

II. ENERGY DEMAND AND SUPPLY OUTLOOK

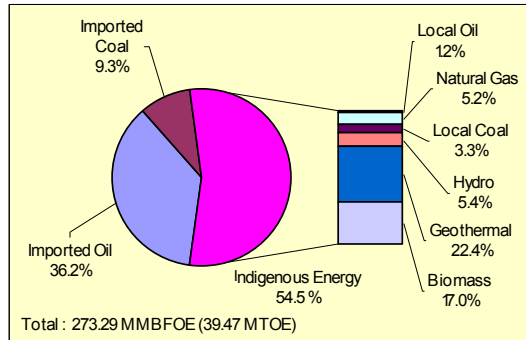
PERFORMANCE ASSESSMENT

PRIMARY ENERGY SUPPLY

For year 2004, the country's primary energy supply grew by 3 percent to 273.3 MMBFOE (39.5 MTOE)² compared to the previous year's level. Oil remained as the major source of energy for the country despite its increasing price in the world market. Combined crude oil and oil products supply decreased by 2.8 percent from its previous level to 102.2 MMBFOE (14.8 MTOE).

A significant 14.2 percent increase in the supply of coal was registered with a total volume of 34.6 MMBFOE (5.0 MTOE), of which around 73.8 percent was imported. Geothermal production went up by 4.7 percent to 61.2 MMBFOE (8.8 MTOE). This was mainly due to the improved performance in production as a result of the partial rehabilitation of the Tiwi geothermal plant (units 1, 2, 5 and 6). The contribution of hydropower in the total energy supply grew by 9.2 percent to post 14.8 MMBFOE (2.1 MTOE) as a result of longer operation periods of hydropower plant facilities. Supply of biomass grew by 8.6 percent to reach 46.3 MMBFOE (6.7 MTOE).

Figure 2.1. PRIMARY ENERGY SUPPLY MIX, 2004



For 2005, the country's primary energy supply is estimated to reach 281.2 MMBFOE (40.6 MTOE). The projected supply will sustain the country's estimated energy requirements of 172.0 MMBFOE (24.9 MTOE) in 2005.

FUEL UTILIZATION FOR POWER GENERATION

The country's total fuel utilization for electricity generation in 2004 was registered at 50.7 MMBFOE (7.3 MTOE). Coal utilization increased by

4.5 percent to 23.9 MMBFOE (3.5 MTOE). Similarly, fuel use of oil-based power plants went up by 19.3 percent to 13.33 MMBFOE (1.9 MTOE). However, natural gas utilization decreased by 12.0 percent to 13.5 MMBFOE (1.9 MTOE).

FINAL ENERGY DEMAND

The country's final energy demand reached 165.3 MMBFOE (23.9 MTOE) in 2004. Oil consumption shared 52.3 percent, wherein bulk was used by the transport and industrial sectors. Meanwhile, biomass which shared 28.0 percent of the final demand and was used solely for non-power application reached 46.4 MMBFOE (6.7 MTOE). Electricity accounted for 15.9 percent, registering 26.2 MMBFOE (3.8 MTOE) of the final demand. Higher coal consumption, mostly by the cement industry, was recorded at 5.8 percent to 6.2 MMBFOE (0.9 MTOE).

Residential Sector

The total energy consumption of the residential sector in 2004 grew by 6.0 percent to 52.1 MMBFOE (7.5 MTOE). Biomass accounted for 67.0 percent of the total residential energy consumption. Demand for petroleum products, specifically liquefied petroleum gas (LPG) and kerosene used primarily for cooking declined by 5.9 percent due to fuel switching as an effect of soaring prices of these fuels. Household electricity consumption increased by 3.7 percent.

Industrial Sector

Final energy consumption of the sector increased to 39.2 MMBFOE (5.7 MTOE) in 2004. Oil and biomass were the major fuels of the sector accounting for average share of 38.1 percent and 23.3 percent, respectively. Used mainly by cement plants, coal demand increased by 5.7 percent to 6.2 MMBFOE (0.9 MTOE) in 2004. Electricity demand of the sector decreased by 1.2 percent to 8.9 MMBFOE (1.3 MTOE).

Transport Sector

Total energy consumption of the transport sector reached 57.2 MMBFOE (8.3 MTOE), registering an increase of 1.9 percent. Diesel registered the highest consumption at 31.4 MMBFOE (4.5 MTOE) representing 54.9 percent of the total sector's consumption. Road transport shared 80.3 percent in the total demand of the sector while the balance was shared by rail and air transport.

² The use of TOE is introduced in this Plan Update in conformance with internationally-accepted standards of energy accounting. For further discussion, please refer to Annexes (Philippine Energy Balance Table).

Commercial Sector

Total energy use in the commercial sector was registered at 14.5 MMBFOE (2.1 MTOE) in 2004, decreasing by 0.4 percent from a year-ago level. On a per fuel consumption basis, electricity shared the highest at 53.3 percent followed by oil and biomass at 30.5 percent and 16.2 percent, respectively. Electricity demand grew by 7.6 percent while the combined diesel and fuel oil demand of the sector declined by 14.0 percent.

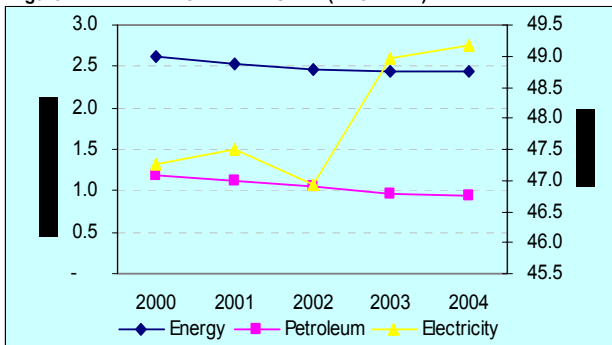
Agriculture Sector

As the least energy-intensive sector, agriculture recorded a total energy demand of 2.3 MMBFOE (0.3 MTOE) in 2004 which posted a 4.4 percent increase from the previous year's level. The sector's electricity consumption also grew by 39.7 percent, reaching 0.06 MMBFOE (0.01 MTOE) in 2004.

ENERGY INTENSITY

The energy intensity for 2004 was recorded at 2.45 BFOE per Php 10,000 of GDP, unchanged from the 2003 level. However, some restraint in the use of petroleum products was apparent in the drop in intensity from 0.97 BFOE/PhP 10,000 in 2003 to 0.95 BFOE/PhP 10,000 in 2004. The change in petroleum intensity can be attributed to the decline in the use of petroleum products particularly by the residential sector. This sector had been the most affected by the increase in the prices of petroleum products in the past years. Meanwhile, the level of electricity consumed per PhP 10,000 increased to 49.2 kWh in 2004. Electricity consumption in 2004 intensified particularly in the residential and commercial sectors.

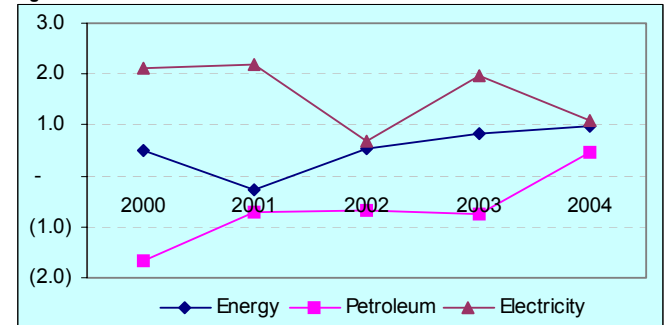
Figure 2.2. ENERGY INTENSITY (BFOE/PhP)



ENERGY-TO-GDP ELASTICITY

The Energy-to-GDP elasticity ratio is the measure of response of energy consumption to economic growth. The elasticity ratio of 0.96 in 2004 indicates that for every one percent increase in GDP, energy consumption increased by 0.96 percent. The elasticity ratio of petroleum products on the other hand, was 0.5. Meanwhile, electricity registered an elasticity ratio of 1.0.

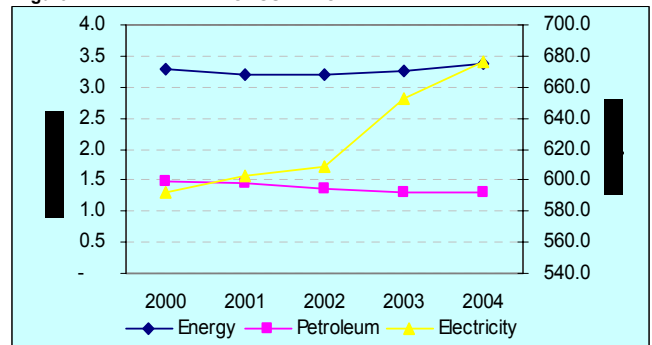
Figure 2.3. ENERGY-TO-GDP ELASTICITY RATIO



PER CAPITA ENERGY CONSUMPTION

Energy consumption per person increased in 2004 to 3.37 BFOE which can be attributed mainly to the rise in the use of electricity recorded at 675.8 kWh per person. Meanwhile, petroleum use per capita remained at 1.3 BFOE/person.

Figure 2.4. PER CAPITA CONSUMPTION



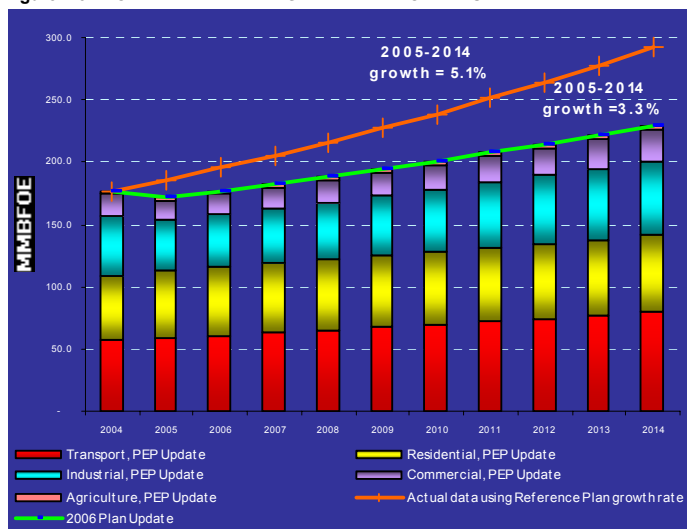
ENERGY DEMAND AND SUPPLY OUTLOOK

FINAL ENERGY DEMAND

Energy consumption is primarily influenced by economic growth, population, fuel prices, income and supply accessibility. These indicators were used in forecasting the country's final energy demand for the 2006 Plan Update. The demand forecast was done on a sectoral basis to include the transport, residential, industrial, commercial and agricultural sectors.

Final energy demand in this 2006 Plan Update shows a lower forecast in almost all sectors in contrast to the Reference Plan taking into account moderate growths in 2004 and preliminary 2005 energy consumption data. In addition, the conduct of the HECS in 2004 firmed up data on biomass consumption in the residential sector. Initial results of the survey indicate that biomass consumption by the household sector is significantly lower than the previous estimates.

Figure 2.5. COMPARATIVE ENERGY DEMAND FORECAST



In this 2006 Plan Update, the country's energy demand for the planning period is estimated to grow by 3.3 percent³. The projected growth in energy demand will be sluggish compared to the projected 5.0 percent growth in the Reference Plan. Figure 2.5 shows the two forecasts.

Despite the current trend in oil prices, petroleum products will remain a dominant fuel due to the demand of the transport and industrial sectors. Collectively, oil products requirement between 2006 and 2014 is projected to grow at an average annual rate of 3.6 percent. Among the petroleum products, LPG will post the fastest growth at 5.2 percent per annum largely due to the residential and commercial sectors. However, the expected growth of LPG is slower than its 5.8 percent growth indicated in the Reference Plan on account of current price trends.

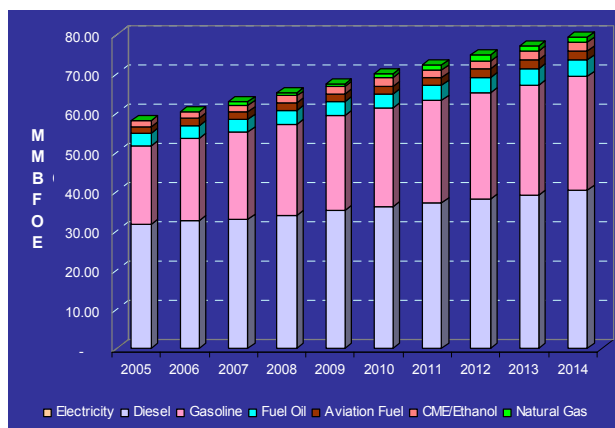
Meanwhile, electricity will emerge as the second fastest growing fuel in the end-use sectors with a projected average annual growth of 5.1 percent over the planning period. The rapid growth of electricity demand will be seen in the residential, commercial and industrial sectors.

On the other hand, the implementation of energy conservation measures will reduce the estimated energy demand by an average of 8.4 percent of the country's total energy demand by the end of the planning period.

Transport Sector

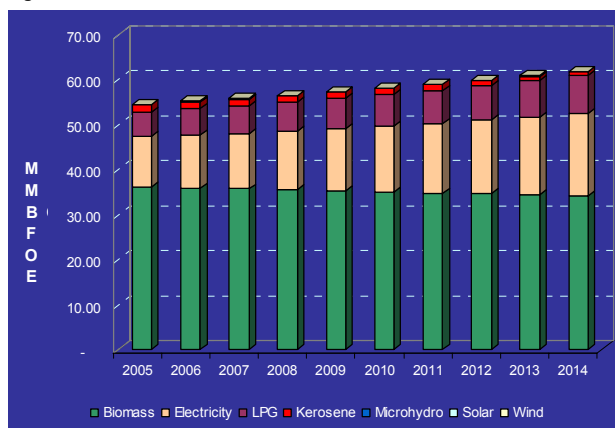
Demand by the transport sector takes into account the fuel consumption of the different types of vehicles used for land, air, and water. The projected population growth, road and rail infrastructure development and other indicators all contribute to a greater demand for fuel by the sector which is estimated to account for the largest share or an average of 34.5 percent of the country's total energy demand (Figure 2.6).

Figure 2.6. FINAL ENERGY DEMAND IN THE TRANSPORT SECTOR



The energy consumption of the transport sector will post an average growth of 3.5 percent.

Figure 2.7. FINAL ENERGY DEMAND IN THE RESIDENTIAL SECTOR



Petroleum products will remain as the dominant fuel for transport use. Meanwhile, demand for biofuels (CME and ethanol) is seen to increase by 4.4 percent annually across the planning period.

Residential Sector

The residential sector will be the second largest user of energy among the different end-use sectors, accounting for an average share of 28.9 percent to the country's total energy demand. Total residential energy demand is estimated to grow at an average annual rate of 1.4 percent.

Biomass will remain as principal fuel in the residential energy requirements. However, in terms of quantity, household biomass consumption will slide down by 0.6 percent on the average due to fuel switching in cooking and lighting based on the 2004 HECS. The use of fuelwood and charcoal as major biomass fuel for cooking will decline as households shift to more efficient and convenient fuels such as LPG and electricity (Figure 2.7).

Consistent with the HECS results as well as the Expanded Rural Electrification Program of the government, electricity will continue to be a major source of fuel in the sector. In this 2006 Plan Update, household electricity consumption will post a 5.6 percent growth.

³ Refers to final energy demand 2005-2014 of the Annexes (A.1.1 OEB Reference Case)

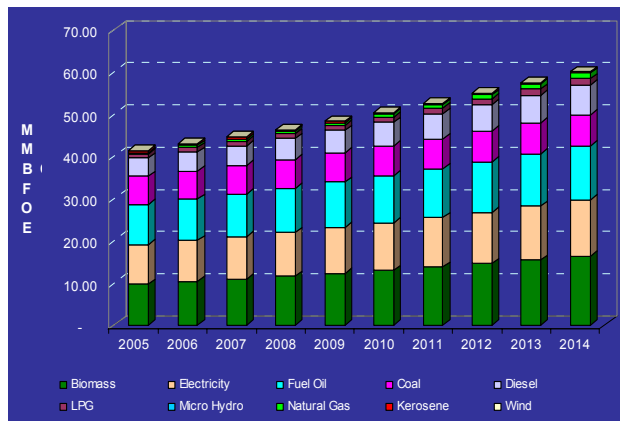
Demand for LPG in the face of the increasing prices of petroleum products will rise by 5.1 percent following urbanization trends. Household demand for kerosene, on the other hand, is estimated to drop by 6.8 percent due to the declining use of kerosene for lighting and cooking in almost all regions of the country.

Industrial Sector

The industrial sector's energy requirements will still grow in this Plan Update at an annual average rate of 4.3 percent. It will register an average share of 25.2 percent to the country's total final energy demand.

Petroleum products will comprise the bulk of the sector's total demand. In this Plan Update, the combined demand for oil will increase by 3.9 percent (Figure 2.8).

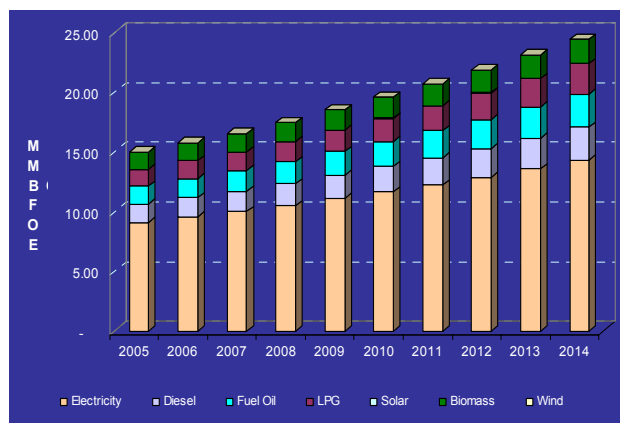
Figure 2.8. FINAL ENERGY DEMAND IN THE INDUSTRIAL SECTOR



Commercial Sector

The energy demand forecast for commercial activities is anchored on the estimated economic growth of the services sector which is estimated to grow by 5.7 percent by the end of the planning period. It will share an average of 9.9 percent to the total final energy demand of the country (Figure 2.9).

Figure 2.9. FINAL ENERGY DEMAND IN THE COMMERCIAL SECTOR

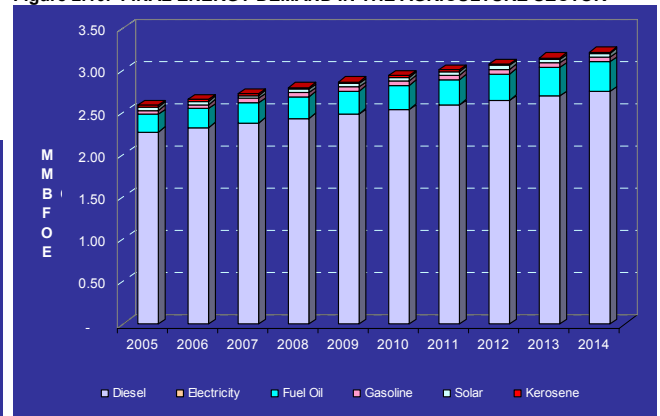


Electricity will predominantly provide the sector's fuel requirements followed by biomass and petroleum products.

Agriculture Sector

The agricultural sector is the least energy-intensive among the sectors with a minimal growth of 2.5 percent and a meager share of 1.5 percent of the country's total final energy demand. Energy requirements for agricultural activities will grow by 2.5 percent within the planning period. Petroleum products will be the main fuel of the sector, growing at an average rate of 2.5 percent over the reference period (Figure 2.10).

Figure 2.10. FINAL ENERGY DEMAND IN THE AGRICULTURE SECTOR



PRIMARY ENERGY SUPPLY

The 2006 Plan Update provides for a *Reference* and a *High Indigenous Case*. The Reference case reflects the least-cost option for power generation which includes mostly coal and oil-based plants. The *High Indigenous Case*, on the other hand, takes into account higher utilization of the country's untapped indigenous resources, particularly increased power generation by hydropower plants, geothermal and natural gas.

In the *Reference Case*, total primary supply is expected to grow at an average annual rate of 3.3 percent within the planning period. In the *High Indigenous Case*, total primary energy supply is estimated to increase at a slightly higher rate of 3.5 percent. In both cases, oil will comprise the bulk of the supply mix at an average share of 37.0 percent followed by geothermal (21.0 percent), biomass (15.0 percent), coal (16.0 percent), natural gas (6.0 percent) and hydropower (5.0 percent).

In the *High Indigenous Case*, the contribution of various indigenous resources will result in higher energy self-sufficiency levels, attaining the 60.0 percent self-sufficiency target by 2010. Beyond 2010, the self-sufficiency level will reach a peak of 64.0 percent in 2012. Simulation in this case accommodated indigenous resources to fuel the indicative capacity additions which include natural gas (2,250 MW), geothermal (170 MW), hydro (780 MW) and coal (100 MW). Renewable energy in the *High*

Indigenous Case will comprise 44.2 percent of the primary energy supply by 2014.

Comparative supply mix for the years 2006-2014 is shown in Figures 2.11, 2.12 and 2.13.

Indigenous Energy Supply

In the *Reference Case*, total indigenous energy supply is estimated to increase by 4.2 percent with an average volume of 191.4 MMBFOE (27.6 MTOE) during the planning period. A higher growth of 5.5 percent is foreseen in the *High Indigenous Case* registering an average annual volume of 201.5 MMBFOE (29.1 MTOE) of indigenous supply.

Geothermal production will increase at an average annual growth rate of 2.6 percent in the *Reference Case* with an average volume of 69.9 MMBFOE (10.1 MTOE) per year. With higher generation levels in the *High Indigenous Case*, its average growth rate will be 4.8 percent with an estimated average volume of 75.3 MMBFOE (10.9 MTOE).

The largest indigenous fossil energy source of the country, natural gas, is estimated to account for around 10.0 percent share in the total indigenous energy production. This translates to an average annual volume of 19.6 MMBFOE (2.8 MTOE) or an equivalent production of 303.8 million standard cubic feet per day (MMSCFPD). The *High Indigenous Case* assumes addition of small gas fields to fuel around 300 MW of additional capacity bringing an average annual volume of 19.8 MMBFOE (2.9 MTOE) of local gas supply.

Local production of oil and condensate in the *Reference Case* is projected to increase by an average rate of 12.5 percent on account of the expected production by 2007 of the Malampaya field. Aside from additional production from Galoc, Nido and Matinloc, West Linapacan and two prospective fields will augment production by 2010. Combined, these fields will yield an estimated average annual production of 17.1 MMBFOE (2.5 MTOE).

Local coal supply will register an average volume of 17.1 MMBFOE (2.5 MTOE) for both the *Reference* and *High Indigenous Cases* during the planning period. Its share to the total indigenous supply will be about 8.0 percent annually. The bulk of the supply will come from Semirara, Antique while significant amount will also be contributed by prospective fields in Luzon and Mindanao.

On the other hand, hydropower will continue to supply significant amount of power during the planning period. For the *Reference Case*, hydropower production will grow by an average of 1.3 percent with an estimated average volume of 15.5 MMBFOE (2.2 MTOE). For the *High Indigenous Case*, the 2006 Plan Update envisions higher utilization of the country's hydropower resources with an average annual growth of 5.9 percent and a corresponding average volume of 20.0 MMBFOE (2.9 MTOE).

Wind and solar will jointly contribute an average volume of 0.6 MMBFOE (0.1 MTOE) for both the *Reference* and *High Indigenous Cases*.

Imported Energy Supply

The country will continue to rely on imports to meet its increasing energy requirements. In the *Reference Case*, imported energy will account for an average share of 42.3 percent of the total energy supply translating to an average annual volume of 141.9 MMBFOE (20.5 MTOE). This represents an average annual growth rate of 2.0 percent.

A lower average annual volume of 134.5 MMBFOE (19.4 MTOE) of imported energy is foreseen in the *High Indigenous Case*. Total importation will post an average growth of 1.0 percent yearly.

In the *Reference Case*, imported oil and oil products will share the bulk of total imports at an average of 75.0 percent for the planning period with a yearly average growth of 1.9 percent.

On the other hand, the *High Indigenous Case* shows a lower volume of oil importation by 0.4 MMBFOE (approximately 0.1 MTOE) as compared to the *Reference Case* due to the anticipated moderation in the use of fuel oil and diesel for power generation.

With coal currently being the least-cost option for power generation, its importation in the *Reference Case* is projected to increase at an average annual rate of 3.7 percent. In contrast, the *High Indigenous Case* shows a decline in coal imports at an average rate of 1.8 percent per annum.

Figure 2.11. PRIMARY ENERGY SUPPLY MIX, 2006, High Indigenous Case

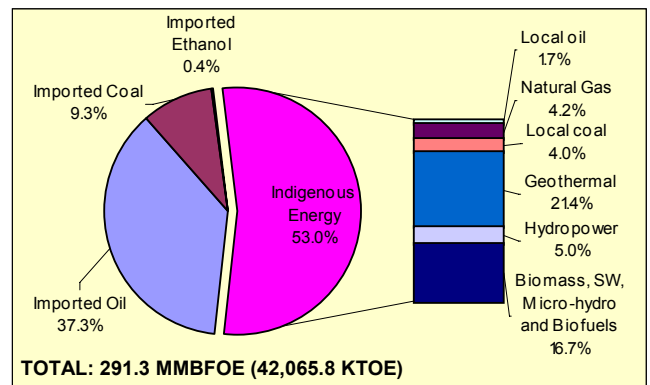


Figure 2.12 PRIMARY ENERGY SUPPLY MIX, 2010, High Indigenous Case

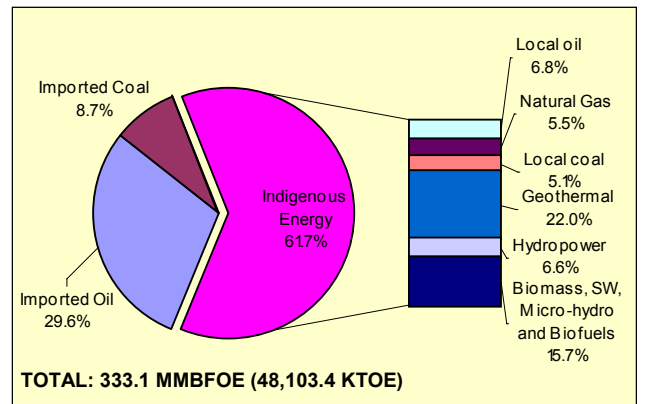


Figure 2.13 PRIMARY ENERGY SUPPLY MIX, 2014, High Indigenous Case

