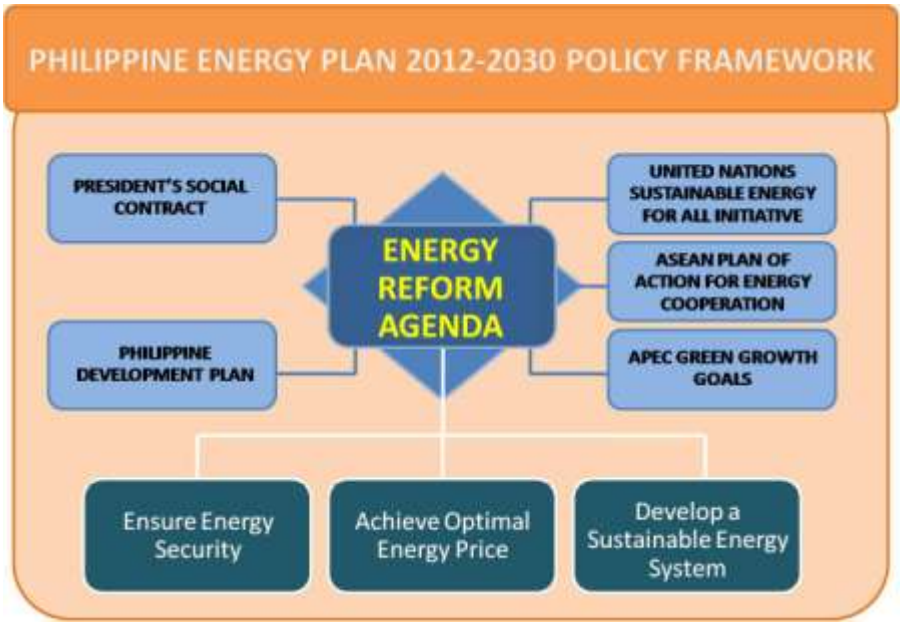
I. OVERVIEW AND EXECUTIVE SUMMARY

Guided by the overall vision of providing *"Energy Access for More,"* the 2012-2030 *Philippine Energy Plan (PEP)* seeks to mainstream access of the larger populace to reliable and affordable energy services to fuel, most importantly, local productivity and countryside development. The energy sector, mindful of its role in promoting better quality of life for the Filipino people, will ensure the delivery of secure, sustainable, sufficient, affordable and environment-friendly energy to all economic sectors. In pursuit of this goal, the government will mobilize private sector participation and involvement of other stakeholders to make *power of choice* a reality.



The 2012-2030 PEP is crafted with due consideration and premium on the economic parameters sourced from the National Economic and Development Authority (NEDA), Development Budget Coordination Committee (DBCC), National Statistics Office (NSO) and international references on energy such as the World Energy Outlook of the International Energy Agency (IEA). For the medium-term, the 2012-2030 PEP is basically anchored on the policy framework set in place with the formulation of the Energy Reform Agenda (ERA). The ERA is consistent with national development directives such as the President's Social Contract and the 2011-2016 Philippine Development Plan; and, responsive to long-term (beyond 2016) global policy frameworks on energy such as the UN Sustainable Energy for All Initiative and the APEC Green Growth Goals.

ENERGY REFORM AGENDA

The ERA has outlined the following major pillars as its overall guidepost and direction: (a) Ensure energy security through the development of indigenous energy such as renewable energy and hydrocarbon fuels (oil, gas, and coal); (b) Achieve optimal energy pricing in electricity and oil; and, (c) Develop a sustainable energy system through the formulation and update of national plans and programs on energy development, which are consistent with the country's economic development plans.

- **The President's Social Contract**

  The PEP is guided by the President's Social Contract with the Filipinos. The plans and programs of PEP are responsive to the Social Contract's pillars: a) Anti-corruption/ transparent, accountable and participatory governance through our energy contracting rounds, Information, Education and Communication (IEC) and public consultation activities; b) Poverty reduction and empowerment of the poor through our programs on rural electrification, energy

efficiency and conservation, and the provision of benefits to host communities; c) Rapid, inclusive and sustained economic growth through basically all our programs especially in improving the supply of energy products and services (both oil and electricity) nationwide to fuel the businesses and spur countryside development; d) Just and lasting peace and the rule of law starting with the efforts of the Department of Energy (DOE) in developing regional energy plans such as the Mindanao Energy Plan (MEP) to serve as the region's energy roadmap; e) Integrity of the Environment and Climate Change Mitigation and Adaptation with our accelerated programs on energy efficiency, renewable energy and alternative fuels; and, f) Gender Development, which is integrated in relevant plans and programs.

- **Philippine Development Plan (PDP) 2011-2016**

  The energy sector contributes to the PDP's goals of promoting inclusive growth and poverty reduction. The PEP programs on ensuring energy supply security and providing energization to the countryside are integral components of the national infrastructure development agenda as contained in the PDP. These energy commitments will support the PDP's targeted outcomes of enhancing the country's competitiveness, reducing gaps in basic services, and improving environmental quality.

- **UN Sustainable Energy For All Initiative Development**

  Cognizant of the fact that the energy sector is the biggest contributor of greenhouse gas (GHG) emissions, accounting for about 49.0 percent of the world's total, the PEP contains the policies, plans and programs that will significantly contribute to the country's transition towards a low carbon economy – an economy that generates minimal output of GHG emissions into the biosphere.

  In December 2010, the United Nations General Assembly declared the year 2012 as the International Year of Sustainable Energy for all. This global initiative engages the support of all governments, the private sector and civil society in ensuring universal access to modern energy services, double the global rate of energy efficiency by reducing energy use (14.0 percent) in 2030, double the share of and/or increase the share of renewable energy in the global energy mix from the current share of 15.0 percent.

- **ASEAN Plan of Action for Energy Cooperation (APAEC) 2010-2015**

  The PEP supports and contributes to the regional action plans and targets as espoused in APAEC 2010-2015. APAEC is the regional framework of energy cooperation highlighting the role of energy under the ASEAN Economic Community Blueprint 2015. It aims to enhance regional energy security and sustainability through aggressive implementation of action plans of the different program components – (1) ASEAN Power Grid; (2) Trans-ASEAN Gas Pipeline; (3) Coal and Clean Coal Technology; (4) Renewable Energy; (5) Energy Efficiency and Conservation; (6) Regional Energy Policy and Planning; and, (7) Civilian Nuclear Energy.

  Among the regional targets set in APAEC to be achieved in 2015 are: (a) 8.0 percent (aggregate) energy intensity reduction based on 2005 level; and (b) increase share of renewable energy resources to total installed power generating capacity of the region by 15.0 percent.

- **Asia Pacific Economic Cooperation (APEC) Green Growth**

  This Plan also adheres to the APEC Green Growth Goals which include the following: a) rationalization/phase out of inefficient fossil-fuel subsidies that encourage wasteful

consumption; b) reduction of aggregate (regional) energy intensity by 25.0 percent in 2030 and 45.0 percent in 2035 (based on 2005 level) as aspirational goal; c) promote energy efficiency; and, d) incorporate low-emissions development strategies to economic development plans, among others.

To contribute to the attainment of these broad policy and program frameworks, the DOE will work on ensuring the implementation of the following plans and programs:

A. Power Sector Development

The development plans on power systems, transmission highways, distribution facilities and missionary electrification provide the platform to put in place long-term reliable power supply, improve the country's transmission and distribution systems and attain nationwide electrification. Specifically, the PEP highlights the implementation of critical power infrastructures to address possible power outages. Based on the Plan, the government will concentrate its efforts on the completion of committed power projects, as well as attract local and foreign investors to venture into indicative and potential power projects to include electrification projects.

B. Fuelling Sustainable Transport Program

As one of the biggest user of energy, the energy sector is mainly concerned on other alternative options to fuel the transport sector. Thus, the PEP will pursue the implementation of the Fueling Sustainable Transport Program (FSTP) which seeks to convert public and private vehicles from diesel and gasoline to compressed natural gas (CNG), liquefied petroleum gas (LPG) and electric power. Under the program, CNG buses are envisioned to ply throughout the country. It also includes the promotion of electric vehicles for public transport and the increase in biofuels blends to 20.0 percent.

With the FSTP, the government hopes to reduce the carbon footprint from road transport in the Philippines. It has been estimated that road transportation accounts for around 50.0 percent of the total air pollutants in the country.

C. Indigenous Energy Development Program

As energy demand is anticipated to grow significantly over the indicated planning period, it is incumbent for the energy sector to pursue all means to develop the country's indigenous resources. In view of this, the Plan looks into a highly diverse energy mix to fuel the Philippine economy within the planning period. Even with the dawning of renewable energy development, the DOE recognizes the fact that the country will remain dependent on conventional fuels for many years to come to address its growing energy requirements. The Plan programs the conduct of energy contracting rounds as an effective strategy to bring in critical investments for the exploration, development and production of local energy resources.

D. National Renewable Energy Plan

With the global trend towards a clean energy future, the Renewable Energy Act was passed in 2008 to fully harness the country's renewable energy potential such as geothermal, hydro, wind, solar, biomass and ocean. To guide the full implementation of the law, the National Renewable Energy Program (NREP) was launched on 14 June 2011 by President Aquino. The PEP includes the targets set under the NREP to strengthen its energy security plan. Specifically, the NREP seeks to increase the country's renewable energy-based capacity by 2030.

E. Energy Efficiency and Conservation Program

With the escalating prices of imported fuels, the call for energy efficiency and conservation has graduated from merely just a personal virtue to that of a national commitment. The PEP includes the National Energy Efficiency and Conservation Program (NEECP) as one of the centerpiece strategies in pursuing energy security of the country and looks into it as a major solution to

the energy challenges of the future. To lay the groundwork for a national energy efficiency plan, the PEP recognizes the need for an energy conservation law as a critical measure in managing the country's energy demand. The proposed legislation aims to incorporate policies and measures to develop local energy auditors and energy managers, establish the ESCO industry, encourage the development of energy efficient technologies and provide incentives for the effective promotion of efficiency initiatives in the energy market sector.

F. Natural Gas Masterplan

A complementary initiative to ensure the country's energy security is the review and update of the Master Plan Study for the Development of the Natural Gas Industry in the Philippines. Said update includes an evaluation of the natural gas infrastructure requirements in the Visayas and Mindanao regions in view of the DOE's plan to implement a Natural Gas Infrastructure Development Plan in these regions. The Masterplan, with technical assistance from Japan International Cooperation Agency (JICA) and World Bank, evaluates the opportunities, critical infrastructures and required investments for the development of the natural gas industry.

ENERGY SECTOR'S PERFORMANCE

The 2012-2030 PEP provides the big picture on how the energy sector will proceed towards meeting its goals and mandate. The main chapters of the Plan highlights the 2011 vis-à-vis 2010 accomplishments of the energy sector. And to provide a more updated assessment, specified below are the major achievements for the period 2011 to 2012.

- There was an increase in primary energy supply of 7.8 percent from 39.4 Million Ton of Oil Equivalent (MTOE) in 2011 to 42.9 MTOE in 2012. However, the country's energy self-sufficiency level in 2012 declined to 56.3 percent from previous year level of 59.6 percent. Such reduction was attributed to a decreased share of natural gas and an increased importation of oil to meet the increasing domestic requirement specifically for the transport sector.

  Crude oil importation dropped by 6.7 percent from 69.61 million barrels (MMB) in 2011 to 64.94 MMB in 2012. Of the total imports, around 79.4 percent was sourced from the Middle East, bulk of which or 45.9 percent came from Saudi Arabia. On the other hand, finished petroleum product imports posted an increase of 18.9 percent or 54.75 MMB from 46.06 MMB in 2011. Diesel fuel exhibited the largest growth at 35.7 percent.

  Local refinery production decreased by 10.5 percent from 67.37 MMB in 2011 to 60.29 MMB in 2012. This was due to the maintenance shutdown of the two (2) refineries. Average refining output in 2012 stood at 164.7 thousand barrels (MB) per day compared with 184.6 MB per day in the previous year.

  The country's demand for petroleum products went up by 4.0 percent to 111.0 MMB from 106.32 MMB in 2011. This could be translated to an average daily requirement of 303.3 MB, higher than previous year's level of 291.3 MB.

- The power sector has always played a key role in driving the country's economy. Its stability and reliability are always of interest for a country that has an increasing trend with respect to its power demand.

Installed Capacity

Total installed capacity of the country increased by 6.0 percent in 2012 to 17,025.0 megawatts (MW) from the 2011 level of 16,226.9 MW.

Among the major island grids, Luzon registered the biggest increase in installed capacity at 5.4 percent from 11,811 MW in 2011 to 12,527.8 MW

in 2012. For the same periods, dependable capacity of the grid likewise increased by 4.8 percent from 10,824.4 MW to 11,348.7 MW. Said increase was attributed to the commercial operations of 651.6 MW coal power plant of GN Power, the 21.3 MW CIP II diesel power plant, and the 19.8 MW Green Future and 1.2 MW Pangea biomass power plants. The uprating of Binga Hydro Electric Power Plant from 100 MW to 125 MW also contributed to the increase.

In the Visayas, installed capacity stood at 2,448.0 MW, an increase of only 2.3 percent from 2011 level of 2,393.8 MW. Meanwhile, the dependable capacity went up by 3.3 percent from 2,036.8 MW in 2011 to 2,103.3 MW in 2012.

In Mindanao, ensuring enough power supply remained a major challenge with the island grid's ever growing demand and with not much additional capacity coming in. In 2012, installed capacity was recorded at 2,049.3 MW with minimal increase of 27 MW in capacity from previous year level of 2,022.0 MW. The additional capacity was due to the commercial operations of 3.2 MW King Energy (oil-based power plant), the 9.2 MW Cabulig Hydro Electric Power Plant, and the capacity expansion of Crystal Sugar (biomass) from 21 MW to 35.9 MW.

The government also came up with immediate and short-term measures to address the capacity gap in Mindanao. One of the solutions considered was the re-commissioning of the Iligan Diesel Power Plant which has a rated capacity of 100 MW.

The other immediate measures that the government considered to address the short-term supply gap were:

- *Interruptible Load Program (ILP).* Designed to entice greater participation from the different distribution utilities (DUs) with embedded generating capacities or those large users within their franchise areas having backup generating capacities to utilize such capacities. Under this program, the DUs with approved Energy Regulatory Commission (ERC) power rates will operate their embedded generating capacities, while the large users running their backup generator sets will be paid by the DU within its franchise area. The reduction of the power load requirements of the DUs with embedded generator will be transferred to other DUs requiring additional supply.

- *Interim Mindanao Electricity Market (IMEM).* The establishment of an electricity market in Mindanao is seen as a mechanism to provide for a central dispatch and price for available capacities. Transaction in the IMEM will only be undertaken during supply shortfall. Power generating companies with uncontracted capacities as well as DUs and large users with available embedded generating capacities may nominate/bid to the IMEM their available capacities for dispatch at approved bid price.

  It is expected that starting second half of 2014 onwards to 2015 and 2016, new capacities from committed power projects will be on commercial operation to provide the needed power supply requirement of the grid.

- *Power Generation.* Gross electricity generation in 2012 went up by 5.4 percent from previous year's level of 69,175.7 gigawatt-hours (GWh) to 72,299 GWh.

  Luzon grid generation posted an increase of 4.6 percent, while Visayas demonstrated a huge increase of almost 10.0 percent (15.0 percent in 2011) due to the 610 MW additional capacities from coal-fired power plants to the grid. On the other hand, despite experiencing suppressed demand from capacity constraints, the Mindanao grid exhibited 4.9 percent improvement in generation which was attributed to the relatively stable hydro facilities and from contribution of biomass-based power plant.

Generation from oil-based power plants also expanded on the same year.

The country's total generation from oil-based power plants accelerated by 25.2 percent from 3,397.6 GWh in 2011 to 4,254.0 GWh in 2012. The increase in generation was evident in Luzon grid with 39.5 percent, followed by Mindanao with 20.8 percent and Visayas with only 7.5 percent. Oil-based power plants were frequently dispatched in Luzon to provide additional supply in view of the planned outage of the 612-MW (block A) Ilijan Natural Gas Plant for about a month and to meet supply requirement during summer months. On the other hand, to reduce supply constraints in the Mindanao grid, generation from oil-based power plants was expanded.

With additional generating capacity, generation from coal increased by 11.5 percent from 25,342.2 GWh in 2011 to 28,264.9 GWh in 2012. Meanwhile, generation from natural gas dropped by 4.6 percent in 2012 from 20,591.3 GWh in 2011 to 19,641.5 GWh. The decrease was attributed to supply restriction from Malampaya as a result of maintenance shutdown in mid- July 2012, and the non-operation of Ilijan Natural Gas Power Plant due to scheduled outage on 18 November–18 December 2012. Contribution from geothermal power plants improved by 3.1 percent, providing 10,250 GWh in 2012 from previous year's level of 9,942.3 GWh. This was despite the decommissioning of the 49-MW Northern Negros Geothermal Power Plant, On the other hand, generation from hydroelectric power plants registered an increase of 5.7 percent from 9,697.5 GWh in 2011 to 10,252.1 GWh in 2012. Such came from an increase in generation in the Luzon grid by 9.4 percent with the uprating of Binga Hydroelectric Power Plant from 100 MW to 125 MW, and Mindanao grid by 2.2 percent with the commissioning of Cabulig Hydroelectric Power Plant. Higher and relatively stable water level during rainy months contributed to increased generation.

Other renewable energy combined generation, such as wind, solar and biomass, likewise rose by 26.8 contributing 250.5 GWh. However, their combined share only stood at 0.36 percent to the total generation. The significant increase was driven by the biomass generation with additional capacities from the commercial operation of 19.8-MW Green Future, 1.2-MW Pangea in Luzon and the capacity expansion of Crystal Sugar in Mindanao.

- The overall barangay electrification level in 2012 stood at 99.99 percent with only six (6) remaining to be unenergized. These barangays are located in the Autonomous Region for Muslim Mindanao (ARMM), specifically in the province of Maguindanao.

  Further to the goal of increasing electricity access, the government also focused its electrification initiatives to cover households as well as sitios. It is envisioned that 90.0 percent household electrification by 2017 and 100.0 percent sitio electrification by 2015 will be achieved. As of 2012, household electrification stood at 76.69 percent[1] with 16,114,213 out of the 21,010,890 households already provided with electricity. In the case of sitios, 87,474 out of the 121,983 potential sitios had access to electricity posting electrification level at 71.13 percent.

[1] Household and sitio electrification level is based on NEA's December 2012 Energization Status. The figure for HH only reflects those covered by electric cooperatives (ECs) and does not include those covered by private DUs.

Installation of PV systems at beneficiary areas

- Missionary electrification is one of the major undertakings in the power sector. The Qualified Third Party (QTP) program is implemented to open unviable areas for private sector investment and provide integrated generation and distribution electric services to households without access to power. In December 2012, Powersource Philippines, the first QTP project in Barangay Rio Tuba, Bataraza in Palawan installed and commissioned a biomass gasifier system and began operating eight (8) hours per day. Evaluation of the second QTP application by the same energy company has been completed for the Malapascua Island, Daan Bantayan in Cebu. The project will be providing 24/7 electricity services to about 800 households in the island.

  Ongoing coordination has been conducted for the third QTP project under the Semirara Mining Corporation. The project is expected to provide electricity to about 3,884 households in three (3) barangays in the island.

- Crude oil production in 2012 stood at 1.64 MMB, 90.5 percent of which came from the Galoc Field (producing about 1.48 MMB for the year). On the other hand, natural gas production from Malampaya for the same year stood at 134.56 BCF with associated condensate of about 4.75 MMB.

  During the 4th Philippine Energy Contracting Round (PECR) held in June 2011, the DOE received 20 bid proposals for petroleum exploration from the 15 offered areas. Of the 20 bid proposals, five (5) have been recommended for approval. Currently, the DOE is monitoring and supervising 27 Petroleum Service Contracts.

- Considering that coal remains to be a leading contributor to the country's energy supply, the government continues to optimize the exploration, development, production and utilization of indigenous coal reserves. In 2012, indigenous coal production (run-of-mine) was recorded at 7.4 million metric tons (MMMT). Of the total coal production, Semirara Mining Corporation provided the largest share of about 7.0 MMMT or 95.0 percent.

  Following the launching of PECR 4 for coal in December 2011 which offered 38 prospective coal areas, 57 out of 69 proposals were accepted. The Review and Evaluation Committee has recommended the approval of new coal operating contracts (COCs) for 18 areas. As of 2012, the DOE monitors and supervises 68 COCs and issued a total of 84 small-scale coal mining permits (SSCMPs).

- The NREP launched in June 2011 is the energy sector's roadmap in the next 20 years to develop sustainable energy system and access to clean and green energy. It is aimed at increasing the renewable energy (RE) installed capacity to 9,525 MW (as aspirational target), which is more than double the 2010 level as base year.

  In 2012, the DOE awarded 101 RE service contracts with total installed capacity of 2,565.94. Of the total, five (5) service contracts are for conversion (with total installed capacity of 1,061 MW) to avail of the incentives under the Renewable Energy Act. These RE Service Contracts are broken down as follows:

- Geothermal with eight (8);
- Hydro with 53;
- Biomass with seven (7);
- Wind with six (6); and,
- Solar with 27.

For the period 2010-2012, service contracts awarded already reached 258 comprising of 215 new service contracts and the remaining were for conversion.

- As of 2012, after 14 years under a deregulated downstream oil industry environment, there is a total of 1,908 players engaged in various activities like marketing, distribution and storage Total investment was estimated at PhP 42.60 billion.

  The DOE has been continuously monitoring the activities of the sector to ensure that there is adequate and stable supply of petroleum products in the country. Information on the sector's activities such as crude and product imports, exports and costs, price movements, refinery production, industry demand, distribution and inventory levels have also been maintained to promote fair and healthy competition in the sector.

  An Independent Oil Price Review Committee (IOPRC) was formed in 2012 to study if there is accumulation of excessive profits and unfair pricing. The final report of the study was submitted to DOE in August 2012 with the following major findings, among others:

  - Oil Deregulation Law's goals of increased competition and fair price (lower than in an oligopoly) are being achieved;
  - Deregulation has resulted in increased responsiveness of local pump prices (Metro Manila prices) to world oil prices;
  - Pump price response to changes in the world oil prices have been symmetrical; and,
  - Oil companies' profits are reasonable.

- To develop the downstream natural gas industry, Pilipinas Shell conducted a technical feasibility on the installation of a Floating Storage Regasification Unit (FSRU) in Batangas through a Memorandum of Understanding (MOU) signed with DOE in June 2012. The viability of the proposed FSRU is linked with the implementation of the Batangas-Manila (Batman 1) pipeline network. The results of the study will be available in the first semester of 2013[2]. On the other hand, the Philippine National Oil Company (PNOC) with assistance from JICA is conducting a feasibility study for Batman 1 in 2013.

  Meanwhile, the PNOC–Energy Corporation (PNOC-EC) will replace the Mamplasan CNG Refueling facility and put up a new one in the Port Area of Batangas City under the Natural Gas Vehicle Program for Public Transport (NGVPPT) pilot project. Said CNG refueling stations are expected to be operational by 1st quarter of 2014.

- In the promotion of alternative fuels for the transport sector, total production of biodiesel in 2012 reached 137.88 million liters, while that of bioethanol was at 32.44 million liters. The DOE issued a Certificate of Registration to one (1) biodiesel plant (Philippine Biochem Products, Inc.) in May 2012 with total capacity of 12 million liters per year.

  In terms of utilization on the mandatory use of 2.0 percent biodiesel blend and 10.0 percent bioethanol blend, total actual sales in 2012 for biodiesel stood at 137.47 million liters, while for bioethanol about 38.89 million liters (including inventory).

  The DOE collaborated with the academe on several biofuels projects to wit:

[2] Completed in July 2013

1. With Mariano Marcos State University (MMSU) in May 2012 on *"Village Scale Production of MMSU Hydrous Ethanol as Feedstock for R & D in Biofuel Trials and Anhydrous Ethanol Production;"*

2. With Xavier University in July 2012 on *"Bioethanol Production Potential of Different Cassava Varieties under Northern Mindanao Condition and Development of a Pilot-scale Cassava Bioethanol Plan;" and,*

3. With the University of Philippines Visayas Foundation, Inc. in August 2012 on the project *"Bioethanol Production from Macro-algae and Socio-ecological Implementations."*

- There are 41 CNG public utility buses commercially operating along South Luzon routes. To enhance incentives for CNG bus operators, the Department of Transportation and Communication (DOTC) signified its preferential approval of franchise applications for CNG-fed buses except for routes that pass along Epifanio Delos Santos Avenue (EDSA). Likewise, the Metropolitan Manila Development (MMDA) granted exemption to CNG buses under the the Unified Vehicle Volume Reduction Scheme.

  Meanwhile, the Auto-Liquefied Petroleum Gas (Auto-LPG) Repowering Program has benefitted the public transport through lower fuel cost of about PhP15.00/liter (LPG cost compared with conventional gasoline fuel). The program was able to facilitate the establishment of 321 accredited auto-LPG conversion shops.

  On the Electric Vehicle Program, there are 20 e-trike units in Mandaluyong City as a pilot project to assess the techno-economic viability of electric-powered tricycles. Under the ADB Loan Assistance Program, 100,000 e-trike units will be purchased to replace two-stroke tricycle units thereby reducing petroleum consumption and achievjng lower emission level. In November 2012, the loan negotiation between the government and ADB was concluded. Subsequently, said loan was approved by the ADB Board on 11 December 2012.

- A silver lining in energy management is the promotion of energy efficiency and conservation (EE&C) as a way of life for Filipinos. Under the government's NEECP, the country was able to save 4.79 MTOE in 2012. This is about 14.6 percent higher than the 2011 level of 4.10 MTOE. Several sub-components of the program have all contributed to the increase in energy savings, such as the use of energy labelling and efficiency standards, implementation of the government energy management program, conduct of IEC activities and the calibrated phase-out of inefficient energy technologies promoted by the Philippine Energy Efficiency Program (PEEP).

  As part of the PEEP, the DOE completed the distribution of 3.6 million compact fluorescent lamps (CFLs) through the 188 congressional districts and 51 party list representatives. Further, CFLs were also distributed to the disadvantaged individuals, families and communities under the Department of Social Welfare and Development's (DSWD) – National Poverty Reduction Strategy and Countryside Partnership.

  As part of the *Bright Now! Do Right! Be Bright!* Campaign, the DOE in partnership with ADB launched the *"Watts Out!"* TV Olympics in August 2012 to demonstrate the

most energy efficient technologies available in the local television market. The *Watts Out!* activity sought to demonstrate the impact of the appliance's power consumption to the monthly electricity bill. Television manufacturers participated in the activity and displayed their most efficient 32-inch CCFL- and LED-backlit Liquid Crystal Display (LCD) models. The power consumption of each of the television model was monitored during the course of event.

In September 2012, a total of 223 households were energized in the provinces of Antique (61), Aklan (29), Palawan (57) and Davao del Norte (76) through the free installation of efficient technology demonstration package. The package includes six (6) pieces of LED lamps, lockable battery, mounting structure, charge controller with built-in AM/FM radio and outlets for mobile phone charger using photovoltaic solar home systems in lieu of kerosene and candles.

The DOE, in partnership with JICA, conducted the *Development Study on Energy Efficiency and Conservation for the Philippines.* The study provided a concept design for the proposed legislation on energy efficiency and conservation.

ENERGY OUTLOOK

For this PEP Update, two (2) scenarios were developed for the supply side – the Business-as-Usual (BAU) and the Low Carbon Scenario (LCS). The BAU scenario simulates the future energy supply based on market forces interaction. On the other hand, LCS scenario considers the policy interventions and aggressive implementations of plans and programs for clean and environment-friendly energy fuels and technologies. On the demand side, the LCS scenario serves as the reference case with inclusion of the sector's goal of 10.0 percent energy savings on the total energy demand of all economic sectors by the end of the planning period.

Over the planning period, the total final energy consumption (TFEC) will exhibit an annual average growth rate of 2.8 percent. TFEC will reach 39.1 MTOE by the end of the planning period.

The transport sector will account for the biggest share at an annual average of 33.7 percent to the total energy consumption, and will post an annual average growth rate of 2.9 percent. The industry sector follows next with an average share of 34.1 percent and will exhibit the fastest growth at 5.1 percent annual average rate. Commercial, agriculture and residential sectors will post average growth rates of 2.7, 0.8 and -0.6 percent, respectively, for the planning horizon.

Oil will still be the major fuel accounting for an average share of 43.5 percent of the total energy demand. Such share of oil is lower than 2011 level of almost 50.0 percent share. This is attributed to target increase in biofuels blends – 20.0 percent for biodiesel by 2025 and bioethanol by 2020, the increase in the number of CNG buses and taxis, and the entry of electric vehicles starting with e-trikes.

For the transport sector, about 42.0 percent of the total energy demand of the sector is diesel followed by gasoline with 28.4 percent average share. With increased biofuels blends and the target increase in the number of CNG buses and taxis to 15,000 and 16,000 units, respectively, and e-vehicles to 230,000 units nationwide by the end of the planning period, significant amount of oil consumption (diesel and gasoline) will be displaced. The LPG for transport is also seen to increase over the planning period registering an annual average share of almost 1.0 percent. For the 16th Congress, an LPG Industry Bill will be proposed to regulate the utilization and safety requirement of the said fuel for transport.

Electricity consumption comes next with 22.9 percent average share and growing annually at 3.8 percent. The growth in electricity consumption has also factored in the 10.0 percent efficiency improvement with the aggressive implementation of the NEECP. The passage of an

EE & C Law, which will likewise be filed in the 16th Congress, will further strengthen the NEECP and vital to realizing the target efficiency improvement.

Coal consumption will also continue to grow at an annual average rate of 7.8 percent. On the other hand, biomass consumption is projected to decrease over the planning period due to the shift to more efficient fuel.

Total primary energy supply will grow at annual average rate of 3.4 percent to reach 73.9 MTOE in 2030 under the BAU. In comparison, the growth rate of total energy supply in LCS will be higher by 2.0 percentage points. Such is due to the utilization of more RE resources, such as hydro, geothermal, wind and solar, contributing about 37.3 percent average share to the total energy supply.

Oil and Oil Products

For the planning period, oil will still be the primary fuel source with an average share of 28.2 percent to the total energy supply and with an average growth rate of 2.1 percent in the BAU scenario. However, under LCS, the share of oil is expected to decline contributing an average of 27 percent share at an annual moderate growth rate of 1.9 percent on the average. This is attributed to increased penetration of alternative fuels and renewable energy.

The domestic upstream sector targets to harness potential oil and gas fields through the awarding of 61 Service Contracts from the conduct of the PECR during the planning period.

Natural Gas

Natural gas is seen to contribute an average share of 9.0 percent to the total primary supply increasing at an annual average growth rate of of 4.9 percent under BAU. The supply of gas will be basically sourced from Malampaya and additional gas (uncontracted gas) from other potential fields. The liquefied natural gas (LNG) importation is seen to provide additional gas supply requirement for the country in the LCS especially if no new gas fields will be discovered during the planning horizon. The share of natural gas in LCS is about 10.3 percent with a projected annual growth rate of 6.9 percent. Thus, it is critical to put in place vital infrastructures such as gas pipelines and LNG terminals for the development of the natural gas industry.

The updating of the Master Plan Study for the Development of the Natural Gas Industry in the country has been completed in March 2012 through the technical assistance of JICA. Meanwhile, a complementary study was conducted by World Bank on the feasibility of supplying natural gas in Mindanao, which was completed in June 2012. The WB study reviewed the current and existing LNG transportation, receiving, storage and regasification approaches, including analysis of a suitable LNG terminal site in the region. Further, the WB study also revisited the identified LNG sites in the Bataan peninsula. Another WB complementary study titled *"Mindanao Natural Gas Development Strategy"* was also conducted with the primary goal of determining the region's possible access to the international gas market.

A Downstream Natural Gas Industry Law will also be filed in the 16th Congress to provide the regulatory framework and incentives to prospective investors. Infrastructure development is strategic to ensure the supply of gas that will fuel prospective capacity additions from natural gas power plants, industry uses, and the CNG buses and taxis.

Coal

Coal will contribute an average share of 30.1 percent to the country's primary energy supply under the BAU and will increase at a rate of 7.2 percent annually during the planning period. The government targets to increase indigenous coal production by 100.0 percent. Increasing the contribution of indigenous coal would reduce coal

importation. Imported coal contributes around 70.0 percent average share to the country's supply requirements.

A much lower average growth rate of 4.8 percent is seen in the LCS with equivalent contribution of 25.2 percent average share to the primary energy supply. This is due to the utilization of more RE resources in the power generation, which will displace some capacities from coal.

Renewable Energy

Under the BAU, contribution from RE will grow at an annual average rate of 0.8 percent (and with average share of 32.6 percent) with only the committed RE power projects coming into the system.

The passage of Renewable Energy Act of 2008 strengthens the policy of the government to accelerate the exploration and development of RE resources in the country. With this, around 9,300 MW from indicative and potential RE resources (geothermal, hydro, wind, solar, biomass, and ocean) have been identified as aspirational target, which could be harnessed within the planning period.

For LCS, RE will grow at an annual average of 3.2 percent and will contribute an average share of 37.0 percent to the total energy supply. Geothermal will grow at an average rate of 4.2 percent contributing an average share of 64.0 percent of total RE. Meanwhile, hydro will exhibit 3.5 percent average growth rate and with an average share of 15.0 percent (total RE) within the planning period. Biomass will demonstrate 11.2 percent average share of RE. However, biomass supply will be on a downward trend by the end of the planning period. Combined share of solar and wind will be almost 1.0 percent and will exhibit an annual average growth rate of 20.4 percent.

Alternative Fuels (Biofuels)

Under both scenarios, the mandated 2.0 percent biodiesel blend (which started in 2009) will have to increase to 20.0 percent by 2025, and the 10.0 percent bioethanol blend (started in 2011) will be accelerated to 20.0 percent by 2020. With the required mandated blends, biodiesel will grow at an annual average growth rate of 15.5 percent, while bioethanol will increase by 9.5 percent.

Power Sector

The country's peak demand for power will grow at an annual average rate of 4.3 percent over the planning period. The country will need about 13,166.7 MW of new capacities to meet domestic power requirement – energy demand and reserve margin. From the needed capacity, 1,766.7 MW will be provided by committed power projects, while the remaining 11,400 MW will be available for private sector investment. Of the 11,400 MW, 8,400 MW will be baseload plants, 2,100 MW mid-range plants, and 900 MW peaking plants.

The investment requirement to pursue and undertake the sectoral targets for this plan update is estimated at Php 2.80 trillion. As such, the government must intensify its initiatives to promote and showcase the various energy investment opportunities with the private sector.

Considering the vulnerability of the energy sector to conditions like extreme weather patterns, an energy sector-wide climate change adaptation strategy is envisioned to be put in place. Said framework aims to address the climate change impacts in energy systems, such as power transmission and distribution systems, fuel distribution and renewable energy systems.