

Chapter 14

Country Report of the Philippines

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CHAPTER 14

Country Report of the Philippines

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1. Background

1.1. Socio-economic Background

The Philippines, officially known as The Republic of the Philippines, with Manila as its capital city, is an archipelago comprising 7,107 islands. The country is located in the midst of Southeast Asia's main water bodies, namely, the South China Sea, the Philippine Sea, the Sulu Sea, and the Celebes Sea.

In 2012, the Philippine economy posted a 6.8 percent growth rate, year-on-year, up from 3.6 percent in 2011. The growth of the economy was largely due to vigorous economic activity in the services and industrial sectors during this period, which posted annual growth rates of 7.6 percent and 6.8 percent, respectively. The increase in service sector activity could be attributed to robust domestic trade and a boom in real estate businesses. The increase in the industrial sector was driven by double digit growth in the construction business, at 15.7 percent. Meanwhile, agriculture, hunting, forestry, and fishing registered a 2.8 percent increase during the period. Gross domestic product (GDP) per capita was US\$1,500 in 2012.

1.2. Policy

Notwithstanding the fact that fossil fuels contribute significantly to the country's primary energy supply, the Department of Energy (DOE) of the Philippines is adopting use of clean, green, and sustainable sources of energy for its long-term energy security strategy. The country's long-term national energy plan ensured that the immediate need for energy is met while making sure that it will not cause damage to people and the environment. A target of a 60 percent self-sufficiency level as part of the country's energy security goal will ensure the development of indigenous energy such as renewable energy and hydrocarbon fuels (oil, gas, and coal). In particular, renewable energy sources like geothermal, wind, biomass, ocean, and alternative fuels like biofuels and compressed natural gas (CNG), are expected to augment the country's energy requirement.

Another key component of the country's energy security strategy is to take full advantage of opportunities in energy efficiency and conservation. The launching of the National Energy Efficiency and Conservation Program (NEECP) in August 2004 is evidence of the energy sector's commitment to work continuously on the development and promotion of new technologies and the practice of good energy habits in the household, business, and transport sectors. In line with the NEECP, the DOE has a goal of 10.0 percent

energy savings from the total annual energy demand. The DOE has pursued its efforts to minimise demand for energy while ensuring the energy requirement to support economic growth by taking the lead on increasing public interest in the use of energy-efficient technologies and conservation practices.

As the DOE walks the path towards energy development, it will continue to implement reforms in the power industry and the downstream oil industry to address socially sensitive issues such as stability of supply and high cost of electricity and petroleum products.

Below are the highlights of the energy sector's plans and programmes:

Renewable Energy (RE)

The passage of Republic Act No. 9513 or Renewable Energy Act of 2008 legally support the policy and programme framework to promote the utilisation of renewable energy (RE) resources and technologies. On 14 June 2011, the government unveiled the National Renewable Energy Program (NREP) or the 'Green Energy Roadmap' for the Philippines. The NREP is anchored in the DOE's Energy Reform Agenda, which aims to ensure greater energy supply security for the country. It has established a policy and programme framework for the promotion of renewable energy and a roadmap to guide efforts in realising market penetration targets for each renewable energy resource in the country. The roadmap is targeting 15,304 MW installed RE capacity by 2030. The NREP also provides for policy mechanisms to support the implementation of the RE Act. These policy mechanisms include: Renewable Portfolio Standards (RPS), Feed-in Tariff (FIT), Green Energy Option Program, and Net-Metering for Renewable Energy.

The RPS sets the minimum percentage of generation from eligible RE resources, provided by the generators, distribution utilities, and electricity suppliers. Initially, an installation target of 760 megawatts (MW) from RE is set for the first three years from 2013 to 2015 broken down as follows: biomass (250 MW), run-of-river hydro (250 MW), solar (50 MW), wind (200 MW), and ocean (10 MW).

Moreover, the FIT provides guaranteed payments on a fixed rate per kWh for RE generation, excluding generation for own use. On 27 July 2012, the Energy Regulatory Commission (ERC) approved the initial FIT rates, which will apply to generation from renewable energy (RE) sources, particularly run-of-river hydro, biomass, wind, and solar. Approved FIT rates for biomass, hydropower, solar, and wind are PhP¹6.63, PhP5.90, 9.68PhP, and PhP8.53 per kilowatt-hour (kWh), respectively. Currently, there is no FIT rate for ocean energy since the technology is still being researched and not yet available in the Philippines.

Alternative Fuels

Biofuels

The DOE is aggressively implementing Republic Act No. 9367 or the Biofuels Act of 2006. The law intends to tap the country's indigenous agricultural resources as potential feedstock for biofuels.

¹ Philippine peso.

The mandatory 1.0 percent biodiesel blend in all diesel fuel sold in the country since May 2007 was increased to 2.0 percent in February 2009 on a voluntary basis. Moreover, the Philippines now enjoys an accelerated use of E10 (10 percent) bioethanol blend as supplied by most of the country's gasoline retailers.

To serve the technical requirements for the biofuels programme and ensure its continuous research and development, the DOE provided counterpart funding of PhP50 million for the establishment of a vehicle testing facility located at the Department of Mechanical Engineering Laboratory, University of the Philippines in Diliman, Quezon City. Roundtable discussions with stakeholders on technical verification and relevance of emerging biofuel technologies also forms part of the DOE's initiatives on research and development.

As part of its continuing effort to diversify the country's energy mix, a biofuel project with the University of the Philippines – Visayas Foundation Inc. (UPVFI) titled 'Bioethanol Production from Macroalgae and Socio-ecological Implications' was launched in September 2013. And the 'B5 Testing on Public Utility Jeepneys' project between the Philippine Coconut Authority (PCA) and UP–National Center for Transportation Studies (UP–NCTS) was launched in July 2013.

Compressed Natural Gas (CNG)

Currently, there are 61 compressed natural gas (CNG) buses in the Philippines, of which 41 are being commercially run. The CNG buses are plying the Manila–Batangas–Laguna routes. In addition, there are 20 CNG buses that had completed technical evaluation and testing. As of June 2012, seven bus operators were accredited for CNG bus operation. The CNG Mother-refueling Station and the Daughter Station are operating in Batangas and Biñan, Laguna, respectively.

Auto-LPG

In terms of using LPG as an alternative fuel for transport, over 19,052 taxis nationwide are now running on LPG, which is complemented by 219 auto-LPG dispensing stations. To date, 31 auto-LPG conversion shops with Philippine National Standard (PNS) licenses are being monitored by the DOE to ensure safe operation and standards compliant conversion of gasoline fed motor vehicles to auto-LPG.

In support of the government's Auto-LPG programme, the Development Bank of the Philippines (DBP) has included auto-LPG initiative in its 'Clean Alternative Transport Fuel Financing Program,' which provides reasonable financing packages for auto-LPG related activities such as acquisition of auto-LPG vehicles. The LTFRB also extended the number of years of franchise for taxis that converted to auto-LPG within two years. These schemes promoted large-scale conversion of taxi fleets and encourage new player participation in the programme. And to validate the technical viability on the use of alternative fuel for public transport, the UP–National Center for Transportation Studies (UP–NCTS) and the UP Vehicle Research and Testing Laboratory (UP–VRTL) were commissioned to conduct two performance tests for Alternative Fuel Vehicles – specifically the Auto-LPG-fuelled Jeepney and the Electric-Powered Jeepney – that were completed in October 2013.²

² Energy Sector Accomplishment Report 2013

E-Vehicle

To date, 623 electric vehicles (EV) of various types have been in use in various cities and municipalities (Makati, Taguig, Mandaluyong, Quezon, Puerto Princesa, Davao, and Surigao del Norte) of the country. The E-vehicle Program is one of the government's initiative towards sustainable, energy efficient, and low-carbon transport future. In relation to the E-vehicle Program, the DOE launched in January 2012 its 'Bright Now! Do Right. Be Bright. Go E-trike!' design-an-electric tricycle contest to encourage and promote the creativity and innovativeness of young Filipinos in crafting the Philippine version of the so called 'Green Vehicle.'

Barangay Electrification

Rural electrification has been one of the government's priority thrust. The goal is to achieve total barangay³ electrification by end of 2010. As of August 2012, the country's total electrification level had reached 99.98 percent, with 41,965 barangays out of 41,974 (formerly 41,980) already enjoying access to electricity. Given the importance of electricity in the economic development of the country, the electrification programme of the government is being extended up to household level. The government is targeting to achieve 90.0 percent household electrification by 2017.

As of 30 December 2013, household electrification was 79.5 percent, meaning that 17.0 million out of the 21.4 million households had an electricity connection.⁴

1.3. Energy

The country's total primary energy supply in 2012 reached 42.3 million tonnes of oil equivalent (MTOE). Oil accounted for the biggest share – 32.1 percent – in the total energy supply, followed by geothermal and coal, which both had shares of about 21.0 percent in the mix. Total production reached 24.3 MTOE in 2012, bringing the energy self-sufficiency level of the country to 57.4 percent.

The Philippines' total electricity generation in 2012 amounted to 72.9 terawatt-hours (TWh). Coal-fired power plants remained the major source of power generation, with an installed capacity of 5,568 megawatt (MW). Coal accounted for 38.8 percent or 28.3 TWh of the country's total electricity requirement in 2012 and natural gas-fired power plants accounted for 26.9 percent or 19.6 TWh in the power mix. The Philippines currently has three natural gas power plants with a combined installed capacity of 2,861 MW. The combined share of renewable energy in the total power generation mix was 28.5 percent in 2012.

2. Modelling Assumptions

Five scenarios were developed to assess the energy savings potential of the country aside from the Business-as-Usual (BAU) scenario, which serves as the reference case in the projection of energy demand and carbon dioxide (CO₂) emission of the energy sector. The BAU scenario incorporates the energy sector's existing energy policies, plans,

³ Filipino term for a village, district, or ward and is the smallest administrative division in the Philippines.

⁴ Status of Household Electrification as of 31 December 2013.

and programmes, which are being implemented and will be pursued over the forecast period. The virtue of this scenario rests on assessing the effects of such measures, which may evolve either as a consequence of need (energy security) or the commercialisation of energy technologies (economics) given the interaction of market forces.

Alternative Policy Scenario (APS) 1 will test the impact of possible policy interventions in terms of possible utilisation of efficient and environment-friendly technologies for future energy use together with its corresponding CO₂ emission reduction. The extended energy saving goals of 15.0 percent of the country's annual final energy demand is expected to be achieved through a range of measures, including intensified energy utilisation management programmes in the commercial and industrial sectors, power plants, and distribution utilities, as well as the continuous use of alternative fuels and technologies. The information and education campaign being conducted by the Department of Energy (DOE) and the 'Palit Ilaw'⁵ Program also contribute to the country's energy saving goals. In the residential and commercial sectors, the utilisation of more efficient electrical appliances is projected to induce savings. Energy labelling and ratings of major electrical appliance will help consumers to choose more efficient electrical products.

APS2 will assess the effect of more efficient thermal power generation, particularly as a result of new technologies to be used in coal and natural gas power plants.

The APS3 will measure the result of the combined contribution of renewable energy and alternative fuels to the total energy supply. As part of the government's initiatives to ensure security of energy supply and at the same time protect the environment and promote green technology, the targets set under the NREP were incorporated in the model, particularly in APS3, to test their impact on the total primary energy supply. The NREP lays down the foundation for developing the country's renewable energy resources, stimulating investments in the RE sector, developing technologies, and providing the impetus for national and local renewable utilisation. It sets out indicative interim targets for the delivery of renewable energy within the timeframe of 2011 to 2030. The intensified development and utilisation of alternative fuels for transport such as compressed natural gas (CNG) and electric vehicles, as part of a continuing strategy to reduce the country's dependence on imported oil, were also part of the APS3 simulation.

Although the Philippines at present has no clear policy direction on the use of nuclear energy in power generation, APS4 considered additional capacity from nuclear power to determine the impact of a possible long-term nuclear option in the country. And lastly, APS5 will focus on the combined effects of the four scenarios (APS1, APS2, APS3, and APS4).

In the model, GDP is assumed to grow at an average annual rate of 6.3 percent⁶ from 2011 to 2035 and the projected population growth of the country is 1.6 percent per year for the same period. Population growth is based on the adjusted 2000 census-based medium population projections using the results of the 2007 population census of including the population level of 93.3 million for 2010.

⁵ Filipino term for 'change lamps' wherein the DOE distributes CFL lamps for free to consumers in exchange of their incandescent bulbs.

⁶ IMF World Economic Outlook (2014).

3. Outlook Results

3.1. Business as Usual (BAU) Scenario

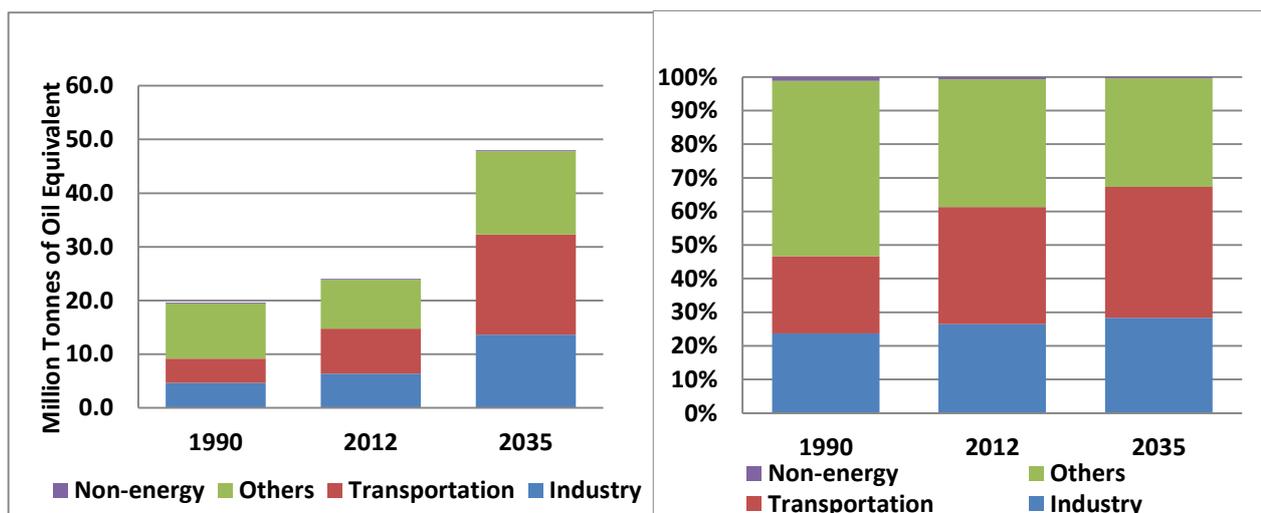
3.1.1. Total Final Energy Demand

Total Final Energy Demand by Sector

The Philippines’ final energy demand grew from 19.7 MTOE in 1990 to 24.0 MTOE in 2012, at an average annual growth rate of 1.09 percent. From 1990 to 2012, energy demand in the transport sector grew fastest, at an average annual rate of 2.8 percent, followed by the industrial sector with 1.4 percent. Final energy demand in the ‘Others’ sector (residential/commercial) decreased by an average 0.5 percent per year over the same period.

Final energy demand is projected to grow at an annual average rate of 3.1 percent in the BAU scenario from 2012 to 2035, the transport sector will grow at an average annual rate of 3.6 percent per year, and the industrial and other sectors are expected to grow at an average rate of 3.4 percent and 2.3 percent per year, respectively (Figure 14-1).

Figure 14-1. Final Energy Demand by Sector, BAU



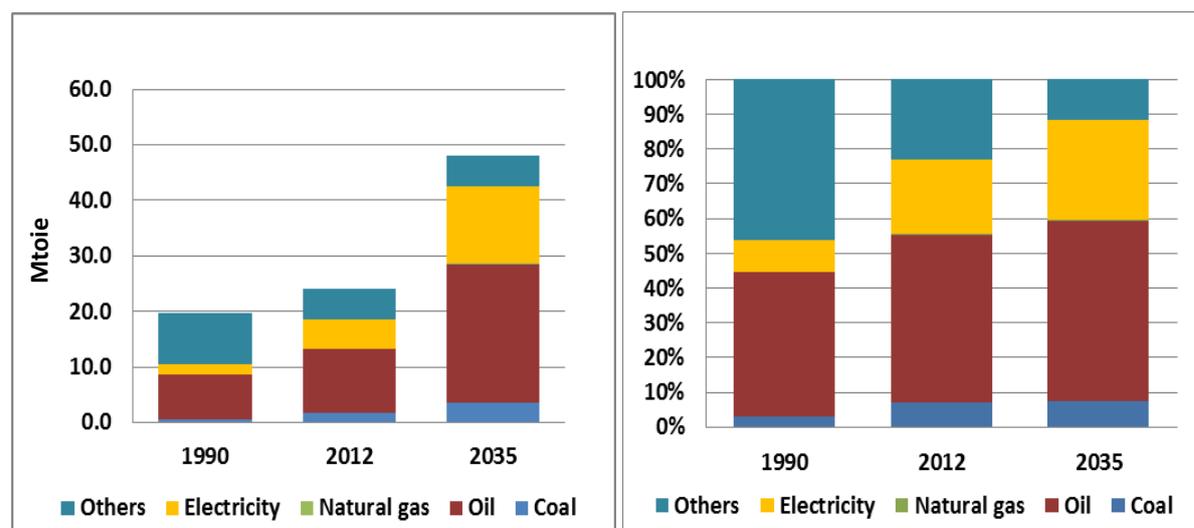
Source: Author’s calculation.

Aggregate energy demand of other sectors, such as residential and commercial, although decreasing from 52.2 percent to 38.0 percent between 1990 and 2012, comprised the biggest share in the total demand mix during that period. The share of the transport sector increased from 23.0 percent to 34.8 percent during the same period, and is projected to further increase its share, to 39.0 percent of the demand mix by the end of the planning period in 2035. The demand of the ‘others’ sector is projected to be 32.3 percent in 2035. The share of energy demand of industry in the demand mix rose from 23.7 percent in 1990 to 26.5 percent in 2012, and is projected to rise to 28.3 percent at the end of the planning period.

Total Final Energy Demand by Fuel

By fuel type, demand for natural gas and electricity is projected to grow at almost the same rate of an annual average 4.4 percent from 2012 to 2035. Oil demand is expected to grow by 3.4 percent over the same period, to be used mainly for the transport sector. Demand for coal for non-power applications will grow at an average annual rate of 3.3 percent over the same period, with the bulk of its end-use demand coming from the cement industry (Figure 14-2).

Figure 14-2. Final Energy Consumption by Fuel, BAU



Source: Author's calculation.

Oil will remain the most consumed fuel throughout the planning period, despite a fall in its share in the total demand mix from 48.2 percent in 2012 to 51.9 percent in 2035.

Electricity will contribute an average share of 28.6 percent at the end of the planning period, making it the second-most consumed energy source after oil. Demand for other fuels such as biomass and other renewable energy (RE), although projected to decline, will account for 11.6 percent of the demand mix in 2035. The share of coal in the industry sector is expected to decrease to 7.5 percent in 2035.

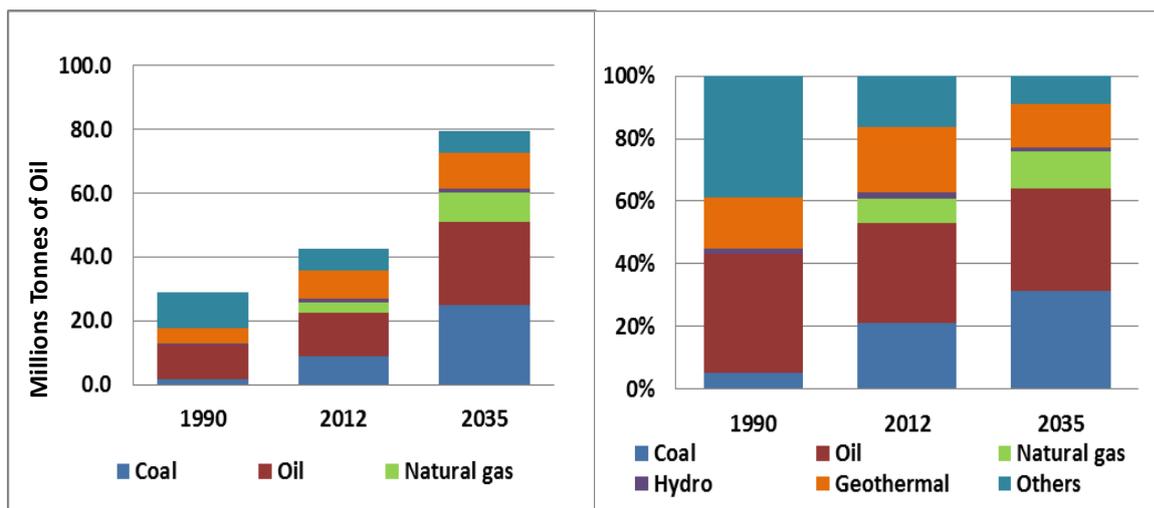
Total Primary Energy Consumption by Fuel

Primary energy consumption in the Philippines grew at an annual average rate of 1.8 percent, from 28.7 Mtoe in 1990 to 42.3 Mtoe in 2012. Amongst the major energy sources, consumption of coal grew the fastest, at 8.3 percent per year, followed by geothermal and hydro, with 2.9 percent and 2.4 percent, respectively. Oil grew at an average annual rate of just 1.0 percent per year from 1990 to 2012 and primary energy consumption of other fuels declined by an average annual 2.1 percent over the same period.

From 2012 to 2035, the country’s primary energy consumption is expected to increase by 2.8 percent per year from its 2012 level, to 79.8 Mtoe in 2035. Consumption of all major energy sources is projected to increase during the period with coal growing fastest at 5.0 percent per year. Natural gas is also expected to expand, at a growth rate of 3.8 percent per year during the same period, and oil is projected to grow at 2.9 percent. Major RE consumption from geothermal and hydro is projected to grow at an average annual rate of 0.9 percent and 0.4 percent, respectively, from 2012 to 2035, and aggregate consumption of other fuels is expected to grow at a meagre 0.1 percent over the projection period.

Coal will account for the largest share in the total energy supply of the country at 33.5 percent at the end of the planning period. Oil and natural gas being part of the country’s major energy requirement are projected to account for shares of 33 percent and 9.7 percent, respectively, in 2035. Geothermal and hydro, which are mainly used for power generation, are expected to have shares of 13.7 percent and 1.2 percent, respectively, and the requirements for other fuels in 2035 will amount to a share of 8.9 percent in the supply mix at the end of the projection period (Figure 14-3).

Figure 14-3. Primary Energy Consumption by Sector, BAU

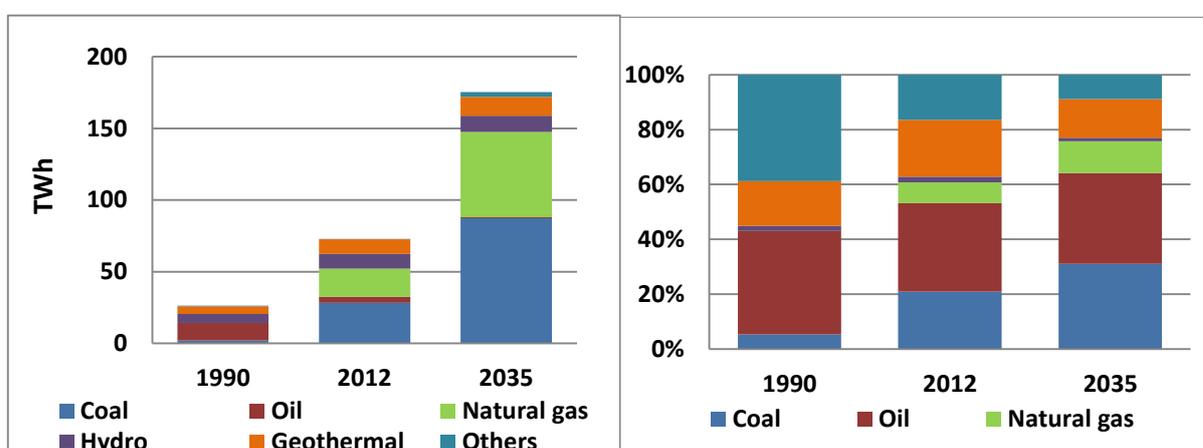


Source: Author’s calculation.

Power Generation

Total power generation in 2012 reached 72.9 terawatt-hours (TWh), nearly a threefold increase on 1990. Power generation is expected to increase at an average annual rate of 3.9 percent over the planning period. Coal remained the major source of power generation, accounting for a share of 38.8 percent in 2012. It is expected to grow at an average annual rate of 5.4 percent, from 28.3 TWh in 2012 to 95.6 TWh in 2035, which increases its share to 54.5 percent. Natural gas followed with output projected to grow from 19.6 TWh in 2012 to 49.2 TWh in 2035, at an average rate of 4.1 percent per year. Oil will decrease at an annual average 0.8 percent over the planning period. Power generation from hydro and geothermal are expected to grow at average annual rates of 0.4 percent and 0.9 percent, respectively. The contribution of other fuel (solar, wind, and biomass) to power generation is expected to increase at an average annual rate of 11.6 percent (Figure 14-4).

Figure 14-4: Power Generation by Fuel, BAU



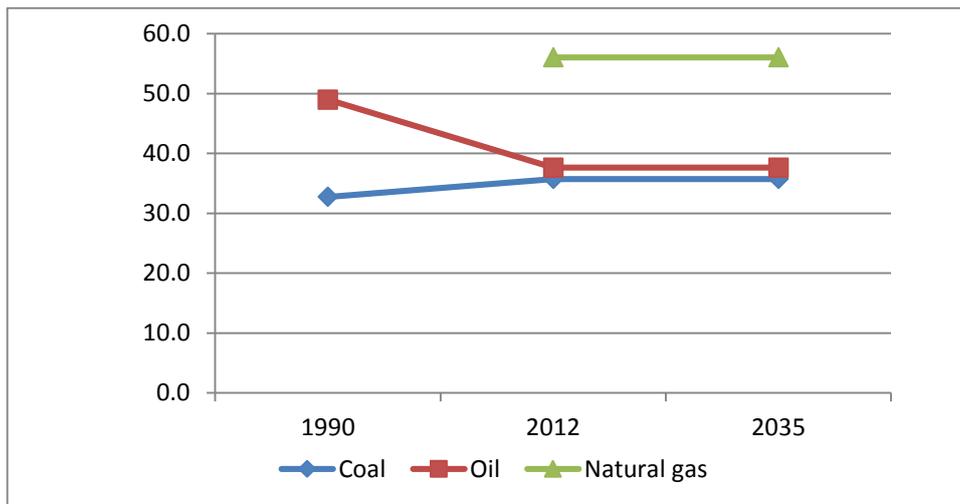
Source: Author's calculation.

The thermal efficiencies of coal, oil, and natural gas under the BAU scenario are projected to be fairly constant over the planning period. By the end of the projection period, coal thermal efficiency is expected to be about 36.0 percent, and oil and natural gas power plants' efficiencies are estimated at around 40.0 percent and 56.0 percent, respectively.

3.1.2. Energy Indicators

Under the BAU scenario, energy intensity of the Philippines is expected to decrease at an average annual rate of 3.0 percent from 2012 to 2035. Energy intensity is the ratio of total primary energy over GDP. The significant reduction in energy intensity is attributable to the government's efforts in promoting energy conservation and efficiency in the different sectors of the economy. Energy per capita is projected to increase from 0.44 toe/person in 2012 to 0.57 toe/person in 2035, due to improvements in people's living standards and income.

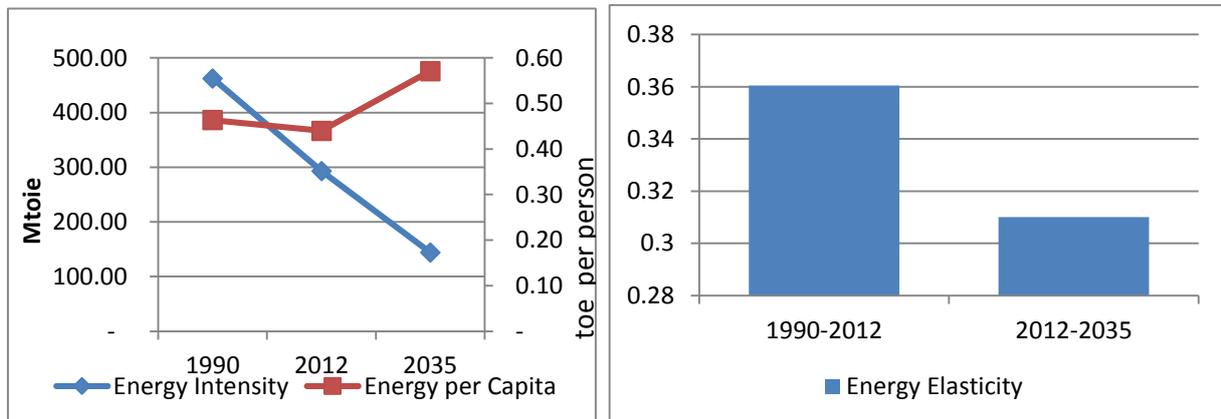
Figure 14-5. Thermal Efficiency by Fuel, BAU



Source: Author's calculation.

Energy elasticity is the relationship between changes in primary energy demand and changes in GDP. It is projected at approximately 0.3 from 2012 to 2035, indicating that energy demand is rising less slowly than income.

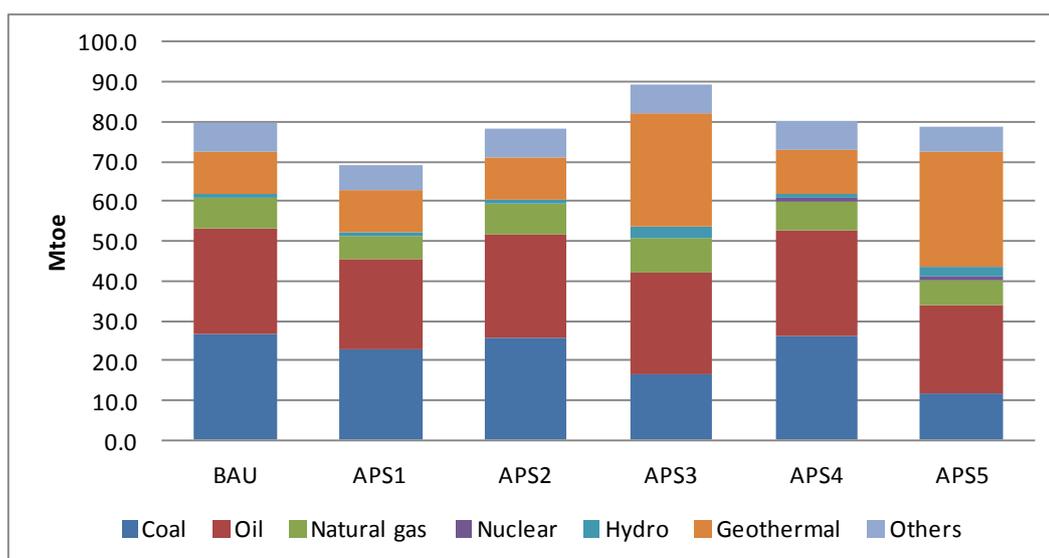
Figure 14-6. Energy Intensity, Energy Per Capita, and Energy Elasticity



Source: Author's calculation.

3.2. Alternative Policy Scenario (APS)

As mentioned above, the assumptions in the APS were analysed separately to determine the individual impacts of each assumption in APS1, APS2, APS3, APS4 and the combination of all these assumptions (APS5 or APS). Figure 14-7 shows the changes in total primary energy supply in all the scenarios.

Figure 14-7: Primary Energy Supply for All Scenarios in 2035

Source: Author's calculation.

In Figure 14-7 above, APS1 has the largest reduction in total primary energy supply due to its energy efficiency assumptions on the demand-side. The country's total primary energy supply under the APS1 will grow at an annual average rate of 2.1 percent, reaching 69.0 Mtoe in 2035. This is lower than under the BAU scenario, indicating the effectiveness of energy efficiency measures implemented in the various sectors of the economy. The projected total primary energy supply reduction under APS1 will be 10.8 Mtoe or 13.5 percent.

APS2, which assumes higher efficiency in thermal electricity generation will have lower total primary energy supply of 1.5 Mtoe or 1.9 percent than the BAU scenario. The country's total primary energy supply under APS2 is projected to reach 78.3 Mtoe in 2035. Most of the reduction would be due to coal and natural gas being used at more efficient plants to generate power in this scenario.

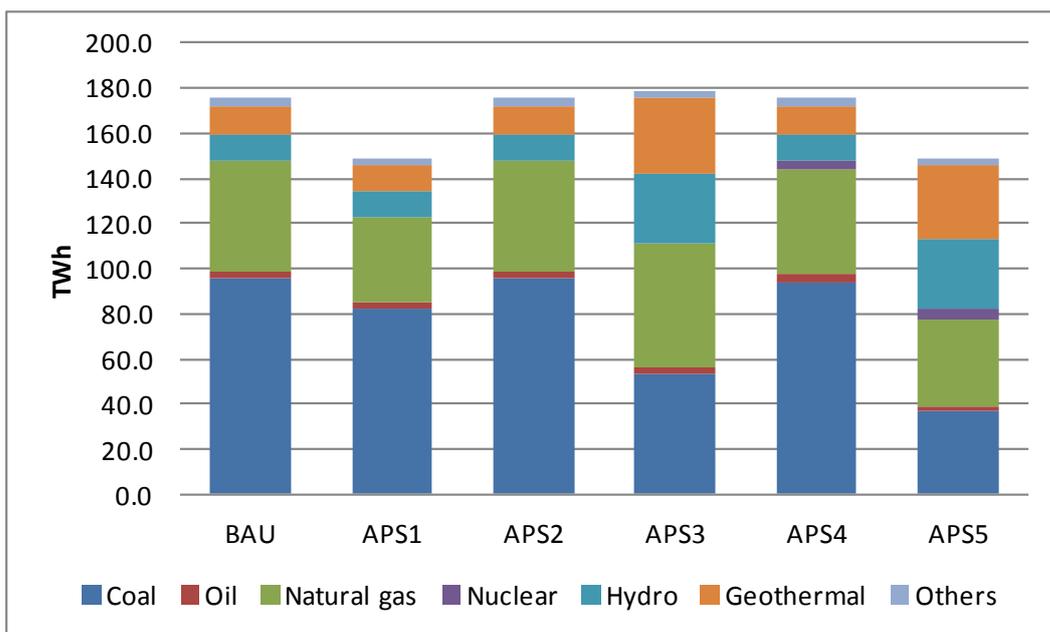
For APS3, total primary energy supply is projected to be almost 9.6 Mtoe higher than under the BAU scenario. This is mainly due to the increased use of geothermal energy in power generation. With the exception of hydro, wind, and solar energy, the efficiency of non-renewable energy (NRE) plants is usually lower than that of fossil-fuelled power plants.

In APS4, total primary energy supply will be 0.3 Mtoe higher than in the BAU scenario. This is due to the assumption that nuclear power plants are only 33 percent efficient, lower than natural gas and coal power plants, which have efficiencies of 35.7 percent and 56.1 percent, respectively.

The combined effect of APS1, APS2, APS3, and APS4, or APS5 will be lower total primary energy supply of only 1.1 Mtoe, or a 1.4 percent saving in primary energy supply.

Figure 14-8 shows total electricity generation in 2035 in all scenarios. In APS1, due to lower electricity demand, the shares of fossil-fired electricity generation were lower than in the BAU scenario – 82.5 percent compared with 84.5 percent in the BAU scenario.

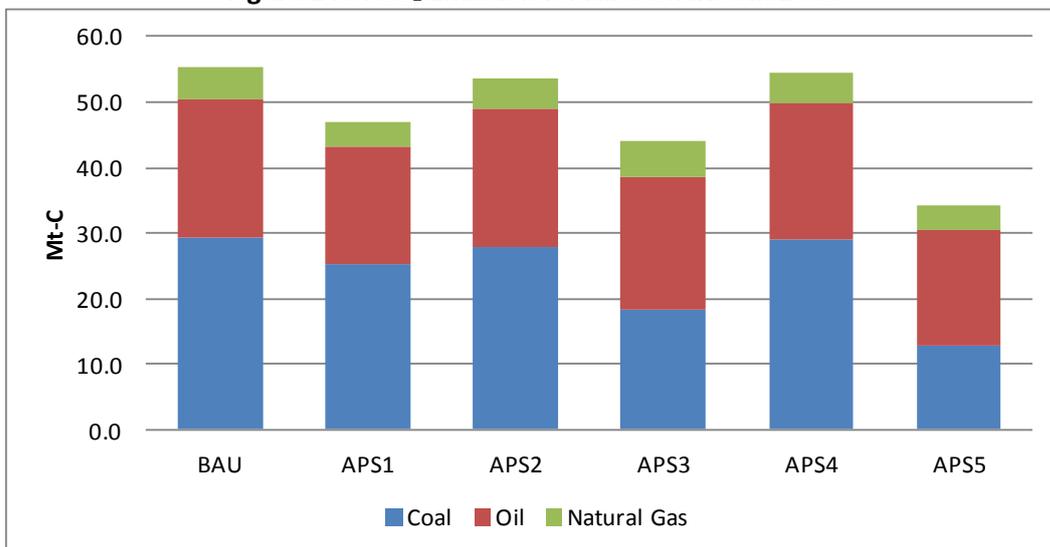
Figure 14-8. Electricity Generation for All Scenarios in 2035



Source: Author’s calculation.

In APS2, the shares are the same as those for BAU. In APS3, due to the assumption of more renewable energy, the shares of fossil fuel-fired generation will only be 62.5 percent compared with the BAU scenario’s 84.5 percent. In APS4, fossil fuel-fired electricity generation is expected to make up 82.0 percent of the total, indicating that nuclear displaced the other 2.5 percent. In APS5, where all scenarios were combined, the shares of fossil energy-based generation will be reduced further to 52.2 percent.

Figure 14-9. CO₂ Emission for All Scenarios in 2035



Source: Author’s calculation.

In terms of CO₂ emission reduction, the energy efficiency assumption in APS1 is expected to reduce emissions by around 8.3 million metric tonnes of carbon (Mt-C), which is 15.1 percent lower than for BAU. The reduction in CO₂ indicates that the energy saving goals, action plans, and policies related to the promotion of energy efficiency and the

conservation programme will be effective in reducing CO₂ emissions.

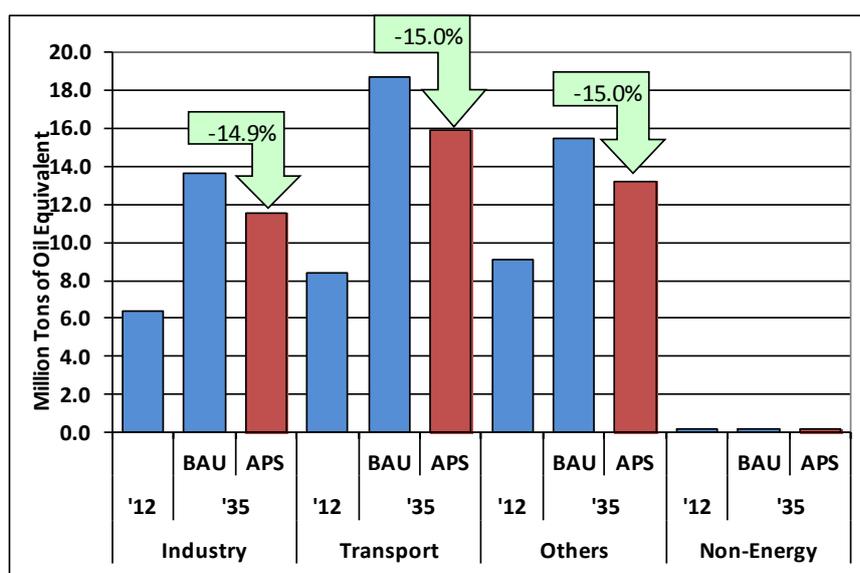
In APS2, total CO₂ emissions could be reduced by 1.5 Mt-C or 2.8 percent relative to BAU. In APS3, the reduction could be 11.1 Mt-C, which is 20.2 percent lower than for BAU. In APS4, the reduction could be 0.7 Mt-C or 1.2 percent relative to BAU, as only 620 MW of nuclear power was assumed in this scenario.

Combining all the assumptions in APS1, APS2, APS3, and APS4 (APS5), is expected to reduce BAU CO₂ emissions by 20.8 Mt-C or 37.7 percent.

3.2.1. Final Energy Demand

In the APS (APS5), final energy demand is projected to increase at a slower rate than in the BAU scenario, increasing at an average rate of 2.3 percent per year, from 24.0 Mtoe in 2012 to 40.9 Mtoe in 2035. Slower growth under the APS, relative to the BAU scenario, is projected across all sectors as a result of the government's programme for energy efficiency and conservation. The transport sector is expected to see the highest growth, at 2.8 percent per year, followed by the industrial sector at 2.6 percent per year. Figure 14-10 shows final energy demand by sector in 2012 and 2035 in both the BAU scenario and the APS. The reduction of final energy demand will be 15 percent in 2035 in all sectors except for the non-energy sector.

Figure 14-10: Final Energy Demand by Sector, BAU and APS



Source: Author's calculation.

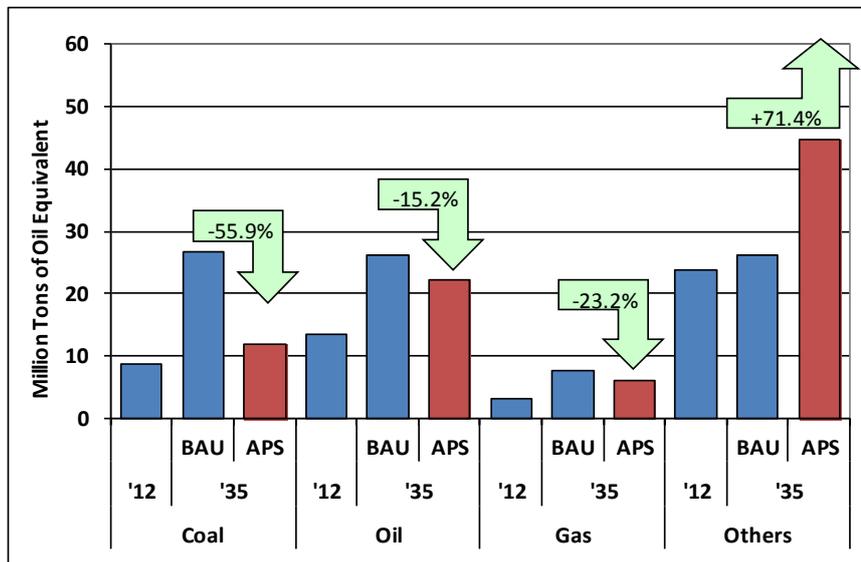
Primary Energy Supply

Over the projection period, the relative share of each form of energy is expected to change significantly in response to changes in economic structure and policy environment. The country's total primary energy supply under the APS will grow at an average annual rate of 2.7 percent, increasing from 42.3 Mtoe in 2012 to 78.6 Mtoe in 2035. Compared with the BAU scenario, the APS will see a 1.4 percent lower energy supply level in 2035 (Figure 14-16).

Renewable energy sources such as geothermal, hydro, and 'other RE' (solar, wind, and biofuels) are expected to see the fastest growth over the projection period, increasing

by 5.3 percent, 4.3 percent, and 5.1 percent per year, respectively. Energy supply from fossil fuels such as coal, oil, and natural gas, is projected to increase more moderately, by 1.3 percent, 2.2 percent, and 2.7 percent per year, respectively, under this scenario.

Figure 14-11. Total Primary Energy Supply by Fuel, BAU and APS

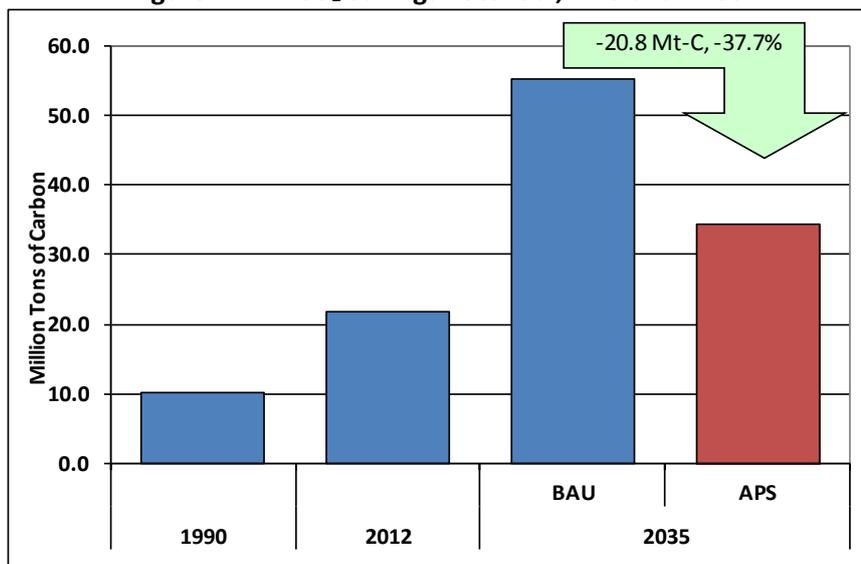


Source: Author's calculation.

CO₂ Reduction Potential

Total CO₂ emissions from energy consumption will reach 34.4 Mt-C in 2035. The CO₂ emission reduction is expected to be 20.8 Mt-C, which is 37.7 percent lower than the BAU level. The reduction in CO₂ indicates that applying all the assumptions for energy saving goals to increase renewable energy and alternative fuels in total supply and improve thermal efficiency in power generation will meet the CO₂ emissions reduction target (Figure 14-12).

Figure 14-12: CO₂ Savings Potential, BAU and APS5



Source: Author's calculation.

4. Implications and Policy Recommendations

Under the BAU scenario, on the supply side, primary energy consumption of coal is projected to grow fastest, at an annual average rate of 5 percent, throughout the planning period. This is due to the significant expected contribution of coal fuel in power generation, which corresponds to an expected increase in demand for electricity at an annual average rate of 4.4 percent. Coal supply is projected to surpass the Philippine's requirement for oil, which is mainly utilised in the transport sector. The aggregate share of RE at 23.8 percent for this most likely energy scenario is also behind by around 41.0 percent compared with the projected contribution of coal in the supply mix. Thus, it is imperative for the government to temper the utilisation of this fuel through the strict implementation of its energy security policy in adopting the use of clean, green, and sustainable sources of energy, particularly in the power sector. However, the government's policy options are limited as the power sector is a deregulated industry, so its control over what power plants are to be built is limited. It can exert some influence by formulating a fuel mix policy for power generation, to guide and inform investors and other key players in the industry on the preferred national power mix for the benefit of the long-term sustainability of the country's power sector. Further, the government should find a way to encourage the stake holders to invest and support the government's thrusts on good governance and initiatives to further enhance operational efficiency and data transparency and exchanges amongst stakeholders.

On the demand side, oil will register the biggest share in the final energy demand by more than 50.0 percent towards the end of the planning period. This is despite of the current effort of the government to implement the promotion of energy efficiency and conservation programme and alternative fuel and technology development. The results of the model indicated that the share of oil in the total demand is constant across different scenarios. This is because oil is the major fuel of the transport sector, which is the biggest user of energy currently and in the future. As indicated by the outlook model results, transport sector will be the biggest user of energy across different scenario throughout the planning period. It would be appropriate for the government to focus on the promotion of alternative fuels in the transport sector to substitute partly and directly the use of oil in the sector with the extended implementation of alternative fuels in transport programme.

Moreover, the use of alternative technologies and fuels such as electric vehicle, CNG, autogas (LPG for transportation), and biofuels for transport will temper the utilisation of oil in the country in the future, thus, reducing the negative impacts of oil prices volatility in the world market. The government's efforts in the promotion of alternative fuels in the transport sector will help not only in reducing energy requirement but also lessen GHG emission coming from the transport sector.

On the other hand, under the APS, energy intensity and CO₂ intensity will continue to decline from 2012 to 2035, although CO₂ emission per energy consumption will increase corresponds to the increase share of fossil fuels. In this regard, the government should implement strictly the energy plans and programmes for energy efficiency and conservation to address; responses to volatile oil prices and their inflationary effects on the prices of basic commodities; and changing economic structure of the country to rely more on its service sector rather more than on energy intensive industries. This is also

consistent with the Asia-Pacific Economic Cooperation's (APEC) target to reduce APEC's aggregate energy intensity (energy demand per unit of GDP) by forty-five (45 percent) percent by 2035 with 2005 as the base year. Improvement in the energy intensity of the Philippines is expected to be driven in part by the country's changing economic structure to rely more on its service sector rather than on energy intensive industries.

In response to the result of the study, the government should pursue its programmes and projects that will further increase and enhance the utilisation of indigenous, clean and efficient alternative fuels. The full implementation of the Renewable Energy Act of 2008 to expand the utilisation and development of indigenous energy such as geothermal, hydro solar, wind and other clean energy will not only promote the use of sustainable energy but will also lessen the country's need for energy imports. The FIT, RPS and other policy mechanism provided under the law will boost the utilisation of RE.

Special attention should also be given to the industrial sector since it is growing almost at the same rate as the transport sector and could have high potential energy savings.

Furthermore, the country must establish a quantitative sectoral energy savings target for easy evaluation and monitoring and to institutionalise energy efficiency and conservation, incentives towards greater participation is needed. Currently, the Philippines has a specific quantitative energy saving requirement as provided under Administrative Order (AO) No. 110, 'Directing the Institutionalization of a Government Energy Management Program'. The AO requires the reduction of at least ten percent (10 percent) in the cost of the consumption of fuel and electricity amongst others in the government. This can be duplicated or expanded to other sectors if there is an existing energy conservation law which will require strict regulation and implementation.

In addition, there is a need to pass the Energy Conservation Law to realise the targets set by the government. The Law will institutionalise energy conservation and enhance the efficient use of energy in the country.

Moreover, looking at the integration of all the scenarios, the result is effective in reducing the carbonisation ratio. This indicates that the government should set the necessary environment to ensure that the policies will strictly be implemented.

References

- Department of Energy (2012), *Philippine Energy Plan 2012–2030*. Manila: Department of Energy.
- Department of Energy (2013), *Energy Sector Accomplishment Report 2013*. Manila: Department of Energy.
- Congress of the Philippines (2007), *Republic Act No. 9367, Biofuels Act of 2006*. Quezon City: Congress of the Philippines.
- Congress of the Philippines (2008), *Republic Act No. 9513, Renewable Energy Act of 2008*, Quezon City: Congress of the Philippines.
- IMF (2014), *World Economic Outlook*. New York: International Monetary Fund.
- National Statistics Coordination Board (NSCB) (2012), *Philippine Statistical Yearbook 2012*. Manila: NSCB.