC2 | 878.0 | 902.0 | 875.0 | 855.0 | 984.0 |
| 49 | <23rd Hour> | Electricity Consumption | Hourly | MW | NWELEC2 | 642.0 | 688.0 | 630.0 | 589.0 | 725.0 |
| 50 | <24th Hour> | Electricity Consumption | Hourly | MW | NWELEC2 | 559.0 | 598.0 | 538.0 | 532.0 | 644.0 |
| 51 | | | | | | | | | | |

1$^{st}$ hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

2nd hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

--------------------------------------------------------------------------------

23rd hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

24th hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

**(3) Holiday data in North**

The Holiday data are hourly average values in Holidays. The Holiday data include the data of Sundays and National holidays. The average hourly data from 1$^{st}$ to 24$^{th}$ clock are prepared not only from Vietnam, but also from Thailand, Malaysia, Philippines, Indonesia and Japan.

**Table 3-2-5 Holiday data in North**

| | North | | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | Holiday Data | | | | | | | | | | |
| 53 | <1st Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 509.0 | 551.0 | 504.0 | 499.0 | 550.0 |
| 54 | <2nd Hour> | Electricity Consumption | Hourly | MW | NHELEC2 | 477.0 | 515.0 | 498.0 | 492.0 | 534.0 |
| 55 | <3rd Hour> | Electricity Consumption | Hourly | MW | NHELEC3 | 483.0 | 497.0 | 509.0 | 492.0 | 541.0 |
| 56 | <4th Hour> | Electricity Consumption | Hourly | MW | NHELEC4 | 515.0 | 505.0 | 511.0 | 499.0 | 545.0 |
| 57 | <5th Hour> | Electricity Consumption | Hourly | MW | NHELEC5 | 581.0 | 522.0 | 552.0 | 573.0 | 619.0 |
| 58 | <6th Hour> | Electricity Consumption | Hourly | MW | NHELEC6 | 630.0 | 629.0 | 660.0 | 635.0 | 649.0 |
| 59 | <7th Hour> | Electricity Consumption | Hourly | MW | NHELEC7 | 711.0 | 696.0 | 689.0 | 670.0 | 669.0 |
| 60 | <8th Hour> | Electricity Consumption | Hourly | MW | NHELEC8 | 762.0 | 795.0 | 673.0 | 678.0 | 714.0 |
| 61 | <9th Hour> | Electricity Consumption | Hourly | MW | NHELEC9 | 796.0 | 839.0 | 780.0 | 763.0 | 804.0 |
| 62 | <10th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 790.0 | 820.0 | 792.0 | 772.0 | 854.0 |
| 63 | <11th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 773.0 | 775.0 | 779.0 | 820.0 | 872.0 |
| 64 | <12th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 691.0 | 711.0 | 683.0 | 688.0 | 829.0 |
| 65 | <13th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 633.0 | 621.0 | 642.0 | 641.0 | 744.0 |
| 66 | <14th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 647.0 | 627.0 | 666.0 | 681.0 | 766.0 |
| 67 | <15th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 700.0 | 718.0 | 728.0 | 708.0 | 783.0 |
| 68 | <16th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 751.0 | 739.0 | 777.0 | 708.0 | 788.0 |
| 69 | <17th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 830.0 | 875.0 | 851.0 | 872.0 | 884.0 |
| 70 | <18th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 1,246.0 | 1,132.0 | 1,041.0 | 982.0 | 962.0 |
| 71 | <19th Hour> | Electricity Consumption | Hourly | MW | NHELEC1 | 1,239.0 | 1,263.0 | 1,322.0 | 1,261.0 | 1,285.0 |
| 72 | <20th Hour> | Electricity Consumption | Hourly | MW | NHELEC2 | 1,126.0 | 1,158.0 | 1,172.0 | 1,144.0 | 1,260.0 |
| 73 | <21st Hour> | Electricity Consumption | Hourly | MW | NHELEC2 | 973.0 | 1,047.0 | 1,028.0 | 975.0 | 1,130.0 |
| 74 | <22rd Hour> | Electricity Consumption | Hourly | MW | NHELEC2 | 847.0 | 901.0 | 869.0 | 818.0 | 983.0 |
| 75 | <23rd Hour> | Electricity Consumption | Hourly | MW | NHELEC2 | 575.0 | 730.0 | 610.0 | 594.0 | 718.0 |
| 76 | <24th Hour> | Electricity Consumption | Hourly | MW | NHELEC2 | 512.0 | 634.0 | 530.0 | 547.0 | 649.0 |
| 77 | | Total Electricity Consumption | | | | | | | | |

1$^{st}$ hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

2nd hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

--------------------------------------------------------------------------------

23rd hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

24th hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

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## (4) Peak day data in North

The Peak day data are average of three peak demand days in a month. The average hourly data from $1^{st}$ to $24^{th}$ clock are prepared from Thailand, Malaysia, Philippines, Indonesia, Japan and Vietnam

**Table 3-2-6 Peak day data in North**

| | North | | | | | VN199601 | VN199602 | VN199603 | VN199604 |
|---|---|---|---|---|---|---|---|---|---|
| 78 | Peak day | | | | | | | | |
| 79 | <1st Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 530.0 | 517.0 | 540.0 | 535.0 |
| 80 | <2nd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 507.0 | 517.0 | 475.0 | 487.0 |
| 81 | <3rd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC3 | 501.0 | 515.0 | 487.0 | 507.0 |
| 82 | <4th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC4 | 490.0 | 535.0 | 499.0 | 495.0 |
| 83 | <5th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC5 | 545.0 | 667.0 | 582.0 | 536.0 |
| 84 | <6th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC6 | 669.0 | 756.0 | 744.0 | 725.0 |
| 85 | <7th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC7 | 838.0 | 822.0 | 716.0 | 729.0 |
| 86 | <8th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC8 | 779.0 | 813.0 | 758.0 | 740.0 |
| 87 | <9th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC9 | 881.0 | 841.0 | 782.0 | 770.0 |
| 88 | <10th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 847.0 | 852.0 | 719.0 | 786.0 |
| 89 | <11th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 894.0 | 870.0 | 824.0 | 784.0 |
| 90 | <12th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 804.0 | 753.0 | 717.0 | 781.0 |
| 91 | <13th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 740.0 | 695.0 | 648.0 | 687.0 |
| 92 | <14th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 742.0 | 727.0 | 694.0 | 702.0 |
| 93 | <15th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 796.0 | 778.0 | 741.0 | 700.0 |
| 94 | <16th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 818.0 | 772.0 | 732.0 | 743.0 |
| 95 | <17th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 943.0 | 915.0 | 848.0 | 929.0 |
| 96 | <18th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 1,294.0 | 1,150.0 | 1,022.0 | 1,058.0 |
| 97 | <19th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 1,346.0 | 1,406.0 | 1,387.0 | 1,377.0 |
| 98 | <20th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 1,270.0 | 1,255.0 | 1,245.0 | 1,243.0 |
| 99 | <21st Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 1,125.0 | 1,095.0 | 1,131.0 | 1,121.0 |
| 100 | <22rd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 866.0 | 923.0 | 923.0 | 915.0 |
| 101 | <23rd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 630.0 | 678.0 | 735.0 | 642.0 |
| 102 | <24th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 597.0 | 582.0 | 574.0 | 600.0 |
| 103 | | | | | | | | | |

$1^{st}$ hour load in Peak day = f ($1^{st}$ hour load in weekday)

2nd hour load in Peak day = f (2nd hour load in weekday)

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23rd hour load in Peak day = f (23rd hour load in weekday)

24th hour load in Peak day = f (24th hour load in weekday)

**(5) Dummy, Social and Economic variable in Center**

    The actual data for Center are set with Thailand (19-27), Malaysia (28-32), Philippines (33-35), Indonesia (36-43), Vietnam (44-151). Japan data are not included in the independent variables.

**a. Dummy variable**

    The Thailand dummy variable has "1" at the time of Thailand's data. In the data number from 19 to 27, the Dummy variable is "1" and other terms are "0".

**Table 3-2-7 Dummy variable, economic data and Climate data in Center region**

| Central | | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| Dummy | | Thailand Dummy | | | CTHADUN | 0 | 0 | 0 | 0 | 0 |
| | | Malaysia Dummy | | | CMAYDUN | 0 | 0 | 0 | 0 | 0 |
| | | Phlippines Dummy | | | CPHIDUM | 0 | 0 | 0 | 0 | 0 |
| | | Indonesia Dummy | | | CINDDUM | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | |
| Economic & Climate Indicators | | | | | | | | | | |
| | | Real GDP (1995 constant) | | | | | | | | |
| | | (1) G.R Agricultute | % | CRAGR | | 8.1 | 8.1 | 8.1 | 8.1 | 8.1 |
| | | (2) G.R. Industry | % | CRIND | | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 |
| | | (3) G.R. Service | % | CRSER | | 7.6 | 7.6 | 7.6 | 7.6 | 7.6 |
| | | (1) Agricultute | Bill US$ | CGAGR | | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| | | (2) Industry | Bill US$ | CGIND | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | | (3) Service | Bill US$ | CGSER | | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| | | (4) GDP Total | Bill US$ | CGDP | | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| | | Population | Mill | CPOP | | 11.3 | 11.3 | 11.4 | 11.4 | 11.4 |
| | | Humidity | % | CHUM | | 81.0 | 73.0 | 84.0 | 84.0 | 80.0 |
| | | Electrified Population | Mill | CELPOP | | 6.7 | 6.7 | 6.7 | 6.7 | 6.7 |
| | | Temperature | Deg | CDEG | | 21.2 | 21.4 | 23.5 | 25.4 | 26.4 |
| Elastic value to GDP sector | | | | | | | | | | |
| | | GDP Total | Bill US$ | CEGDP | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

    The Malaysia dummy variable has "1" at the time of Malaysia's data. In the data number from 28 to 32, the Dummy variable is "1" and other terms are "0".

    The Philippines' dummy variable has "1" at the time of Philippines' data. In the data number from 33 to 35, the Dummy variable is "1" and other terms are "0".

    The Indonesia's dummy variable has "1" at the time of Indonesia's data, In the data number from 36 to 57, the Dummy variable is "1" and other terms are "0".

**b. Economic and Climate Indicators in North**

    Real GDP and sector GDP are used as exogenous variables, the future values are given by the growth rate. The sector GDP of Agriculture, Industry and Services are calculated by the growth rate.

The data of Population, Electrified population, Humidity and temperature in North are given and used for forecasting daily load curve.

**(6) Weekday data in Center**

The weekday data are average hourly values in weekday. The weekday data do not include the data of Sundays, National holidays and three Peak days in a month. The average hourly data from $1^{st}$ to $24^{th}$ clock are prepared from Thailand, Malaysia, Philippines, Indonesia and Vietnam.

**Table 3-2-8 Weekday data in Center**

| 105 | Central | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 126 | Weekday Data | | | | | | | | | |
| 127 | <1st Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 89.0 | 92.0 | 109.0 | 111.0 | 128.0 |
| 128 | <2nd Hour> | Electricity Consumption | Hourly | MW | CWELEC2 | 87.0 | 90.0 | 106.0 | 109.0 | 125.0 |
| 129 | <3rd Hour> | Electricity Consumption | Hourly | MW | CWELEC3 | 89.0 | 89.0 | 106.0 | 108.0 | 124.0 |
| 130 | <4th Hour> | Electricity Consumption | Hourly | MW | CWELEC4 | 91.0 | 93.0 | 109.0 | 112.0 | 126.0 |
| 131 | <5th Hour> | Electricity Consumption | Hourly | MW | CWELEC5 | 107.0 | 107.0 | 122.0 | 132.0 | 141.0 |
| 132 | <6th Hour> | Electricity Consumption | Hourly | MW | CWELEC6 | 144.0 | 144.0 | 143.0 | 142.0 | 140.0 |
| 133 | <7th Hour> | Electricity Consumption | Hourly | MW | CWELEC7 | 138.0 | 141.0 | 140.0 | 143.0 | 146.0 |
| 134 | <8th Hour> | Electricity Consumption | Hourly | MW | CWELEC8 | 137.0 | 141.0 | 150.0 | 153.0 | 162.0 |
| 135 | <9th Hour> | Electricity Consumption | Hourly | MW | CWELEC9 | 138.0 | 139.0 | 152.0 | 153.0 | 169.0 |
| 136 | <10th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 146.0 | 145.0 | 159.0 | 169.0 | 182.0 |
| 137 | <11th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 144.0 | 145.0 | 161.0 | 171.0 | 183.0 |
| 138 | <12th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 123.0 | 124.0 | 135.0 | 147.0 | 166.0 |
| 139 | <13th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 117.0 | 119.0 | 136.0 | 143.0 | 162.0 |
| 140 | <14th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 127.0 | 126.0 | 144.0 | 156.0 | 169.0 |
| 141 | <15th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 133.0 | 133.0 | 150.0 | 161.0 | 172.0 |
| 142 | <16th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 142.0 | 140.0 | 158.0 | 166.0 | 176.0 |
| 143 | <17th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 166.0 | 169.0 | 183.0 | 179.0 | 190.0 |
| 144 | <18th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 246.0 | 225.0 | 232.0 | 224.0 | 221.0 |
| 145 | <19th Hour> | Electricity Consumption | Hourly | MW | CWELEC1 | 259.0 | 262.0 | 277.0 | 285.0 | 293.0 |
| 146 | <20th Hour> | Electricity Consumption | Hourly | MW | CWELEC2 | 241.0 | 248.0 | 272.0 | 270.0 | 282.0 |
| 147 | <21st Hour> | Electricity Consumption | Hourly | MW | CWELEC2 | 210.0 | 222.0 | 245.0 | 242.0 | 260.0 |
| 148 | <22rd Hour> | Electricity Consumption | Hourly | MW | CWELEC2 | 178.0 | 182.0 | 213.0 | 204.0 | 220.0 |
| 149 | <23rd Hour> | Electricity Consumption | Hourly | MW | CWELEC2 | 115.0 | 121.0 | 147.0 | 140.0 | 164.0 |
| 150 | <24th Hour> | Electricity Consumption | Hourly | MW | CWELEC2 | 98.0 | 97.0 | 115.0 | 124.0 | 142.0 |
| 151 | | | | | | | | | | |

$1^{st}$ hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)


2nd hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)


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23rd hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)


24th hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

**(7) Holiday data in Center**

The Holiday data are average hourly values in Holidays. The Holiday data include the data of Sundays and national holidays. The average hourly data from 1$^{st}$ to 24$^{th}$ clock are prepared from Thailand, Malaysia, Philippines, Indonesia and Vietnam.

Table 3-2-9 Holiday data in Center

| 105 | Central | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 152 | Holiday Data | | | | | | | | | |
| 153 | <1st Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 82.0 | 119.0 | 109.0 | 108.0 | 125.0 |
| 154 | <2nd Hour> | Electricity Consumption | Hourly | MW | CHELEC2 | 84.0 | 95.0 | 108.0 | 110.0 | 119.0 |
| 155 | <3rd Hour> | Electricity Consumption | Hourly | MW | CHELEC3 | 86.0 | 94.0 | 107.0 | 105.0 | 115.0 |
| 156 | <4th Hour> | Electricity Consumption | Hourly | MW | CHELEC4 | 87.0 | 98.0 | 110.0 | 112.0 | 118.0 |
| 157 | <5th Hour> | Electricity Consumption | Hourly | MW | CHELEC5 | 98.0 | 106.0 | 122.0 | 124.0 | 126.0 |
| 158 | <6th Hour> | Electricity Consumption | Hourly | MW | CHELEC6 | 130.0 | 131.0 | 129.0 | 128.0 | 132.0 |
| 159 | <7th Hour> | Electricity Consumption | Hourly | MW | CHELEC7 | 133.0 | 142.0 | 137.0 | 138.0 | 139.0 |
| 160 | <8th Hour> | Electricity Consumption | Hourly | MW | CHELEC8 | 137.0 | 146.0 | 146.0 | 147.0 | 152.0 |
| 161 | <9th Hour> | Electricity Consumption | Hourly | MW | CHELEC9 | 138.0 | 142.0 | 154.0 | 156.0 | 152.0 |
| 162 | <10th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 143.0 | 135.0 | 164.0 | 165.0 | 169.0 |
| 163 | <11th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 139.0 | 128.0 | 160.0 | 166.0 | 171.0 |
| 164 | <12th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 123.0 | 117.0 | 137.0 | 142.0 | 154.0 |
| 165 | <13th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 109.0 | 118.0 | 135.0 | 144.0 | 151.0 |
| 166 | <14th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 121.0 | 123.0 | 145.0 | 150.0 | 155.0 |
| 167 | <15th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 133.0 | 133.0 | 154.0 | 153.0 | 160.0 |
| 168 | <16th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 144.0 | 142.0 | 165.0 | 162.0 | 168.0 |
| 169 | <17th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 154.0 | 162.0 | 177.0 | 178.0 | 177.0 |
| 170 | <18th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 244.0 | 210.0 | 224.0 | 218.0 | 197.0 |
| 171 | <19th Hour> | Electricity Consumption | Hourly | MW | CHELEC1 | 252.0 | 268.0 | 286.0 | 276.0 | 282.0 |
| 172 | <20th Hour> | Electricity Consumption | Hourly | MW | CHELEC2 | 236.0 | 255.0 | 269.0 | 268.0 | 267.0 |
| 173 | <21st Hour> | Electricity Consumption | Hourly | MW | CHELEC2 | 201.0 | 228.0 | 240.0 | 241.0 | 243.0 |
| 174 | <22rd Hour> | Electricity Consumption | Hourly | MW | CHELEC2 | 172.0 | 194.0 | 207.0 | 185.0 | 206.0 |
| 175 | <23rd Hour> | Electricity Consumption | Hourly | MW | CHELEC2 | 107.0 | 145.0 | 133.0 | 140.0 | 148.0 |
| 176 | <24th Hour> | Electricity Consumption | Hourly | MW | CHELEC2 | 91.0 | 124.0 | 116.0 | 121.0 | 130.0 |
| 177 | | Total Electricity Consumption | | | | | | | | |

1$^{st}$ hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

2nd hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

--------------------------------------------------------------------------------

23rd hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

24th hour load = f(   (Industry GDP + Service GDP) / GDP,   GDP per capita,

Electrified pop*(Humidity + Temperature)

**(8) Peak day data in Center**

The Peak day data are average hourly values of three peak demand days in a month. The average hourly data from 1$^{st}$ to 24$^{th}$ clock are prepared from Thailand, Malaysia, Philippines, Indonesia and Vietnam

**Table3-2-10 Peak day data in Center**

| | North | | | | | | VN199601 | VN199602 | VN199603 | VN199604 |
|---|---|---|---|---|---|---|---|---|---|---|
| 78 | Peak day | | | | | | | | | |
| 79 | | <1st Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 530.0 | 517.0 | 540.0 | 535.0 |
| 80 | | <2nd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 507.0 | 517.0 | 475.0 | 487.0 |
| 81 | | <3rd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC3 | 501.0 | 515.0 | 487.0 | 507.0 |
| 82 | | <4th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC4 | 490.0 | 535.0 | 499.0 | 495.0 |
| 83 | | <5th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC5 | 545.0 | 667.0 | 582.0 | 536.0 |
| 84 | | <6th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC6 | 669.0 | 756.0 | 744.0 | 725.0 |
| 85 | | <7th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC7 | 838.0 | 822.0 | 716.0 | 729.0 |
| 86 | | <8th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC8 | 779.0 | 813.0 | 758.0 | 740.0 |
| 87 | | <9th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC9 | 881.0 | 841.0 | 782.0 | 770.0 |
| 88 | | <10th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 847.0 | 852.0 | 719.0 | 786.0 |
| 89 | | <11th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 894.0 | 870.0 | 824.0 | 784.0 |
| 90 | | <12th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 804.0 | 753.0 | 717.0 | 781.0 |
| 91 | | <13th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 740.0 | 695.0 | 648.0 | 687.0 |
| 92 | | <14th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 742.0 | 727.0 | 694.0 | 702.0 |
| 93 | | <15th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 796.0 | 778.0 | 741.0 | 700.0 |
| 94 | | <16th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 818.0 | 772.0 | 732.0 | 743.0 |
| 95 | | <17th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 943.0 | 915.0 | 848.0 | 929.0 |
| 96 | | <18th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 1,294.0 | 1,150.0 | 1,022.0 | 1,058.0 |
| 97 | | <19th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC1 | 1,346.0 | 1,406.0 | 1,387.0 | 1,377.0 |
| 98 | | <20th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 1,270.0 | 1,255.0 | 1,245.0 | 1,243.0 |
| 99 | | <21st Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 1,125.0 | 1,095.0 | 1,131.0 | 1,121.0 |
| 100 | | <22rd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 866.0 | 923.0 | 923.0 | 915.0 |
| 101 | | <23rd Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 630.0 | 678.0 | 735.0 | 642.0 |
| 102 | | <24th Hour> | Peak ectricity Consumptio | Hourly | MW | NPELEC2 | 597.0 | 582.0 | 574.0 | 600.0 |
| 103 | | | | | | | | | | |

1$^{st}$ hour load in Peak day = f( 1$^{st}$ hour load in weekday)

2nd hour load in Peak day = f( 2nd hour load in weekday)

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23rd hour load in Peak day = f( 23rd hour load in weekday)

24th hour load in Peak day = f( 24th hour load in weekday)

## (9) Dummy, Social and Economic variable in South

### a. Dummy variable

The Thailand dummy variable has "1" at the time of Thailand's data. In the data number from 1 to 9, the Dummy is "1" and other terms are "0".

**Table 3-2-11 Dummy, Economic data and Climate data in South region**

| | | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 205 | South | | | | | | | | | |
| 206 | Dummy | Thailand Dummy | | | STHADUM | 0 | 0 | 0 | 0 | 0 |
| 207 | | Malaysia Dummy | | | SMAYDUM | 0 | 0 | 0 | 0 | 0 |
| 208 | | Phlippines Dummy | | | SPHIDUM | 0 | 0 | 0 | 0 | 0 |
| 209 | | Indonesia Dummy | | | SINDDUM | 0 | 0 | 0 | 0 | 0 |
| 210 | | Japan Dummy | | | SJAPDUM | 0 | 0 | 0 | 0 | 0 |
| 211 | | | | | | | | | | |
| 212 | Economic & Climate Indicators | | | | | | | | | |
| 213 | | Real GDP (1995 constant) | | | | | | | | |
| 214 | | (1) G.R. Agriculture | % | SRAGR | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 215 | | (2) G.R. Industry | % | SRIND | | 15.3 | 15.3 | 15.3 | 15.3 | 15.3 |
| 216 | | (3) G.R. Service | % | SRSER | | 9.7 | 9.7 | 9.7 | 9.7 | 9.7 |
| 217 | | (1) Agricultute | Bill US$ | SGAGR | | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 |
| 218 | | (2) Industry | Bill US$ | SGIND | | 4.5 | 4.5 | 4.6 | 4.6 | 4.7 |
| 219 | | (3) Service | Bill US$ | SGSER | | 5.4 | 5.4 | 5.5 | 5.5 | 5.6 |
| 220 | | (4) GDP Total | Bill US$ | SGDP | | 12.6 | 12.7 | 12.8 | 12.9 | 13.0 |
| 221 | | Population | Mill | SPOP | | 27.2 | 27.3 | 27.3 | 27.4 | 27.4 |
| 222 | | Humidity | % | SHUM | | 80.0 | 73.0 | 71.0 | 77.0 | 85.0 |
| 223 | | Electrified Population | Mill | SELPOP | | 13.4 | 13.4 | 13.5 | 13.5 | 13.6 |
| 224 | | Temperature | Deg | SDEG | | 22.2 | 22.8 | 24.3 | 25.1 | 24.9 |

The Malaysia dummy variable has "1" at the time of Malaysia's data. In the data number from 10 to 15, the Dummy variable is "1" and other terms are "0".

The Philippines' dummy variable has "1" at the time of Philippines' data. In the data number from 16 to 19, the Dummy variable is "1" and other terms are "0".

The Indonesia's dummy variable has "1" at the time of Indonesia's data, In the data number from 20 to 28, the Dummy variable is "1" and other terms are "0".

The Japan's dummy variable has "1" at the time of Japan's data, In the data number from 29 to 57, the Dummy variable is "1" and other terms are "0".

### b. Economic and Climate Indicators in Center

Real GDP and sector GDP are used as exogenous variables, the future values are given by the growth rate. The sector GDP of Agriculture, Industry and Services are calculated by the growth rate.

The data of Population, Electrified population, Humidity and temperature in South are given and used for forecasting daily load curve.

**(10) Weekday data in South**

The weekday data are average hourly values in weekdays. The weekday data do not include the data of Sundays, National holidays and three Peak days in a month. The average hourly data from 1st to 24th clock are prepared from Thailand, Malaysia, Philippines, Indonesia, Japan and Vietnam.

**Table 3-2-12 Weekday data in South**

| 205 | South | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 227 | Weekday Data | | | | | | | | | |
| 228 | <1st Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 601.0 | 605.0 | 698.0 | 770.0 | 738.0 |
| 229 | <2nd Hour> | Electricity Consumption | Hourly | MW | SWELEC2 | 592.0 | 596.0 | 676.0 | 749.0 | 718.0 |
| 230 | <3rd Hour> | Electricity Consumption | Hourly | MW | SWELEC3 | 579.0 | 599.0 | 668.0 | 741.0 | 707.0 |
| 231 | <4th Hour> | Electricity Consumption | Hourly | MW | SWELEC4 | 595.0 | 609.0 | 680.0 | 740.0 | 709.0 |
| 232 | <5th Hour> | Electricity Consumption | Hourly | MW | SWELEC5 | 634.0 | 638.0 | 709.0 | 770.0 | 751.0 |
| 233 | <6th Hour> | Electricity Consumption | Hourly | MW | SWELEC6 | 726.0 | 716.0 | 787.0 | 829.0 | 787.0 |
| 234 | <7th Hour> | Electricity Consumption | Hourly | MW | SWELEC7 | 731.0 | 710.0 | 777.0 | 807.0 | 802.0 |
| 235 | <8th Hour> | Electricity Consumption | Hourly | MW | SWELEC8 | 810.0 | 766.0 | 878.0 | 935.0 | 946.0 |
| 236 | <9th Hour> | Electricity Consumption | Hourly | MW | SWELEC9 | 849.0 | 806.0 | 929.0 | 1,007.0 | 1,011.0 |
| 237 | <10th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 905.0 | 848.0 | 998.0 | 1,061.0 | 1,069.0 |
| 238 | <11th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 887.0 | 833.0 | 973.0 | 1,048.0 | 1,059.0 |
| 239 | <12th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 764.0 | 745.0 | 848.0 | 917.0 | 929.0 |
| 240 | <13th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 755.0 | 745.0 | 867.0 | 947.0 | 941.0 |
| 241 | <14th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 839.0 | 777.0 | 935.0 | 1,001.0 | 1,002.0 |
| 242 | <15th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 877.0 | 808.0 | 962.0 | 1,023.0 | 1,014.0 |
| 243 | <16th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 904.0 | 837.0 | 984.0 | 1,039.0 | 1,039.0 |
| 244 | <17th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 945.0 | 860.0 | 989.0 | 1,037.0 | 1,064.0 |
| 245 | <18th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 1,058.0 | 947.0 | 1,017.0 | 1,085.0 | 1,086.0 |
| 246 | <19th Hour> | Electricity Consumption | Hourly | MW | SWELEC1 | 1,112.0 | 1,097.0 | 1,185.0 | 1,209.0 | 1,203.0 |
| 247 | <20th Hour> | Electricity Consumption | Hourly | MW | SWELEC2 | 1,063.0 | 1,070.0 | 1,158.0 | 1,186.0 | 1,171.0 |
| 248 | <21st Hour> | Electricity Consumption | Hourly | MW | SWELEC2 | 1,027.0 | 1,018.0 | 1,120.0 | 1,170.0 | 1,144.0 |
| 249 | <22rd Hour> | Electricity Consumption | Hourly | MW | SWELEC2 | 918.0 | 939.0 | 1,026.0 | 1,101.0 | 1,065.0 |
| 250 | <23rd Hour> | Electricity Consumption | Hourly | MW | SWELEC2 | 749.0 | 776.0 | 870.0 | 944.0 | 885.0 |
| 251 | <24th Hour> | Electricity Consumption | Hourly | MW | SWELEC2 | 638.0 | 654.0 | 764.0 | 830.0 | 787.0 |
| 252 | | | | | | | | | | |

1st hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

2nd hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

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23rd hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

24th hour load = f(　(Industry GDP + Service GDP) / GDP,　GDP per capita,

Electrified pop*(Humidity + Temperature)

**(12) Holiday data in South**

The Holiday data are average hourly values in holidays. The Holiday data include the data of Sundays, national holidays. The average hourly data from 1$^{st}$ to 24$^{th}$ clock are prepared from Thailand, Malaysia, Philippines, Indonesia, Japan and Vietnam.

**Table 3-2-13 Holiday data in South**

| | | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|
| 205 | South | | | | | | | | | |
| 253 | Holiday Data | | | | | | | | | |
| 254 | | <1st Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 578.0 | 607.0 | 702.0 | 757.0 | 752.0 |
| 255 | | <2nd Hour> | Electricity Consumption | Hourly | MW | SHELEC2 | 565.0 | 555.0 | 682.0 | 746.0 | 740.0 |
| 256 | | <3rd Hour> | Electricity Consumption | Hourly | MW | SHELEC3 | 560.0 | 553.0 | 675.0 | 731.0 | 724.0 |
| 257 | | <4th Hour> | Electricity Consumption | Hourly | MW | SHELEC4 | 558.0 | 557.0 | 673.0 | 737.0 | 723.0 |
| 258 | | <5th Hour> | Electricity Consumption | Hourly | MW | SHELEC5 | 601.0 | 575.0 | 692.0 | 749.0 | 761.0 |
| 259 | | <6th Hour> | Electricity Consumption | Hourly | MW | SHELEC6 | 650.0 | 640.0 | 736.0 | 772.0 | 759.0 |
| 260 | | <7th Hour> | Electricity Consumption | Hourly | MW | SHELEC7 | 664.0 | 649.0 | 741.0 | 763.0 | 759.0 |
| 261 | | <8th Hour> | Electricity Consumption | Hourly | MW | SHELEC8 | 721.0 | 668.0 | 823.0 | 828.0 | 838.0 |
| 262 | | <9th Hour> | Electricity Consumption | Hourly | MW | SHELEC9 | 739.0 | 677.0 | 914.0 | 883.0 | 920.0 |
| 263 | | <10th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 811.0 | 688.0 | 962.0 | 964.0 | 980.0 |
| 264 | | <11th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 807.0 | 680.0 | 928.0 | 937.0 | 970.0 |
| 265 | | <12th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 703.0 | 637.0 | 827.0 | 859.0 | 857.0 |
| 266 | | <13th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 681.0 | 636.0 | 818.0 | 874.0 | 868.0 |
| 267 | | <14th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 726.0 | 655.0 | 856.0 | 899.0 | 881.0 |
| 268 | | <15th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 756.0 | 686.0 | 893.0 | 910.0 | 881.0 |
| 269 | | <16th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 801.0 | 719.0 | 914.0 | 928.0 | 941.0 |
| 270 | | <17th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 823.0 | 754.0 | 928.0 | 944.0 | 946.0 |
| 271 | | <18th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 985.0 | 847.0 | 979.0 | 1,015.0 | 999.0 |
| 272 | | <19th Hour> | Electricity Consumption | Hourly | MW | SHELEC1 | 1,015.0 | 1,049.0 | 1,157.0 | 1,117.0 | 1,138.0 |
| 273 | | <20th Hour> | Electricity Consumption | Hourly | MW | SHELEC2 | 1,003.0 | 1,008.0 | 1,126.0 | 1,101.0 | 1,120.0 |
| 274 | | <21st Hour> | Electricity Consumption | Hourly | MW | SHELEC2 | 957.0 | 953.0 | 1,101.0 | 1,092.0 | 1,091.0 |
| 275 | | <22rd Hour> | Electricity Consumption | Hourly | MW | SHELEC2 | 819.0 | 884.0 | 1,017.0 | 1,031.0 | 1,002.0 |
| 276 | | <23rd Hour> | Electricity Consumption | Hourly | MW | SHELEC2 | 700.0 | 770.0 | 841.0 | 858.0 | 864.0 |
| 277 | | <24th Hour> | Electricity Consumption | Hourly | MW | SHELEC2 | 595.0 | 655.0 | 715.0 | 780.0 | 738.0 |
| 278 | | | | | | | | | | | |

1$^{st}$ hour load = f(    (Industry GDP + Service GDP) / GDP,    GDP per capita,

Electrified pop*(Humidity + Temperature)


2nd hour load = f(    (Industry GDP + Service GDP) / GDP,    GDP per capita,

Electrified pop*(Humidity + Temperature)


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23rd hour load = f(    (Industry GDP + Service GDP) / GDP,    GDP per capita,

Electrified pop*(Humidity + Temperature)


24th hour load = f(    (Industry GDP + Service GDP) / GDP,    GDP per capita,

Electrified pop*(Humidity + Temperature)

**(13) Peak day data in South**

The Peak day data are average hourly values of three peak demand days in a month. The average hourly data from 1$^{st}$ to 24$^{th}$ clock are prepared from Thailand, Malaysia, Philippines, Indonesia, Japan and Vietnam

<div align="center">

**Table 3-2-14 Peak day data in South**

</div>

| 205 | South | | | | | | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 279 | Peak day | | | | | | | | | | |
| 280 | | <1st Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 612.0 | 605.0 | 766.0 | 755.0 | 795.0 |
| 281 | | <2nd Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC2 | 599.0 | 593.0 | 732.0 | 741.0 | 793.0 |
| 282 | | <3rd Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC3 | 607.0 | 598.0 | 731.0 | 728.0 | 771.0 |
| 283 | | <4th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC4 | 628.0 | 607.0 | 738.0 | 741.0 | 773.0 |
| 284 | | <5th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC5 | 669.0 | 658.0 | 793.0 | 756.0 | 795.0 |
| 285 | | <6th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC6 | 762.0 | 735.0 | 843.0 | 828.0 | 839.0 |
| 286 | | <7th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC7 | 762.0 | 716.0 | 808.0 | 789.0 | 833.0 |
| 287 | | <8th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC8 | 819.0 | 793.0 | 948.0 | 958.0 | 951.0 |
| 288 | | <9th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC9 | 864.0 | 879.0 | 1,018.0 | 1,012.0 | 1,085.0 |
| 289 | | <10th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 938.0 | 943.0 | 1,042.0 | 1,101.0 | 1,112.0 |
| 290 | | <11th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 907.0 | 905.0 | 1,039.0 | 1,065.0 | 1,104.0 |
| 291 | | <12th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 748.0 | 787.0 | 919.0 | 885.0 | 960.0 |
| 292 | | <13th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 783.0 | 787.0 | 960.0 | 933.0 | 973.0 |
| 293 | | <14th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 873.0 | 864.0 | 1,000.0 | 1,011.0 | 1,021.0 |
| 294 | | <15th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 898.0 | 886.0 | 1,011.0 | 1,028.0 | 1,032.0 |
| 295 | | <16th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 942.0 | 935.0 | 1,044.0 | 1,057.0 | 1,047.0 |
| 296 | | <17th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 968.0 | 960.0 | 1,031.0 | 1,045.0 | 1,048.0 |
| 297 | | <18th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 1,041.0 | 1,018.0 | 1,077.0 | 1,102.0 | 1,137.0 |
| 298 | | <19th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC1 | 1,146.0 | 1,154.0 | 1,264.0 | 1,259.0 | 1,280.0 |
| 299 | | <20th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC2 | 1,100.0 | 1,120.0 | 1,213.0 | 1,212.0 | 1,229.0 |
| 300 | | <21st Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC2 | 1,056.0 | 1,038.0 | 1,180.0 | 1,203.0 | 1,212.0 |
| 301 | | <22rd Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC2 | 962.0 | 941.0 | 1,110.0 | 1,149.0 | 1,178.0 |
| 302 | | <23rd Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC2 | 809.0 | 753.0 | 950.0 | 946.0 | 958.0 |
| 303 | | <24th Hour> | Peak ectricity Consumptio | Hourly | MW | SPELEC2 | 681.0 | 680.0 | 807.0 | 830.0 | 865.0 |
| 304 | | | | | | | | | | | |

1$^{st}$ hour load in Peak day = f( 1$^{st}$ hour load in weekday)


2nd hour load in Peak day = f( 2nd hour load in weekday)


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23rd hour load in Peak day = f( 23rd hour load in weekday)


24th hour load in Peak day = f( 24th hour load in weekday)

**(14) Load factor forecasting**

In Data analysis sheet, load factor, peak demand and monthly power consumption are calculated. The load factors in Data analysis sheet are calculated from peak demand and monthly consumption. In the SimpleE sheets, the load factors in future are estimated by regression equations by using actual peak demand and monthly power consumption, and load factor data calculated in the actual terms.

**Table 3-2-15 Load factor forecasting in Data sheet**

| E | F | G | H | I | J | TIME | VN199601 | VN199602 | VN199603 | VN199604 | VN199605 |
|---|---|---|---|---|---|------|----------|----------|----------|----------|----------|
| 307 | | Load factor | | North | | DLNRTH | 0.58 | 0.56 | 0.55 | 0.54 | 0.59 |
| 308 | | | | Central | | DLCENT | 0.53 | 0.53 | 0.54 | 0.54 | 0.57 |
| 309 | | | | South | | DLSOUT | 0.70 | 0.67 | 0.71 | 0.75 | 0.73 |
| 310 | | | | Total | | DLTOTL | 0.62 | 0.60 | 0.62 | 0.63 | 0.65 |
| 311 | | | | | | | | | | | |
| 312 | | Monthly Comsumption | | North | MWh | PKNRTH | 564,213 | 511,810 | 557,053 | 525,384 | 604,130 |
| 313 | | | | Central | MWh | PKCENT | 111,571 | 103,344 | 125,673 | 123,498 | 135,957 |
| 314 | | | | South | MWh | PKSOUT | 595,279 | 513,754 | 665,099 | 677,827 | 693,869 |
| 315 | | | | Total | MWh | PKTOTL | 1,271,063 | 1,128,908 | 1,347,824 | 1,326,710 | 1,433,955 |
| 316 | | | | | | | | | | | |
| 317 | | Peak demand | | North | MW | PLNRTH | 1,312 | 1,371 | 1,353 | 1,343 | 1,383 |
| 318 | | | | Central | MW | PLCENT | 281 | 292 | 315 | 317 | 319 |
| 319 | | | | South | MW | PLSOUT | 1,141 | 1,150 | 1,259 | 1,254 | 1,274 |
| 320 | | | | Total | MW | PLTOTL | 2,735 | 2,812 | 2,928 | 2,914 | 2,976 |
| 321 | | | | | | | | | | | |

**a. Load factor forecasting**

Future load factors are estimated by the following regression equations.

Load factor in North = f( Monthly power demand in North / (Peak demand in North 30*24) )

Load factor in Center = f( Monthly power demand in Center / (Peak demand in North 30*24) )

Load factor in South = f( Monthly power demand in South / (Peak demand in North 30*24) )

Load factor in Whole = f( Monthly power demand in Whole / (Peak demand in North 30*24) )