Department of Energy
Government of the Philippines

The Study for Verification on Achievement and Progress of the Energy Sector Reform of the Philippines

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Executive Summary

Background of Study

The Government of the Philippines started deregulation of the power generation sector in the late 1980s with a view to ease power shortage introducing the private sector to the industry. This effort largely solved electricity shortage, however, incurred problems such as soaring electricity tariff and inflating debts at the National Power Corporation (NPC). To cope with these, the government of the Philippines enforced the Electric Power Industry Reform Act of 2001 (EPIRA), implementing unbundling and privatization of the NPC and introduction of effective competition into the electricity industry. To date, unbundling and deregulation of the electric power generation, transmission and distribution sectors have made certain progress. However, the country is facing following problems;

a. The electricity tariff prevailing in the Philippines is highest among ASEAN countries damaging the competitive edge of the industry and affecting the living standard of the citizens.
b. The private sector investment would not necessarily follow the national power development plan to aim at the optimal power mix from social, economic and environmental consideration.
c. Rural electrification is difficult and costly due to the problems peculiar to isolated settlements and small islands that are of significant number in the country.

Under the circumstance, this Study aims to examine the present policy formulation in the Philippines and possible policy actions with regard to the appropriate role and the extent of participation of the government in the energy market management. The Study has been conducted by way of;

a. Policy Dialogues with ASEAN Countries held in Manila to exchange information on the current status and opinions on the direction and core principles of the energy policy inviting officers/experts from Indonesia, Thailand and Vietnam, and
b. Symposium on Investment Opportunities in the Philippines held in Tokyo inviting experts from Japanese industries and investors.

In addition, basic information was provided by the comparative study of ASEAN energy/electricity markets conducted by the Institute of Energy Economics, Japan (IEEJ) attached as Appendix-I Background Paper.

Findings of the Study

The Policy Dialogue with ASEAN countries was held in Manila from August 29 through September 4, 2013. Major findings of the Dialogue including among others are the differences among ASEAN countries in the role of the government sector leading the power sector development as explained below:

- *National plan*

Philippines and all invited countries have national plans for energy sector development. All invited countries have governmental function to lead the power development program through national power companies. Philippines also has power development plan, but it remains presentation of the future plan with no mandate for direct intervention in or administrative guidance for the market. Such architecture is common among matured economies. However, effectiveness of the national energy plan is relatively weak compared with other ASEAN countries.

- *Financing*

The Philippines government does not provide financial assistances for electricity sector development like other ASEAN countries such as institutional financing, government guarantee, or instruments to introduce foreign funds. Small/medium projects can be accommodated by local capitals and private banks, while problems are found in financing large scale projects such as large scale advanced coal plants and large hydro stations that need a huge fund and/or longer credit due to longer construction and cost recovery period.

- *Affordable access*

The electricity price in the Philippines is decided through market competition without governmental intervention. However, it is notable that all the invited countries more or less intervene in the electricity market and keep electric tariff substantially lower even after their subsidies are considered. The Philippine government is not given mandate or instrument to directly work to ensure cheaper cost and price. Other ASEAN countries provide direct support for electrification while electricity tariffs in the invited countries are much lower.

The Investment Symposium for Energy Sector in the Philippines was held on October 16, 2013, in Tokyo participated in by Japanese government officers, industry experts and investors. In his opening remarks, Energy Secretary Hon. Carlos Jericho L Petilla explained the present status and investment opportunities in the energy sector of the Philippines as follows:

a. The Philippines has restructured its power industry 12 years ago with enforcement of the EPIRA Law. The main part of the electricity industry has been liberalized, and now the government pays virtually no subsidies.
b. There are complaints among people on high electricity tariff.
c. The Philippines provides investor-friendly framework and welcomes Japanese investment in the energy sector. The DOE will provide support for investors to facilitate necessary permits from various government agencies.

The Symposium was informative to recognize the current status of the Philippines energy sector and the investment environment as well as available technology options for electricity development. Some investors showed concerns on the investment environment for foreign investors such as restriction on

the foreign share holding as well as cumbersome numerous procedures and permits. The DOE explained that it is trying to streamline the bureaucratic formality and provide supports for application for permits.

These conferences were quite informative, however, following points may be considered in preparing similar opportunities in future.

a. With longer preparatory period and more concrete investment promotion plans, participants may be able to develop more closely-focused discussion.
b. Matching with local partners will be crucial to lead to actual investment actions.

Observations for Improvement

The Philippines has successfully implemented power sector reform with least governmental market intervention. However, the government is facing the following problems;

a. While the marketization has paved the way to the transparency of the true cost, electricity tariff remains highest among ASEAN countries.
b. While the economy is expanding rapidly, power sector development may lag and become shackles to the sustainable economic development.
c. Rural electrification has to overcome difficult and costly access to isolated settlements and small islands.

These issues may be interpreted as questions how to guide the economy for long term investment in view of the following points;

1) Guiding the private sector, or the market, toward active investment to ensure sufficient power supply with optimal power mix along the time line as scheduled in the national plan.
2) Directing the market reform to realize internationally competitive electricity tariff, in particular, enhancing new investment for comprehensive development of the power sector, which is the most important factor in the long run.
3) Constructing interconnections among regional grids, which will expand the electricity market size and make it possible to benefit from economy of scale.
4) Facilitating development of basic infrastructure to construct a desirable fuel supply system such as natural gas import terminals and pipelines.
5) Facilitating introduction of advanced technologies such as high thermal efficiency plants, clean coal technologies, renewable energies, etc.
6) Promoting investment in capital intensive long term projects such as hydro power which requires a longer construction period, hence longer financial credit.
7) Promoting rural electrification in isolated villages and islands which are sub-commercial.

In summary, materialization of reasonable price is the present serious national concern of the Philippines to keep the competitive edge of other domestic industries as well as the comfort of the citizens' life. Also, since the power sector is the platform of the economy, it is essential to develop it in

a comprehensive manner along the time schedule coherent with the national economic development. It is of course important to keep in mind its nature of being public utilities to serve for the benefit of the whole society. The following summarize several approaches toward these issues.

Enhancing Market Competition

To ensure fair and affordable electricity prices as public utility service, it will be necessary to continuously monitor important issues such as,

a. Level and movement of the market prices if they are too high, too low or too vulnerable.
b. Competition condition if a sufficient number of even-handed players are participating and acting fairly in the market.
c. Business environment and profitability if players are enjoying excess profits or incurring undue losses.
d. Possibility if the present market mechanism and movement allows developing innovative technologies and businesses.

Reports covering these points may be reviewed from time to time by the committee comprising relevant government offices, industries, academies and other stakeholders. Then, if any remedial action is needed, some government office, most likely the DOE, may have the key role for improvement.

On the supply side of the wholesale market, power generators are presently guarded by the long term PPAs contracted with the former NPC and not exposed to competition. IPPs contracted with distributors are also exempted from competition. Thus, only a limited amount of electricity is supplied to WESM, while competition is not sufficient to reduce electricity price. To solve this situation, suppliers may be obligated to sell a sufficient quantity of electricity at WESM so that the overall electricity tariff will be more elastically adjusted from time to time. At the same time, WESM must offer attractive prices for generators sufficient to support additional investment. Or, the other way around, the approved long term PPA price may be reviewed more strictly to encourage trading at WESM.

On the demand side of the wholesale market, policy measures enhancing retail competition are installed in the Philippines in 2013 through the commercial implementation of the Retail Competition and Open Access (RCOA). Performance of this mechanism should be monitored carefully.

Ensuring Optimum Power Development

Ample and efficient supply capacity is the platform for fair competition and reasonable price. To this end, the power development plan must be prepared to optimize the electricity supply structure in the long run. A power plant, once built, will be locked-in for a long period in the national power mix with its own efficiency and environmental characteristics. In this regard, an optimum power development plan must be formulated and implemented as scheduled since any delay will greatly affect other sectors of the economy.

The electricity industry is an integrated system comprising various sub-sectors, and all of them must be developed in a coherent manner. Then, economics of individual projects in different sub-sectors are not same. Private capitals may flow toward the projects with higher profit potential and less uncertainties, but not to the projects with lower profit prospect and high uncertainties. In order to implement coherent development of a comprehensive plan, it is necessary to assure proper capital flows to all the sub-sectors. In addition, providing a huge amount of fund with long term credit may sometimes be beyond the capacity or favor of local private banks in developing countries when government support is not available. Institutional finance is an old fashioned policy tool, but very effective to ensure large scale construction at controlled cost. Introduction of foreign funds and investments are also well known measures to promote investment.

In other ASEAN countries, long term PPAs are functioning to provide the required assurance, while national companies are playing significant role to lead the power development. However, in the Philippines, electricity market has been liberalized in a form to virtually prohibit activities of the national power company. Therefore, it is necessary to create a different mechanism in its electricity market system to mitigate future uncertainties for investment. Several formulas such as “Vesting Contract” applied in Singapore, Capacity Mechanism” or “Capacity payment” considered in Europe, a variant formula of Feed-In Tariff (FIT) or Renewable Portfolio Standard (RPS), etc. may be considered in guiding investments toward the desirable power mix.

Aggregation of Demand

To ensure fair competition between sellers and purchasers, at the same time to enable lager scale transaction to enjoy economy of scale in investment, it is desirable to have greater players on both sides. However, this is far from the reality in the Philippines on the purchasers’ side. Except for the case of MERALCO, other power purchasers such as electric cooperatives are extremely small against the desirable size on the generators side.

The small ECs in the Philippines have recently shown a response that demonstrated reduction in electricity prices is possible through joint action. Twenty (20) ECs in Mindanao bidden 330 MW of their aggregated demand and eventually signed a power supply contract at Php4.09/kWh. In Central Luzon, the 12 ECs also aggregated and bidden jointly in October 2013 a 300 MW base load demand and the lowest offer that they received is Php3.70/kWh. The contracting of ECs which have no affiliated generation companies through competitive process resulted in substantially lower prices compared to MERALCO’s power supply contracts of Php4.50/kWh to Php5.50/kWh.

The joint action of small ECs can be institutionalized by National Electrification Administration (NEA) by issuing policy guidelines organizing the power supply aggregation of Electric Cooperatives for competitive bidding.

Reducing Power Rates in Economic Zones

The Economic Zones has been created to attract industrial investors. It can attract more investors if

the power rates can be reduced to a more competitive level through strategic investment of government corporations in power generation. If equity internal rate of return (EIRR) of the government corporation should be set at a risk-free rate (e.g., 7%) rather than private commercial expectation of 20%, and is applied together with institutional finance providing low interest loans, it will be quite effective to deal a lower power rates in Economic Zones.

Indigenous Resource fund

In view that an extremely high natural gas price is prevailing in the Asian market, excessive profit may be occurring at the indigenous resource producers while pushing up fuel prices for power generation. Then, such excessive profit may be absorbed by way of windfall profit tax and be used as Indigenous Resource Fund for infrastructure construction such as natural gas import terminals and gas pipelines. Similar concept may be considered if geothermal projects become excessively profitable due to the price mechanism applied; excessive profits may be diverted to infrastructure construction that will reduce electricity tariff such as transmission/delivery lines.

Infrastructure Construction by Expertise State Entity

For construction of energy infrastructure such as LNG import terminals and gas pipelines, other national entity like PNOC with specific expertise may be able to alleviate the technical and financial burden of the power sector.

Next Steps for the Electricity Sector Reform

Multi-stakeholder Roundtable

To cope with the challenges in the electricity market management to assure materialization of optimum power mix as well as reasonable electricity tariff, in-depth study should be conducted mainly in the following areas.

a. Review of the present market system if it properly functions as provided in EPIRA in the areas such as electricity tariff evaluation, monitoring and guidance
b. Formulation of power development plan to aim at optimal power mix and sorting out measures to enhance investment to orderly implement the plan
c. Restructuring of the electricity market system to enhance long term investment and facilitate fair and sound market competition with ample even-handed players such as aggregation of individual demand and separation of linked players
d. Examining benefits of government involvement in certain energy projects such as natural gas infrastructure construction and power supply project at special economic zones
e. Exploring ways to raise Indigenous Resource Fund and utilize for reduction of electricity tariff

To implement this, multi-stakeholder Energy Roundtable may be assembled inviting experts widely from among industries, academies and government offices. The DOE may act as the secretariat of the

Roundtable. Discussion results shall be formulated into policy recommendations as a consensus of the participants.

At the same time, as the new policy action must incorporate the global trend on energy and environment, exchanges with foreign countries, in particular neighboring ASEAN countries are important. In this regard, the DOE should continue the bilateral and multilateral dialogues with them as experienced under this program.

Next Steps

Based on the above discussion, we wish to recommend the following actions.

1) DOE will examine the value of setting up Energy Roundtable in the Philippines with a view to review energy market reform. If deemed valuable, DOE will set up Energy Roundtable inviting various stakeholders from among government offices, industries and academies.
2) DOE, as secretariat of the Energy Roundtable, will identify necessary study items, such as discussed in this Study, and invite in-depth studies for policy actions from among national researchers and experts.
3) Energy Roundtable will from time to time gather and discuss desirable policy actions. Once consensus is formed, recommendation for policy action shall be formulated and submitted to the government.

In addition to the above, the DOE should continue bilateral and multilateral dialogue among ASEAN countries for regular exchange of information and opinions on energy sector policy. Next step should probably be to initiate actions to schedule a region-wide dialogue with relevant officials and entities in the ASEAN.

Chapter 1 Outline of the Study

1.1 Background of the Study

In response to prevailing electricity shortage in the middle of the 1980s, the Government of Republic of the Philippines (herein after referred to as “GOP”) initiated in 1987 a system under which independent power producers (IPP) are able to participate in the electric power generation sector, and further developed deregulation of the power generation sector setting forth the law to introduce a BOT (build, operate and transfer) system. These efforts largely solved electricity shortage, however, incurred various problems such as soaring electricity tariff, inflating debts at the National Power Corporation (NPC), heavier burden on the government financing, etc. To cope with these problems, the GOP enforced the Electric Power Industry Reform Act of 2001 (EPIRA), main pillars of which are unbundling and privatization of the NPC and introduction of effective competition into the electricity industry.

Since then, unbundling and deregulation of the electric power generation, transmission and distribution sectors have made certain progress though behind the original schedule. Nevertheless, least improvement has been seen to date in the oligopoly status in the power sector occupied by several private capitals as well as the amount of debt at the NPC; EPIRA is yet to fully materialize the objectives originally expected.

Under the circumstance, in accordance with the request of the Department of Energy (DOE) of the Philippines, this Study aims to provide assistance and support on policy formulation with regard to the appropriate role and the extent of participation of the government in the energy market management.

In this Study, we have adopted an approach to promote International Policy Dialogue inviting high officials deeply engaged in energy policy formulation in neighboring ASEAN countries and exchange information and opinions as a method to explore for the direction and core principles of energy policy in addition to the Background Paper on the current status of energy sectors and energy policies in these countries. We selected Singapore, Thailand, Indonesia and Vietnam for such comparative study, as their energy sectors have reached a certain development stage among ASEAN countries. However, high officials of Singapore could not participate in the dialogue due to their tight schedule. Following are the reasons for selection of these countries for the comparative study;

a. Singapore has almost fully liberalized its electricity market like the Philippines, and will provide a good model where the liberalized electricity market effectively functions in the matured stage of economic development.
b. Thailand has established a stable electricity market policy liberalizing its market on one hand, and successfully completing the national electrification on the other. Indonesia is following Thailand in formulating electricity market policy.
c. Indonesia and the Philippines are both archipelago countries having a huge number of islands, which is an extremely tough condition in their pursuit of national electrification. To conquer

these difficulties, it is quite valuable for the two countries to exchange information and promote cooperation.

d. Indonesia and Vietnam are implementing marketization of the electricity sector, while struggling to secure stable supply capacity under the strong current of electricity demand increase. They share the same objective with the Philippines how to develop the electricity sector to cope with the strong demand increase, which requires a huge amount of fund and high technology accumulation.
e. Indonesia, Thailand and Vietnam hold certain amount of indigenous energy resources; however, they are going to be not sufficient to accommodate the ever increasing domestic demand. They are coming into the stage to curb export and/or increase import. Their energy markets are going to be more internationalized, accordingly. Thus, they are struggling against the same policy objective with the Philippines how they should secure stable energy supply and establish effective energy markets.

This Study is also positioned to side-support the policy action plans, which the Government of the Philippines is expected to implement as set forth in the program loan of 2012, namely, Development Policy Support Program – Investment Climate (DPSC-IC). The program sets out three action plans for the government, which are 1) improvement of industry competitive edge, 2) improvement of the infrastructure, 3) increase of employment. It is recognized that improvement of the electricity infrastructure is critically important in order to achieve the objective 1) and 2).

1.2 Objectives of the Study

The main objectives of the Study are to assist the Department of Energy (hereinafter referred to as "DOE" and also as the "Counterpart" as appropriate) in formulating the energy policy, in particular relating to the energy sector reform to reinforce the electricity supply and rationalize electricity tariff in the Philippines, collecting information on the current status, views and opinions on energy sector reform by way of policy dialogues with neighboring countries. High officials at the DOE who are deeply engaged in policy formulation will meet and exchange views and opinions with their counterparts and energy experts of ASEAN (Association of South-east Asian Nations) countries and Japan. To this end, the following tasks have been conducted;

a. Policy Dialogues inviting officers/experts from Indonesia, Thailand and Vietnam, held in Manila from August 29 through 4 September, 2013,and
b. Symposium on Investment Opportunities in the Philippines inviting experts from Japanese industries and investors, held in Tokyo on October 16.

Despite their willingness, Singapore declined the invitation to the Policy Dialogue due to their tight schedule. Progress of the Study is as summarized below.

1.3 Study Plan and Progress

1.3.1 Background Paper

The current status of the energy sector in the ASEAN countries was compiled through the preparatory study. Characteristics of the Filipino energy sector were analyzed in comparison with the other ASEAN countries via the following studies.

1) Study on data and literature

Electricity structure

Comparison of electricity structure reform in ASEAN countries in relation to energy policy, energy demand and supply, and energy resources

a. Electricity reform

Comparison of impacts of electricity reform in ASEAN countries in relation to electricity industry structure, electricity demand and supply, electricity facilities, development plans of electricity facilities, policies on electricity tariff and subsidies, financial information on electric power companies and unions

b. Specific factors

Current status and issues on specific factors on which the GOP is working in relation to environmental regulations, laws and institutions on renewable energies such as RPS (Renewables Portfolio Standard), FIT (Feed-in Tariff), etc. and energy conservation

c. Study status

Current status of the studies to cope with the situation at the government of the Philippines

d. Quantitative analysis

Comparative quantitative analysis of important factors relating to the structure of and policies for the electricity sector in the major ASEAN countries

2) Survey on the current status and issues of the electricity industry in countries participating in the policy dialogue as summarized in Chapter 2. In addition to collection of data and information, interviews were conducted to obtain views and comments of officials/experts.

3) Analysis and Summary

Based on the foregoing study, characteristics of the energy sector in the Philippines are analyzed and summarized as the background study as shown in Chapter 4.

1.3.2 Policy Dialogue

The current status of the energy sector in the ASEAN countries is analyzed as a background study. With this basic information being shared, policy dialogue workshops were held in Manila from 29 August through 4 September with ASEAN officials/experts, with a view to provide fundamental information for the C/P on policy formulation on the energy sector, in particular on the electricity sector. High-level works shops were held on the first day with each country, and following the discussion, technical workshops were held for in-depth discussion on the following day.

In October, a symposium was held in Tokyo on Investment Opportunities in the energy sector in the Philippines attended by Secretary Petilla and high officials from the DOE of the Philippines inviting Japanese business sector experts.

The gist of these functions is summarized in Chapter 5 and 6.

Based on the above study, policy recommendation shown in Chapter 6 of this report has been compiled that illustrates the direction of policies on energy and electricity reform to be considered for policy formulation in the Philippines.

Chapter 2 Power Situation in the Philippines and Comparison with Other Southeast Asian Countries

2.1 Current status of the Power Sector

The electricity services in the Philippines began a process of reforms toward liberalization in line with EPIRA, which came into effect in June 2001. The main Structural reform of EPIRA was three-fold, i.e. to divide and privatize the power generation and transmission assets owned by NPC; to make the market mechanism function by creation of a wholesale market; and to optimize electricity rates by encouraging healthy competition in the two areas of supply and demand through liberalization of the retail market. In the above process, the DOE is charged with planning and policy making related to electric utilities, whereas the Energy Regulatory Commission (ERC) is responsible for monitoring of the proper operation of EPIRA, such as price and market regulation.

In a more detailed description of the Philippine's electric utility system, its power generation activity is carried out by NPC and independent power producers (IPP). On the privatization of power plants owned by NPC, the Power Sector Assets and Liabilities Management (PSALM) is responsible for its administration. Juristically, the PSALM is set to exist for a period of 25 years from the effectivity of EPIRA, and all assets and liabilities held by it are to be divested or otherwise privatized by the expiration of its term of existence.

Concerning the power transmission business, the National Transmission Corporation (TRANSCO) was created under EPIRA to own and operate the power transmission assets of NPC. Subsequently, management of the national transmission network owned by the TRANSCO was taken over by a fully private National Grid Corporation of Philippines (NGCP) in 2008, when the latter won a public bidding for a concession contract. NGCP, a joint venture between State Grid Corp. of China and two Philippine investors, is in charge of developing and maintaining the nationwide transmission network as well as operating the national electricity grid for 25 years.

In addition to the above, as a part of the reform, the Wholesale Electricity Spot Market (WESM) was created in the main regions of Luzon (in 2006) and Visayas (in 2010). The WESM is operated and governed by the Philippine Electricity Market Corporation (PEMC) incorporated by the DOE as an independent entity. In WESM, all spot market transactions of IPP-generated power except bilateral contract quantities are settled in the market. Further, existing distributers are mandated by law to procure at least 10% of its electricity from WESM, where it is being studied to ultimately raise this ratio to 50% depending on the observed market trends.

The distribution of power in the Philippines is handled by so-called Distribution Utilities (DUs) who individually operate an exclusive franchise covering a particular geographical area and are made up with, in addition to 20 private electricity distributors such as Manila Electric Company (known as MERALCO) who supplies power to about 75% of the Luzon franchise area including the Metropolitan

Manila, and as many as 120 small scale entities called Electrification Cooperatives (ECs). These DUs procure power by trading in WESM or through bilateral transactions with power producers to sell electricity to consumers in the respective supply area.

In the Philippines, in addition to the above-described measures, the practice of Retail Competition and Open Access (RCOA) has been introduced in steps, and its initial commercial application started as of June 26, 2013, where large users with an average monthly peak demand of 1 MW or more are given a choice of a supplier. As discussed earlier, a consumer of electricity hitherto has had no choice but to purchase power from the DU who has an exclusive franchise covering the area where that consumer is domiciled. After the introduction of RCOA, this system will be changed such that the transactions are directed to go through an authorized electricity trader called a Retail Electricity Supplier (RES). It is expected that, by allowing consumers to choose a RES with the most advantageous supply offer, it is expected to improve consumers' bargaining position which will eventually lead to more competitively priced electricity. It is planned to expand the eligibility of RCOA to end-users of 750kW or more in two years after its initial implementation, and eventually to general household consumers.

In the following discussions, in addition to presenting an overview of the power situation in the Philippines, an attempt is made to quantitatively compare and analyze the power situation of the Philippines and the four other countries studied from various viewpoints including power generation cost, supply and demand, as well as electricity prices and the improvement potential, with an intent to identify characteristics and challenges for the power sector of the Philippines.

2.2 Economy and power consumption

According to the IEA statistics of the 2013 edition[1], power consumption[2] in the Philippine was 61,496 GWh in 2011, and the unit power consumption per GDP (gross domestic product) was 0.45 kWh per U.S. dollar. According to the demographic data provided by the IEA[3], the population of the Philippine in 2011 was 94.9 million equating to annual electricity consumption per capita of 582 kWh. Compared with the power consumption of 49,750 GWh in 2005, the consumption in 2011 represents an average annual growth rate of 3.6%. As the average annual GDP growth in real term during the same period was 4.8%, the GDP elasticity of electricity consumption was 0.8 in average.

[1] IEA, World Energy Statistics and Balances, Energy Balances of non-OECD Countries, 2013

[2] Obtained by subtracting transmission and distribution losses from the generated power, and includes the self-use in the conversion sector.

[3] For the population in the Philippines a variety of demographic data is available; according to the IEA statistics of the 2013 edition it was 94.85 million in 2011, and 95.05 million based on the 2013 edition of the World Bank statistics(latest available), or 94.2 million in the 2012 edition of the ADB statistics, and so on. In order to maintain the consistency of data, this section uses the IEA statistics to the extent possible.

Table 2.1 Power consumption and macroeconomic data

Year	Description	Unit	Philippines	Indonesia	Singapore	Thailand	Vietnam
2005							
	Real GDP	billion 2005 USD	103.1	285.9	123.5	176.4	52.9
	Population	Million Person	85.5	227	4.3	66.7	82.4
	GDP/Capita	2005 USD/Capita	1,205	1,258	28,951	2,644	642
	Electricity Consumption	GWh	49,750	113,133	36,290	125,259	47,781
	Electricity consumption /GDP	kWh/2005 USD	0.48	0.40	0.29	0.71	0.90
	Electricity consumption/Capita	kWh/person	582	498	8,507	1,878	580
2011							
	Real GDP	billion 2005 USD	136.3	402.2	177.3	210.3	78.6
	Population	Million Person	94.9	242.3	5.2	69.5	87.8
	GDP/Capita	2005 USD/Capita	1,437	1,660	34,194	3,024	895
	Electricity Consumption	GWh	61,496	165,712	43,565	154,190	94,277
	Electricity consumption /GDP	kWh/2005 USD	0.45	0.41	0.25	0.73	1.20
	Electricity consumption/Capita	kWh/person	648	684	8,404	2,218	1,073
2011-2005							
	Average Annual Growth Rate						
	GDP	%	4.8	5.9	6.2	3.0	6.8
	Electricity	%	3.6	6.6	3.1	3.5	12.0
	Elasticity		0.8	1.1	0.5	1.2	1.8

Source: IEA

Although the Philippine is in a level considerably higher than Vietnam in either the size of the economy (by GDP as a whole) or the economic standard (by per capita GDP), its per capita power consumption in 2011 remained at the lowest level among the five countries studied at this time. This appears mainly due to the impact of electricity prices[4]. On the other hand, the GDP elasticity of electricity consumption in the Philippines is lower than other countries studied except Singapore. As the reason for this, circumstances can be mentioned such as that repatriation of earnings by oversea workers account for more than 10% of the GDP, a lack of power-intensive industries, and others.

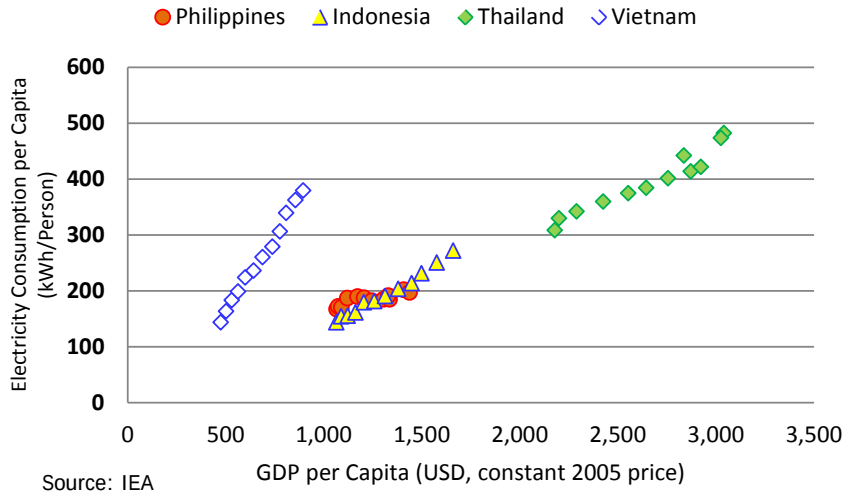


Figure 2.1 Economic standard and per capita electricity consumption

[4] See analysis of electricity prices later in this section.

2.3 Final consumption, structure and characteristics of power use

Final electricity consumption in the Philippine was 56,099 GWh in 2011, with an average annual growth rate of 3.7% over 45,158 GWh in 2005. In terms of consumption by sector, final consumption in the industrial sector was 19,334 GWh accounting for 34.5% of the total, consumption in the commercial sector was 16,624 GWh and 29.6%, and consumption in the residential sector was 18,694 GWh and 33.35%. The average annual rates of growth from 2005 in power consumption in each of the sectors mentioned above were 3.9%, 4.0%, and 2.6%, respectively. Also, during the period from 2005 to 2011, average annual rate of growth in power consumption in the residential sector was lower than that of the final power consumption overall. While the expansion of power consumption in the industrial sector was higher than that of the total, it was slightly lower than the commercial sector.

Table 2.2 Final power consumption in the studied countries

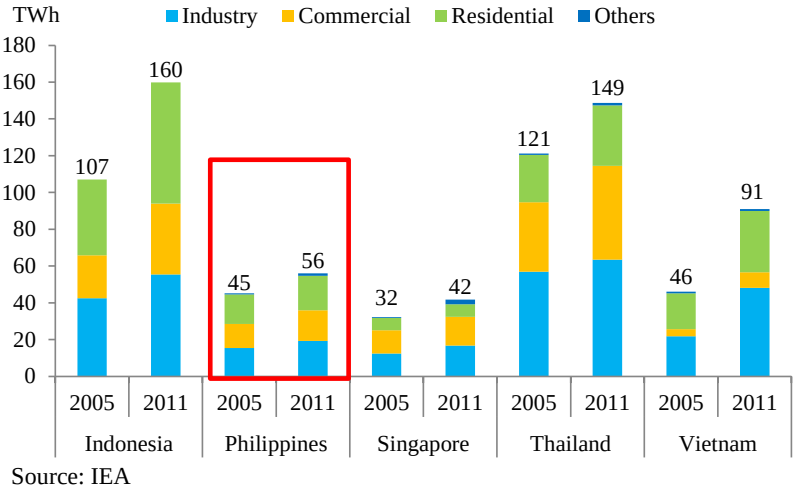
Description		Unit	Philippines	Indonesia	Singapore	Thailand	Vietnam
Final Electricity Demand (2005)		GWh	45,158	107,032	32,213	121,229	46,129
	Industry	GWh	15,411	42,448	12,457	56,885	21,743
	Commercial	GWh	13,134	23,400	12,616	37,863	3,936
	Residential	GWh	16,031	41,184	6,750	25,613	19,465
	Others	GWh	582	0	390	868	985
	Industry	%	34.1	39.7	38.7	46.9	47.1
	Commercial	%	29.1	21.9	39.2	31.2	8.5
	Residential	%	35.5	38.5	21.0	21.1	42.2
	Others	%	1.3	0.0	1.2	0.7	2.1
Final Electricity Demand (2011)		GWh	56,099	159,867	41,725	148,700	90,922
	Industry	GWh	19,334	55,375	16,775	63,418	48,135
	Commercial	GWh	16,624	38,608	15,653	51,019	8,438
	Residential	GWh	18,694	65,884	6,860	32,920	33,349
	Others	GWh	1,447	0	2,437	1,343	1,000
	Industry	%	34.5	34.6	40.2	42.6	52.9
	Commercial	%	29.6	24.2	37.5	34.3	9.3
	Residential	%	33.3	41.2	16.4	22.1	36.7
	Others	%	2.6	0.0	5.8	0.9	1.1
Annual Growth Rate (2005-2011)		%	3.7	6.9	4.4	3.5	12.0
	Industry	%	3.9	4.5	5.1	1.8	14.2
	Commercial	%	4.0	8.7	3.7	5.1	13.6
	Residential	%	2.6	8.1	0.3	4.3	9.4
	Others	%	16.4	-	35.7	7.5	0.3

Source: IEA

With regard to the breakdown of power consumption, it can be seen that the share of industrial consumption in the Philippines in 2011 is lower compared to four other countries studied at this time, indicating a characteristic of the power consumption structure of the Philippine. In addition, the

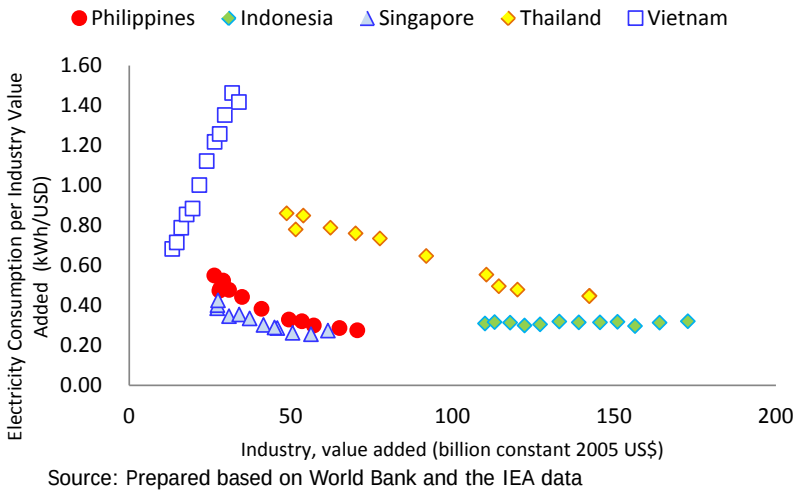
growth rate of industrial power consumption in the Philippine is low compared with the countries other than Thailand[5], and significantly so compared to 14.2% of Vietnam in particular. This may indirectly suggest that the development in the industrial sector in the Philippine is on a sluggish side.

Meanwhile, according to the World Bank statistics[6], industrial production in the Philippine (Industry, Value Added, 2005 constant price) was US$ 70.6 billion in 2011, and its industrial power consumption divided by the above amount was 0.27 kWh/$, which is roughly at the same level as Singapore. In addition, industrial power consumption per unit production in the Philippines has been declining in recent years, suggesting a need for examination on whether it is due to the energy saving effect or other factors.



Source: IEA

Figure 2.2 Power consumption by sector



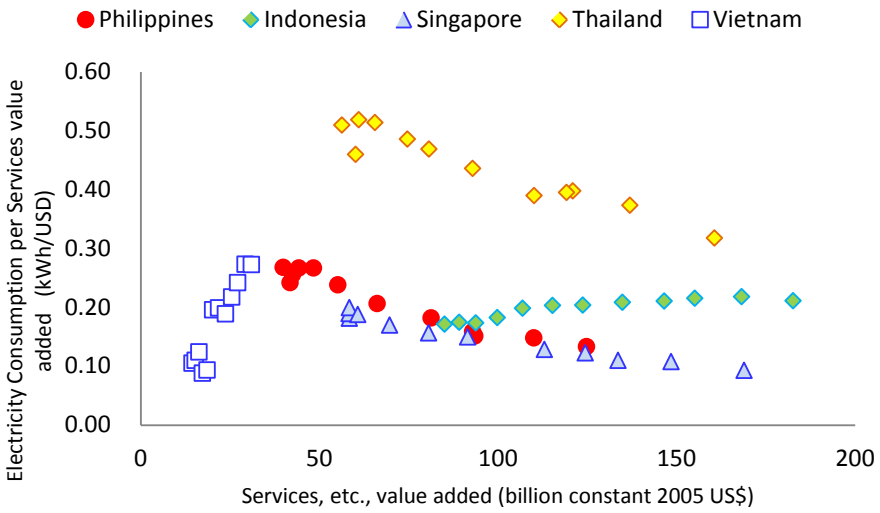
Source: Prepared based on World Bank and the IEA data

Figure 2.3 Scale of industrial sectors of studied countries and power consumption

[5] In recent years, economic development in Thailand has been hampered due to political instability and natural disasters such as floods.

[6] World Bank [http://databank.worldbank.org/data/databases.aspx]

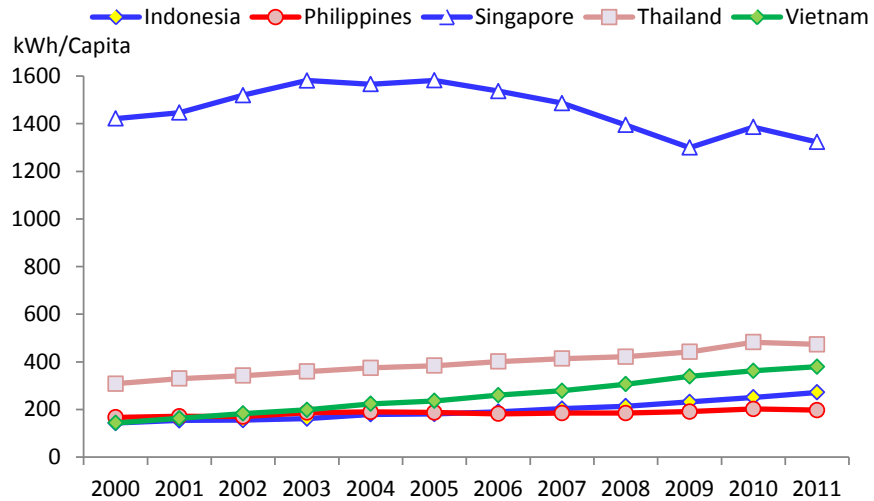
Next, commercial value-added in the Philippine provided in the same statistics (Services, etc., Value Added) was US$124.8 billion in 2011, and the intensity obtained by dividing the commercial power consumption with the above amount was 0.13 kWh/$, which is slightly higher than 0.09 kWh/$ in Singapore but lower than other countries in the study. As with the industrial sector, power intensity in the commercial sector has been declining year by year.



Source: Prepared based on World Bank and the IEA data

Figure 2.4 Scale of commercial sectors of studied countries and power consumption

Lastly, per capita power consumption in the Philippines as calculated from power consumption in the residential sector and the population is 197 kWh in 2011, which is not only significantly lower than 1,323 kWh of Singapore with a high economic standard or 474 kWh of Thailand, but much lower than 272 kWh of Indonesia with the same economic scale or 380 kWh of Vietnam at an economic level even lower than the Philippines.



Source: Prepared based on World Bank and the IEA data

Figure 2.5 Residential power consumption intensity of the studied countries

2.4 Power supply

The amount of power generation in the Philippines in 2011 was 69,176 GWh, with an average annual growth rate of 3.4% registered for the period from 2005 to 2011. Of the total power generation, coal-fired thermal power contributed 25,342 GWh (accounting for 36.6% of the total generation, the same for below figures), the natural gas-fired thermal power 20,591 GWh (29.8%), oil-fired thermal power 3,398 GWh (4.9%), renewable energy (i.e., geothermal) 10,147 GWh (14.7%), and 9,698 GWh for hydropower (14.0%). For the power mix of 2011, the share of coal-fired power generation showed a significant rise of 9.7% in comparison with that of 2005, while the share of oil-fired thermal power fell by 5.9%. Also, in terms of sources of energy in 2012 (by installed capacity), it can be seen that oil-fired power generation is higher compared to other countries in this study with exception of Singapore. This is presumably caused mainly due to power supply for island regions where oil-fired power (i.e., diesel generators) is utilized in many cases. It can be suggested therefore that remote islands have a high potential of introducing a hybrid system of diesel power generation and renewable energy.

Table 2.3 Power source configuration and fuel mix

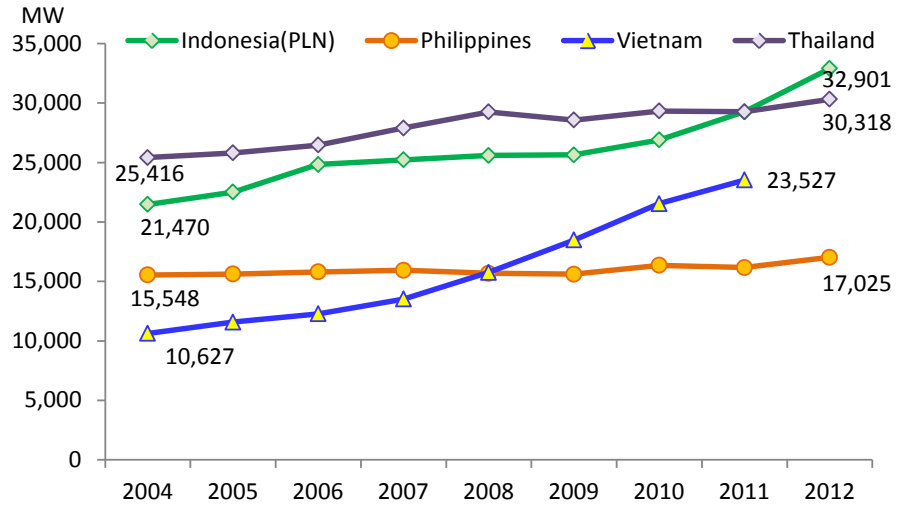
Item		Unit	Philippines	Indonesia	Singapore	Thailand	Vietnam
Electricity Generation (2005)		GWh	56,567	127,751	38,213	132,198	53,462
	Coal	%	27.0	40.5	0.0	15.5	22.8
	Natural gas	%	29.8	13.9	74.4	72.3	41.8
	Oil	%	10.9	31.9	23.1	6.6	4.0
	Renewable	%	17.5	5.2	2.5	1.2	0.0
	Hydro	%	14.8	8.4	0.0	4.4	31.7
Electricity Generation (2011)		GWh	69,176	182,384	45,999	155,986	99,179
	Coal	%	36.6	44.4	0.0	22.3	21.1
	Natural gas	%	29.8	20.3	78.0	68.3	43.9
	Oil	%	4.9	23.2	18.4	1.3	4.8
	Renewable	%	14.7	5.2	3.6	2.8	0.0
	Hydro	%	14.0	6.8	0.0	5.2	30.1
Annual Growth Rate (2005-2011)		%	3.4	6.1	3.1	2.8	10.8
Installed Capacity (2012)		MK	17,026	33,251	10,478	32,871	26,839
	Coal	%	32.7	50.3	0.0	21.0	17.7
	Natural gas	%	16.8	23.4	65.3	68.5	26.5
	Oil	%	18.1	15.0	31.8	1.0	2.0
	Renewable /Others	%	11.8	4.9	2.9	5.6	5.5
	Hydro	%	20.7	6.4	0.0	3.9	48.3

Source: IEA [Energy Database 2013], etc.

Compared with four other countries, the power source configuration and generation fuel mix in the Philippines show higher shares for hydro and geothermal power with the total of the two being more than 30%. Furthermore, with regard to the comparison of fuel mix for thermal power generation among the countries, as opposed to high shares of natural gas in Thailand and Singapore and a

relatively high share of coal and oil in Indonesia, the share of oil and natural gas is significantly smaller in the case of the Philippines. Under such power source configuration and generation fuel mix, the effect of rising fossil fuel prices worldwide on the generation cost may be smaller compared to other countries, and the average fuel cost could be relatively low as well.

According to statistics and other references available for respective countries, installed generation capacity in Vietnam was 10,627 MW in 2004[7], and more than doubled in seven years to 23,527 MW in 2011, with an average annual rate of increase registering 12.0%. The installed capacity in Indonesia[8] (only for PLN) increased from 21,470 MW in 2004 by 11,431 MW to 32,901 MW in 2012, registering an average annual growth rate of 5.5%. In Thailand, due to the impact of economic recession, its installed capacity[9] at 30,318 MW in 2011 showed an increase of only 4,902 MW from 25,416 MW in 2004, with an average annual growth rate of 2.2%. On the other hand, generating capacity in the Philippines[10] was 17,025 MW in 2012, registering an increase of only 1,477 MW in eight years from 15,548 MW in 2004, or the average rate of increase of 1.1% during the same period.



Source: Prepared based on respective Annual Reports, etc.

Figure 2.6 Development of installed capacities in studied countries

In recent years, the pace of expansion in power generation facilities in the Philippines has been lower than that of its electricity demand or economic development, resulting in a GDP elasticity of facility expansion of only 0.1. Because of differences in economic structure, the pace of increase in power generation facilities in developing countries in general is higher than the rate of GDP growth in a country with an emphasis on industrial development, and higher than 0.5 even in other economies. It may not be an exaggeration to regard that power development in the Philippines is lagging behind. If such stagnation in power development continues as it is, it may cause a disincentive against economic growth.

[7] MOIT [APEC Energy Model Building Seminar 2013]
[8] Perusahaan Listrik Negara Persoro (PLN) [Statistics 2013]
[9] EGA [Statistics 2013]
[10] DOE [Electricity Statistics]

2.5 Power development

According to the 2013 edition of the power development plan by the government of the Philippines[11], the average annual growth rate of electricity demand in the three major grids (i.e., Luzon, Visayas, and Mindanao Regions) for the period covering 2012-2030 is forecast at 4.13%, 4.52%, and 4.75%, respectively. It also considers necessary to introduce a new capacity of 11,400 MW before the 2015 – 2030 period. However, as its planning assumptions are not explicitly given, it is difficult to determine the suitability or appropriateness of the plans at this time.

Table 2.4 Power development plans in the Philippines up to 2030 (in MW)

		Luzon	Visayas	Mindanao	Philippines
Committed Power Projects					
	Coal	735	270	500	1,505
	Oil-based	21		30	51
	Hydro		16	8	24
	Geothermal	20	20	50	90
	Biomass	25.2	4		29.2
	Wind	67.5			67.5
	Sub Total	869	310	588	1,767
Indicative Power Projects					
	Coal	3,075	266	420	3,761
	Oil-based	150			150
	Natural Gas	1,150			1,150
	Hydro			32	32
	Geothermal	120	80		200
	Biomass	32.3	130	35	197.3
	Wind	466	104	5	575
	Solar			35	35
	Sub Total	4,993	580	527	6,100
Total		5,862	890	1,115	7,867

Source: DOE [Power Development Plan]

According to the above plans, the generation capacity of confirmed construction projects or those under construction for completion by 2020 totals 1,767 MW, while the aggregated capacity of projects for which construction plans have been announced but not necessarily with firm investment programs is 6,100 MW. Of the construction projects that have been confirmed or already under construction, 85% of the planned capacity is coal-fired thermal power, whereas about 62% of projects with announced plans employ the same. Also in the above program, other plans have been added to introduce natural gas-fired power plants with the total capacity of 1,150 MW during 2013-2015. However, as of 2013, construction and start-ups of natural gas-fired power plants are behind schedule as an inevitable result of delays in construction of LNG terminals or pipeline systems required, triggering a doubt on whether the above plans could be implemented as scheduled. It is noted that if this condition is left unattended, there is a possibility that shortage of power supply against demand might cause a serious problem in the future.

[11] DOE [2012 PDP]

Table 2.5 GDP elasticity of power consumption and installed capacity (2005-2011)

Description		Unit	Philippines	Indonesia	Thailand	Vietnam
GDP		%	4.8	5.9	3.0	6.8
Electricity Demand		%	3.6	6.6	3.5	12.0
Installed Capacity		%	0.6	4.5	2.1	12.5
Elasticity	Capacity/GDP		0.1	0.8	0.7	1.8
	Demand/GDP		0.2	0.7	0.6	1.0

Source: Prepared based on various materials

2.6 Power generation and transmission/distribution efficiencies

According to the IEA data on various thermal power plants of the countries studied for 2005 and 2011, thermal efficiency of coal-fired power plants in the Philippines in 2011 was 35.2%, whereas natural gas-fired power 56.7%, oil-fired power 36.7%, and the average for fossil fuel-burning power plants was 41.9%. The 2011 efficiency of fossil fuel-fired power plants in the Philippines, while it is lower than the three countries except Indonesia, has slightly improved in comparison with that of 2005. However, considering that the thermal efficiency of coal-fired power plants in Japan exceeds 40% in average, generation efficiency of fossil fuel-fired power plants in the Philippines is still low, leaving a considerable room for improvement. On the other hand, thermal efficiency of natural gas-fired power plants in the Philippines is the highest among the countries studied and roughly comparable to 58.6% observed in Japan. Estimating from factors such as the types and timing of introduction of existing power plants in the Philippines, it would appear that the thermal efficiency data may have been reported with higher performance than reality. However, in the face of chronic shortage of power generation capacity or under the terms of power sales contracts, those gas-fired power plants in the Philippines, unlike Japan, are conceivably operated close to full capacity leading to the high efficiencies.

With regard to transmission and distribution losses, the rates of losses in the studied countries are declining year by year. The amount of transmission and distribution losses in the Philippines in 2011 was 7,680 GWh, and the ratio as a percentage of total domestic power supply was 11.1%, which shows an improvement over 12.1% of 2005. However, the above figure is higher than any of the other countries studied. As transmission and distribution losses in Indonesia with the same geographical condition of an island nation are at 9.1%, there is room for improvement in the transmission and distribution systems in the Philippines. Furthermore, according to some information, there seem to be electricity theft problems in the Philippines indicating the need for countermeasures including strengthened oversight and education.

Table 2.6 Thermal efficiency of thermal power plants in the countries studied

Description			Indonesia		Philippines		Sigapore		Thailand		Vietnam	
			2005	2011	2005	2011	2005	2011	2005	2011	2005	2011
Fuel Consumption												
	Coal	ktoe	13,436	21,881	4,550	6,194	-	-	4,846	8,764	3,132	5,140
	Oil and oil products	ktoe	9,343	10,350	1,426	796	2,190	1,872	1,985	440	679	1,266
	Natural gas	ktoe	4,108	8,251	2,491	3,123	5,431	6,296	19,013	19,159	4,813	7,627
	Thermal power	ktoe	26,887	40,482	8,467	10,113	7,621	8,168	25,844	28,363	8,624	14,033
Generation												
	Coal	GWh	51,793	81,000	15,257	25,342	-	-	20,522	34,809	12,173	20,920
	Oil and oil products	GWh	40,809	42,305	6,141	3,398	8,827	8,464	8,724	2,062	2,132	4,749
	Natural gas	GWh	17,820	37,090	16,861	20,591	28,430	35,879	95,621	106,566	22,356	43,548
	Thermal power	GWh	110,422	160,395	38,259	49,331	37,257	44,343	124,867	143,437	36,661	69,217
Efficiency												
	Coal	%	33.1	31.8	28.8	35.2	-	-	36.4	34.2	33.4	35.0
	Oil and oil products	%	37.6	35.1	37.0	36.7	34.7	38.9	37.8	40.3	27.0	32.3
	Natural gas	%	37.3	38.7	58.2	56.7	45.0	49.0	43.2	47.8	39.9	49.1
	Thermal power	%	35.3	34.1	38.9	41.9	42.0	46.7	41.5	43.5	36.6	42.4

Source: IEA

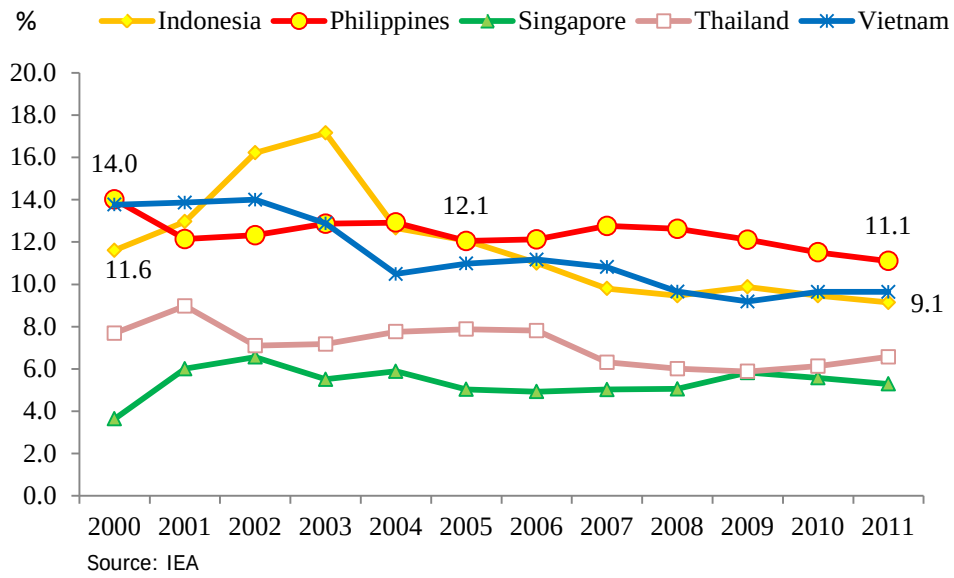


Figure 2.7 Historical transmission and distribution losses

2.7 Electricity prices and cost components in the Philippines

In view of its national economic standard or relative tariff levels in neighboring economies, electricity prices in the Philippines could be regarded as extraordinarily high. For example, according to the Philippine Department of Energy (DOE) data, in terms of U.S. dollars at the 2011 average exchange rate, the average price for industrial use was 19.4 ¢/kWh, commercial electricity was 21.0 ¢/kWh, and household electricity charge by the national average was 20.8 ¢/kWh, respectively in 2011. The foregoing prices are much higher than those of the ASEAN countries, and are only slightly different from electricity prices in Japan.

According to the World Bank statistics[12], household consumption expenditure per capita in the Philippines was US$1,732 in 2011, as compared to US$18,098 for Singapore, US$2,829 for Thailand, US$1,895 for Indonesia, and US$ 905 for Vietnam.

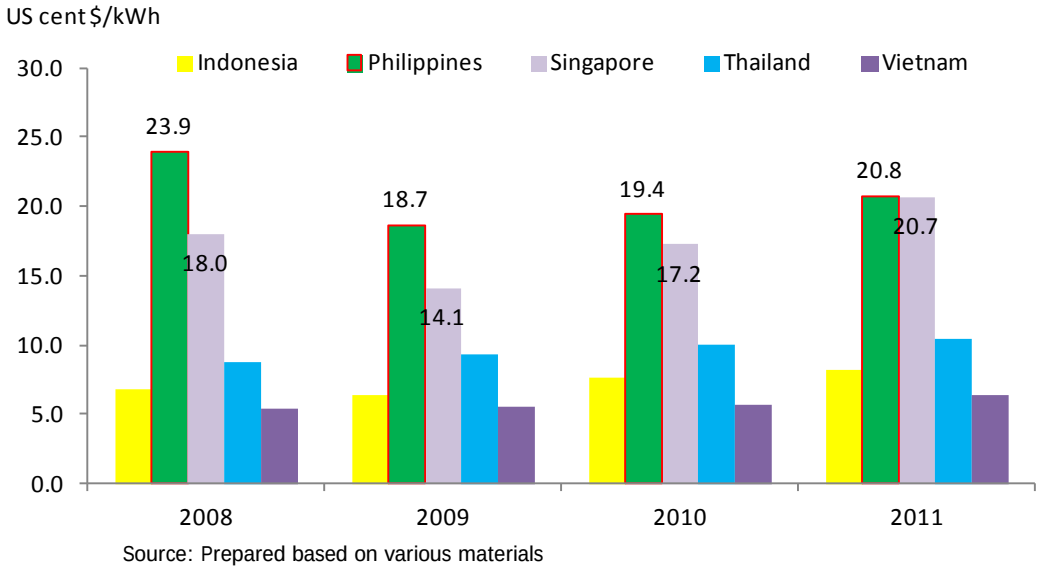


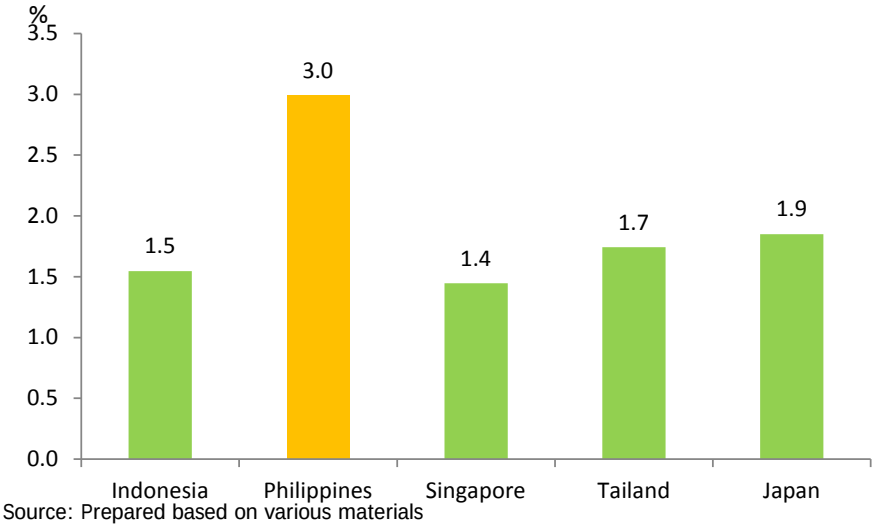
Figure 2.8 Electricity prices in the studied countries (2011)

Meanwhile, using data available from the Philippine Statistical Yearbook and relevant power statistics, i.e., power consumption in the residential sector in 2011 of 18,694 GWh, electrification rate of 79%[13], and with the population of 94.85 million, annual electricity consumption per capita can be calculated as 249 kWh. When calculated on the basis of electricity charges of the same year (national average), annual electricity consumption expenditure per capita was US$51.8, accounting for 3.0% of per capita household final consumption expenditure. By comparison, the ratio of power use as a percentage of final household consumption expenditure per capita in Singapore, calculated in the same way, was 1.4%, while it was 1.9% in Japan. The above would portray a picture where, as shown in Figure 1.9, relative power consumption expenditure in the Philippines is peculiarly high since its per capita GDP is about the same as Indonesia. In spite of this, more elaborate verification may be required regarding the statistics discussed herein.

By the same token, when calculated from the sales performance of the Manila Electric Company (Meralco)[14], per household electricity consumption in the Metro Manila in 2011 was 2,065 kWh. Given an average number of household members of four to five, the above equates to per capita power consumption of 400 to 500 kWh per year, i.e., approximately two times the national average is used in urban areas. Although there are no statistics available to enable a direct comparison of the above figure with consumer spending, unless the household spending in urban areas becomes about four times the national average, the power consumption expenditure does not fall to a level comparable to other

[12] World Bank Database[http://databank.worldbank.org/data/databases.aspx]
[13] JICA Study [Energy Status of Selected ASEAN Countries]
[14] Meralco [Annual Report 2012]

countries in the study. As this seems to be somewhat unrealistic, it would be safe to conclude that the power expenditure ratio in the Philippines is well above the level of other countries in the study group.



Source: Prepared based on various materials

Figure 2.9 Ratio of power consumption spending to per capita household expenditure

The above analyses would lead to an observation that the electricity prices of the Philippines at such a high level may have a substantial impact on people's daily living and also work as a limiting factor for direct foreign investments as well as domestic industry development. When calculated based on the actual results from 2000 to 2011, the short-term price elasticity of power consumption in the industrial sector was -0.3, whereas it was -0.8 in the commercial sector and -1.1 for power consumption in the residential sector. The above suggests that when electricity charge goes up by 1%, power consumption in the household sector decreases by 1.1%. For the household expenditure in general, while the income effect works strongly, the price elasticity is low. Therefore the high price elasticity found in the residential sector in the Philippines appears almost anomalous.

Meneleo J. Carlos, Jr., Chairman of the Federation of Philippine Industries (FPI) pointed out that the high electricity price was proving the largest reason for foreign enterprises to have second thoughts about investing into the Philippines[15].

2.8 Why electricity prices are high in the Philippines

In this section, an attempt is made to shed light on possible causes for the high electricity prices discussed above, by analyzing the cost structure covering power generation to distribution in the Philippines in comparison with those in Singapore and Thailand.

With the electricity liberalization in the Philippines, power generation, transmission, and distribution have been unbundled in the power sector and electricity prices are also made to reflect cost of the respective elements.

[15] http://nna.jp/free/news/20110208php002A.html

2.7.1 Cost of power generation

First, according to the 2011 annual report of Aboitiz Power Corporation[16], Cebu, the Philippines, the amount of power generated in 2011 was 9,422 GWh, expenditure in its power generation segment (excluding the cost of purchased power) was 20,655 million Philippine Pesos (PHP), while its revenue was PHP 54,447 million. Calculating from the foregoing, unit power generation cost equates to 2.2 PHP/kWh (5.1 US¢/kWh), whereas unit electricity selling price was 5.8 PHP/kWh (13.3 US¢/kWh).

Next, according to the 2012 annual report of SEM-Calaca Power Corporation[17] (a subsidiary of Semirara Mining Corporation), which operates coal-fired power plants, the quantity of electricity sold was 2,025 GWh in 2011 (2,355 GWh in 2012) and the revenue from electricity sale in 2011 was PHP 9,612 million (PHP 9,700 million in 2012), and the unit selling price of electricity by a simple calculation was 4.8 PHP/kWh (4.1 PHP/kWh in 2012), or, in terms of U.S. dollar, the above amounts to 10.5 US¢/kWh in 2011. Meanwhile, the quantity of power generated in 2011 was 1,860 GWh, with the balance 472 GWh being purchased from outside at an average cost of 3.2 PHP/kWh. The net cost for electricity generation in 2011 was PHP 5,559 million, which equates to an average unit generation cost of 2.8 PHP/ kWh (6.1 US¢/kWh). From the company's cash flow statements in 2012, it can be seen that the fuel-related costs accounted for 68.0% of the total cost, whereas power purchase cost accounted for 2.7%, maintenance and operation for 6.9%, labor for 3.0%, and others (mostly depreciation and amortization) for 19.4%.

Likewise, looking at the 2012 annual report of Energy Development Corporation (EDC)[18], which operates the world's largest geothermal power plant, electricity sales in 2011 was about 6,839 GWh, the revenue from the sales was PHP 24.5 billion, and the unit selling price obtained with a simple calculation was 3.6 PHP/kWh (about 8.0 US¢ kWh).

Lastly, according to the 2011 annual report of Philippines' state-run utility, National Power Corporation (NPC)[19], while NPC's power generation performance is on a declining trend, its power generation operation is mainly by hydropower facilities that seemingly are almost fully depreciated. In addition, in 2011, the company received a subsidy of PHP 2,257 million from the government. According to the analysis of an expert on power industry in the Philippines, the subsidy was extended by the National Government to NPC in 2011 because the level of the Universal Charge (this is the regulated tariff imposed on all consumers to provide subsidies in small isolated islands) at the time was not sufficient to cover the expenses of the NPC for Small Power Utilities Group (SPUG). Fuel suppliers had stopped delivering fuel to certain areas because of unpaid fuel bills. Areas of Batanes and Camotes, among others, actually ran out of fuel and SPUG could no longer operate its power plants in these areas. The government intervened through DOE providing a direct subsidy to the NPC

[16] Aboitiz Power has total generation capacity of 2,350 MW comprising 439 MW hydropower, 467 MW geothermal, 844 MW coal-fired and 600 MW oil-fired thermal power plants, altogether accounting for 14.5% of total installed capacity of 16,162 MW in the Philippines. Its amount of generated power was 9,422 GWh or 5.0% of the national total.

[17] Installed generation capacity estimated at 600MW, and an additional 300MW under construction.

[18] http://www.energy.com.ph/

[19] 2011 Annual Report [http://www.napocor.gov.ph/]

to pay for the fuel bills.

The same was true for NPPs, or New Power Providers (private generators), operating in SPUG areas. NPPs receive subsidies through UCs but when UCs got run out of fund in 2011, they also had to be paid via cash infusion from the government.

This subsidy was provided only as a one-time emergency response. The NPC no longer receives same subsidy from the government as the ERC has already approved the increase in Universal Charge level.

The 2011 net income generated through activities such as power generation was PHP 6,846 million, while the total expenditure including PHP 6,313 million for power generation was PHP 7,951 million, resulting in a deficit amounting to PHP 1,105 million. The above annual report does not publish data items such as power generation, sales amount, etc. to enable direct calculation of the wholesale price or cost of generation. According to the electricity statistics of the Philippine DOE, the amount of power generated by NPC in 2011 was 5,685 GWh, and calculating from its expenditure for power generation, NPC's cost of generation in 2011 is 1.1 PHP/kWh, which is drastically low compared to other power generation companies. The main reason for this is considered to be that NPC mainly produces hydroelectric power through facilities that are already fully paid off. Nevertheless, the existence of such a magnitude of difference found between NPC and other power generation companies suggests that there may be some problems with statistics of the Philippine DOE or published figures in the annual report of NPC.

With an average power generation cost of three companies other than NPC being 6.3 US¢/kWh and average selling price of 11.2 US¢/kWh, these companies sell their electricity at prices nearly as much as double the cost.

It should be noted here that, of the four companies investigated in the above, the balance sheet of two companies included loss of all types such as technical loss or power theft in the expenditure items. The loss statement of Aboitiz Power in 2011 declared PHP 1,229 million, whereas PHP 1,105 million has been recorded for NPC.

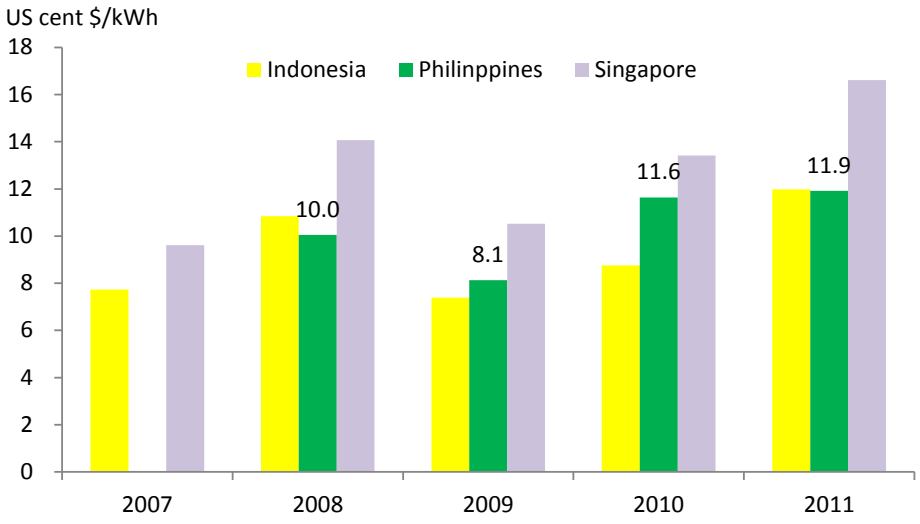
The cost of power generation in the Philippines (as exemplified by contract power suppliers to Meralco) is higher than that in Indonesia (i.e., PLN) although it is lower than Singapore. The source of electricity for Singapore is oil and natural gas, all dependent on imports, except for a negligibly small amount of renewable energy (waste power generation). In the absence of natural sources of energy such as geothermal or hydropower, Singapore's cost of power generation is considerably higher than other ASEAN nations. In 2011, unit cost of power purchased from power producers in the Philippines stated in the annual report of Meralco was 11.9 US¢/kWh, and with Indonesia (PLN) registering 12.0 US¢/kWh for its unit generation cost, power generation cost in the Philippines has become lower than that in Indonesia for the first time.

Table 2.7 Power generation cost and wholesale prices at power producers in the Philippines

Item	Unit	AboitizPowe	SEM-CALACA	EDC	Average
Generation	GWh	9,422	1,860	-	11282
Purchases	GWh	-	472		472
Sales	GWh	9,422	2,025	6,839	18,286
Own use*	GWh		307		
Revenues	Million Peso	54,447	9,612	24,540	88,598
Expenses	Million Peso	20,655	5,559	4,660	30,875
Cost	Peso/kWh	2.2	3.0		2.7
Price	Peso/kWh	5.8	5.2	3.6	4.8
Exchange Rate	Peso/USD	43.3	43.3	43.3	43.3
Cost	Cent/kWh	5.1	6.9		6.3
Price	Cent/kWh	13.3	11.9	8.3	11.2

Source: Prepared based on respective annual reports
Note: * was Estimated

However, unlike Meralco whose distribution responsibility does not cover high cost areas such as remote islands requiring expensive sources like diesel generators, PLN serves outlying islands or other remote areas as well. Taking this fact into account, the unit cost of power generation in the Philippines presumably is still at a level higher than that of Indonesia.



Source: Prepared based on respective annual reports

Figure 2.10 Comparison of generation cost

2.7.2 Costs of power transmission and distribution

The largest power transmission enterprise in the Philippines is National Grid Corporation of the Philippines (NGCP), which was founded in 2008 when the state-run transmission utility, National Transmission Corporation (Transco) was privatized. According to a report[20], against complaints raised by electric utilities in the Philippines that service charge of NGCP is high, the top management

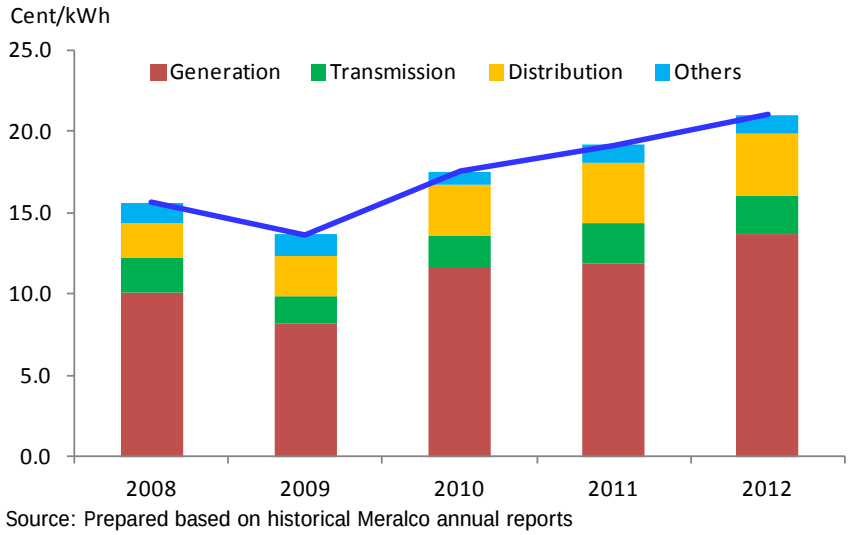
[20] http://www.ngcp.ph/

responded that NGCP was looking for ways to reduce its cost. As a non-listed company, NGCP does not disclose information about its business conditions and the data such as profit pictures or transmission charges are not directly available. However, from the annual reports of power distribution companies discussed below, it is estimated that the power distribution cost may account for more than 11% of the entire electricity charges.

According to the annual report[21] of Meralco, the largest power distribution company in the Philippines, the amount of power distributed throughout the calendar year 2011 was 30,592 GWh, generating distribution revenue of PHP 253,989 million, which produced net income of PHP 48,315 million after deducting the cost of purchased power. A closer look at the details of the company's cost reveals that, in contrast with the purchase cost of power that accounted for 81.0% of the overall cost, the ratios of other cost items are very small where operation and maintenance expenses accounted for 7.5%, amortization for 2.2%, and others for 9.3%.

In addition, according to this annual report, the average power generation cost in 2012 was 5.6 PHP/kWh, transmission charge was about 1.0 PHP/kWh, and distribution charge 1.6 PHP/kWh, totaling to average electricity charge of 8.6 PHP/kWh including loss and other costs. Converted at the 2012 exchange rate of 41.05 PHP to a U.S. dollar, the above electricity price amounted to as much as 21.0 US¢/kWh.

The report also describes the makeup of electricity charges in the Philippines as being made up with; 58% of the total by cost of power generation, 10% by cost of transmission, 16% by cost of distribution, 10% by tax and other costs, and losses by 6%.



Source: Prepared based on historical Meralco annual reports

Figure 2.11 Electricity prices and make-ups in the Philippines

By comparison, Singapore's electricity prices in 2011 are made up with the following components: 80.4% by power generation costs, 18.5% by transmission and distribution costs, and remaining 1.1%

[21] http://www.meralco.com.ph/consumer-index.html

by market support and others. Because the land area of Singapore is very small compared to the Philippines, making the distance of transmission and distribution required short, the cost for transmission and distribution naturally is cheaper than that in the Philippines[22].

Further, in the comparative breakdown[23] of electricity charge in Thailand, its cost of power generation in 2012 accounted for 78.2 percent of the entire electricity charge, whereas transmission and distribution each accounted for 8.7% and 13.0% of the costs, respectively. While the share of power generation cost in the cost breakdown of Thailand is higher than that of the Philippines, the ratio of transmission and distribution costs is lower.

For Vietnam and Indonesia, because power generation and transmission/distribution are integrated in these counties and the information about the cost of individual segments is not published, their cost components cannot be discussed in comparison with the above two countries. .

It should be pointed out in closing this discussion that, in the electricity prices in the Philippines, profit and various charges of respective enterprises are included in each of the power generation, transmission, and distribution stages. On the other hand, it appears that, because of the continuing state of power shortage, competition among the utility companies in the Philippines has not been adequately developed yet. In order to reduce the electricity prices in the short term, it seems necessary that the supervisory authorities regulate taxation rates and profit margins of utility companies at a reasonable level, and guide the industry to abolish various charges. Furthermore, it is considered important in the long term to promote power development, encourage competition, and formulate and implement policies such as for revising contract terms.

[22] Energy Market Authority [http://www.ema.gov.sg/]
[23] EGAT Statistics book

Chapter 3 Current Status of EPIRA Implementation

This chapter summarizes the current status of implementation of the Electric Power Industry Reform Act according to the 22nd report[24] covering the period from November 2012 to April 2013.

3.1 Privatization

As of the report period ending April 2013, the privatization level of the generating facilities previously owned by the National Power Corporation (NPC) is expected to reach 86.5 percent from the 79.56 percent, the level where the RCOA was declared to commence by the Energy Regulatory Commission (ERC). The increase is brought about by the in-progress turn-over of Angat HEPP to Korean Water Resources, Inc. (K-Water). Meanwhile, for the IPP contracts, the level remains at 76.85 percent. Currently, the PSALM is working on the bid of the remaining unprivatized power plants subject to the policy direction of the government.

The PSALM still has to privatize a total of 1,913 MW of owned-generating assets of which 1,014 MW are located in Mindanao comprised mainly by the Agus-Pulangui hydro complexes. In Luzon and Visayas are all oil-fired power plants. Summarized in Table 3.1 are the list of the power plants and the indicative schedule of bids as identified by PSALM.

Table 3.1 Schedule of Privatization for Generating Assets as of 30 April 2013

Asset Type	Plant Name	Rated Capacity (MW)	Bid Date	Turn Over Date
Owned Generating Plants	**Luzon Grid**			
	Angat Hydro	218.00	April 2010	2013
	Malaya Thermal	650.00	2014	2014
	Sub-total Luzon	**868.00**		
	Visayas Grid			
	PB 101 (Diesel/Bunker)	32.00	2013	2013
	PB 102 (Diesel/Bunker)	32.00		
	PB 103 (Diesel/Bunker)	32.00		
	Cebu Thermal 1 & 2 (Naga Complex)[1]	109.30	2013	2013
	Cebu Diesel (1-6) (Naga Complex)[1]	43.80		
	Sub-total Visayas	**249.10**		
	Mindanao Grid			
	PB 104 (Diesel/Bunker)	32.00	2013	2013
	Agus 1 & 2 Hydro	260.00	2017	2017
	Agus 4 & 5 Hydro	213.10		
	Agus 6 & 7 Hydro	254.00		
	Pulangui Hydro	255.00		
	Sub-total Mindanao	**1,014.10**		
	GRAND TOTAL	**2.131.20**		
Decommissioned Plants	Bataan Thermal	-	2013	2013
	Sucat Thermal	-	2013	2013

[24] DOE, http://www.doe.gov.ph/doe_files/pdf/01_Energy_Situationer/22nd_EPIRA_Status_Report_Final.pdf

Table 3.2 Generated and Collected Proceeds of Privatization as of 30 April 2013,

(In US$ Billion)

Privatization Assets	Generated	Collected
Generating Assets[1/]	3.260	3.064
Decommissioned Plants[2/]	0.004	0.004
Transmission Asset (TransCo)[3/]	7.685	2.226
Appointment of IPPAs[4/]	10.807	1.077
TOTAL	**21.757**	**6.371**

As of the report period, the generated privatization proceeds of PSALM was US$21.757 Billion while actual collection amounted to US$6.371 Billion as shown in Table 3.2. The proceeds were utilized for debt prepayment, regular payment of debts and IPP obligations as shown in Table 3.3, and payment of other privatization-related expenses with details indicated in Table 3.4.

Table 3.3 Utilization of Privatization Proceeds as of 30 April 2013

Privatization Proceeds Utilized	In US$ Billion
Debt Prepayment	1.298
Regular Debt Service	3.396
Lease Obligations	1.682
Others	0.054
TRANSCO Opex	0.001
TOTAL	**6.431**

Table 3.4 Summary of STAs (Sub Transmission Assets) Sale Per Region as of 30 April 2013

	DUs	Sale Amount in PhP (Original Contract)	CKM
North Luzon	32	1,625,300,696.83	1,213
South Luzon	17	1,120,511,843.37	467.04
Visayas	27	1,168,202,902.00	683.21
Mindanao	30	1,827,564,957.83	1,557.12
TOTAL	**106**	**5,741,580,400.03**	**3,920.02**

3.2 Electricity Rates

This section provides an update on Various Generation Costs and Electricity Rates prevailed during the report period.

3.2.1 Generation cost

Figure 3.1 provides the record of the power generation cost incurred by MERALCO and other generating companies versus WESM spot market price. The WESM spot price was generally higher than the reported generation cost and has shown significantly vulnerable movement from time to time.

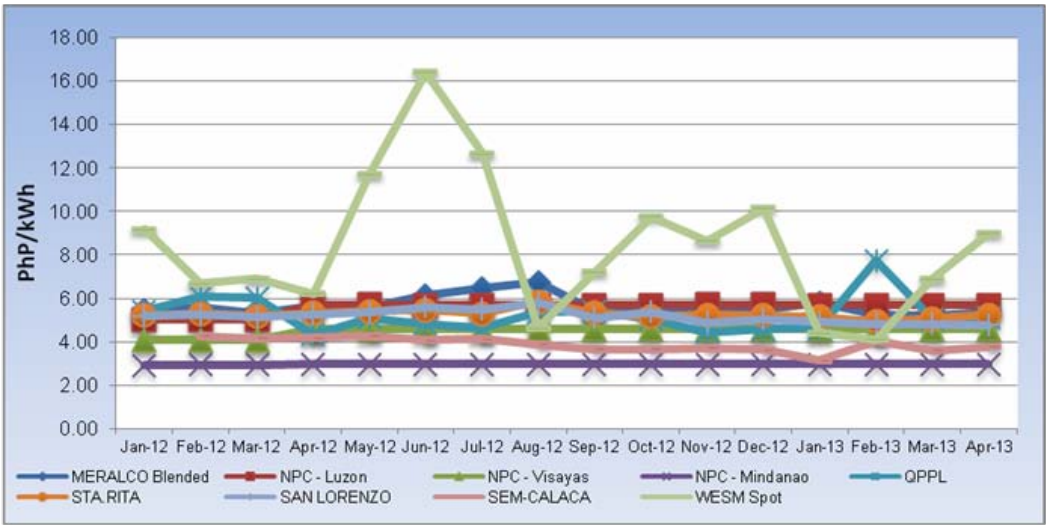


Figure 3.1 Generation Cost for MERALCO and NPC

3.2.2 Transmission/wheeling Rates

The total amount of the Transmission Wheeling Rates has increased 3.8% in March 2013 compared with a year ago, while the indicative average rate decreased about 1% shown in Table 3.5.

Table 3.5 Indicative Power Delivery Service Charges

(Transmission Wheeling Rates)

Particulars	Average Transmission Rate		
	March 2012	March 2013	Difference
PhP, Million	42,903.05	44,567.18	1,664.13
Indicative Average, PhP/kW/mo.	333.87	330.77	(3.1019)
Indicative Average, PhP/kWh	0.68450	0.67475	(0.00975)

3.2.3 Rates for DUs and EUs

Distribution Utilities (DUs) rates, and Electricity Cooperative (ECs) are as sown in Table 3.6 and 3.7. Rates have increased at both electric cooperatives and private distribution utilities.

Table 3.6 Average Systems Rates, September 2012 vs. April 2013 (PhP/kWh)

(Distribution Utilities (DUs) Rates)

Grid	Electric Cooperatives			Private Distribution Utilities			National Average		
	12-Sep	13-Apr	Change	12-Sep	13-Apr	Change	12-Sep	13-Apr	Change
Luzon	8.1521	9.1419	0.9898	8.7987	8.7180	(0.0807)	8.4754	8.9300	0.4546
Visayas	8.462	9.0978	0.6358	7.9601	8.0985	0.1384	8.21105	8.5981	0.3871
Mindanao	6.3474	7.0855	0.7381	6.0052	6.2944	0.2892	6.1763	6.6900	0.5137
Philippines	7.7680	8.6082	0.8402	8.5412	8.6064	0.0652	8.1546	8.6073	0.4527

The generation cost comprises about a half of the final rate, followed by distribution cost (19%), and transmission cost (11%). The system loss was 8.7% of the total rate or 17.9% over the generation cost.

Table 3.7 EC's Unbundled Average Effective Residential Electricity Rates, March 2013 (PhP/kWh)

(Electricity Cooperatives Rates)

Bill Subgroup	LUZON		VISAYAS		MINDANAO		NATIONAL	
	PhP/kWh	Percent	PhP/kWh	Percent	PhP/kWh	Percent	PhP/kWh	Percent
Generation	4.6714	49%	5.3032	52%	3.3576	44%	4.4441	49%
Transmission	1.1127	12%	0.9584	9%	0.9875	13%	1.0195	11%
System Loss	0.8473	9%	0.8965	9%	0.6447	8%	0.7962	9%
Distribution *	1.6910	18%	1.8165	18%	1.6687	22%	1.7254	19%
Subsidies**	0.0813	1%	0.0432	0%	-0.0316	0%	0.0310	0%
Government Taxes***	0.8832	9%	0.8835	9%	0.7516	10%	0.8394	9%
Other Charges ****	0.2993	3%	0.3559	3%	0.2141	3%	0.2899	3%
Total	**9.5863**	**100%**	**10.2572**	**100%**	**7.5926**	**100%**	**9.1455**	**100%**

3.2.4 Administration of Universal Charge (UC)

The cumulative amount of the Universal Charge remittances to PSALM as of 30 April amounted to almost Php 30 billion as shown in Table 3.8, of which the total amount received during the period November 2012 through April 2013 was Php 3.7 billion. They are mostly used for missionary electrification, while some amount was disbursed as environmental charge.

Table 3.8 Universal Charge Remittances, Interests and Disbursements as of April 2013

(In Billion PhP)

Particulars	Remittances	Interests	Disbursements	Balances
Missionary Electrification	28.439	0.043	28.460	0.022
Environmental Charge	1.224	0.079	0.498	0.805
Stranded Contract Cost	0.185	-	-	0.185
Total:	**29.848**	**0.122**	**28.958**	**1.012**

3.2.5 Assumption of Loans of Electric Cooperatives

As of 30 April 2013, PSALM has paid a total of PhP15.833 billion worth of financial obligations of ECs to National Electrification Administration (NEA) and other government agencies (OGAs) as well as local government units (LGUs) pursuant to Executive Order (EO) No. 119, s. 2002 and the Memorandum of Agreement between PSALM and NEA dated 03 October 2003.

Table 3.9 PSALM's outstanding financial obligations to NEA and LGUs/OGAs.

	Total Consumption	Actual Payments		Balance	
		Amount	%	Amount	%
NEA	17.978	15.756	86.64	2.221	12.36
LGU/OGA	0.096	0.077	79.85	0.019	20.15
TOTAL	**18.074**	**15.833**	**87.60**	**2.240**	**12.40**

Of the PhP15.756 billion total payments to NEA as of 30 April 2013, about 75.12% or PhP11.836 billion was used to pay the rural electrification loans incurred by the ECs, 15.57% or PhP2.454 billion for Mini-hydro loans, and 9.23% or PhP1.454 billion for DendroThermal loans. Payments intended for house wiring services only amounted to PhP0.012 billion or 0.08%. Table 3.9 shows the summary of payments made by PSALM:

Table 3.10 PSALM Payments per Type of Loan as of 30 April 2013 (In PhP Billion)

Type of Payment	Amount Paid	Percentage to Total
Rural Electrification Loan	11.836	75.12
Mini-hydro	2.454	15.57
Dendro Thermal	1.454	9.23
House wiring	0.012	0.08
TOTAL	**15.756**	**100.00%**

3.2.6 Mandatory Rate Reduction (MRR)

Pursuant to Section 72 of the EPIRA, NPC continuously grant to residential customers the mandatory discount of 30-centavos/kWh. For the period November 2012 to April 2013, total discounts granted by NPC amounted to PhP467.478 million of which 75 percent were availed by residential customers in Mindanao, 24 percent in the Visayas and one percent by the MERALCO customers in Luzon.

3.2.7 Lifeline Rate Subsidy Program

The provision of Lifeline Rate subsidy is allowed by Section 73 of the EPIRA which defines the lifeline rate as a subsidized rate given to low-income captive market end-users who cannot afford to pay at full cost.

For the report period, the average total amount of the Lifeline Rate was Php 2.73/kWh in the whole country, and each lifeline customers enjoyed an average monthly subsidy of Php 105.47, while an average amount of the subsidy paid by non-lifeline customers was Php0.12/kWh.

Table 3.11 Summary of Lifeline Subsidy Implementation, November 2012 - April 2013

Particulars	MERALCO	Other PDUs*	ECs	Total
Monthly Average Total Amount of Subsidy Provided by Non-Lifeline Customers (in Php)	345,946,536	107,126,141	58,164,499	511,237,177
Average Monthly Total Consumption of Lifeline Customers (kWh)	110,020,810	42,672,278	34,649,593	187,342,681
Monthly Average Number of Lifeline Customers	2,140,089	875,191	1,831,961.22	4,847,242
Monthly Average Number of Non-Lifeline Customers	3,072,981	1,336,911	4,938,678	9,348,570
Average Amount of Subsidy Provided to Lifeline Customers (In PhP/kWh)	3.14	2.51	1.68	2.73
Average Amount of Subsidy Provided to Lifeline Customers (In PhP/Customer)	161.65	122.40	31.75	105.47
Average Amount of Subsidy Paid by Non-lifeline customers (in PhP/kWh)	0.13	0.11	0.08	0.12

3.3 Competition

The key areas of market competition in the Philippine electricity market during the report period is summarized in this section including the operation of the WESM (Wholesale Electricity Spot Market), preparation for RCOA (Retail Competition and Open Access) and monitoring of compliance to EPIRA. Significant developments during the report period include declaration of the commencement date of RCOA, which was later put in operation on June 26, 2013, including promulgation of the Retail Market Rules and issuance of General Policies and Guidelines and the corresponding implementing rules and regulations to ensure smooth implementation of the RCOA.

3.3.1 Wholesale Electricity Spot Market (WESM) Operations

As of April 2013, the integrated WESM has a total of 252 participants comprised of 56 generating companies and 196 customer trading participants comprised of 16 PDUs, 72 ECs, 101 Bulk end-users and 7 wholesale aggregators. There are 30 applications being evaluated in Luzon and Visayas, comprised of 23 bulk users, 2 generation companies, 3 PDUs and 2 ECs.

Highlights of WESM trading for the period from November 2012 through April 2013 are as summarized below:

a. Average system demand for Luzon and Visayas registered during the report period was at 8,874 MW.
b. System peak demand was recorded at 9,688 MW which occurred in the month of April 2013.
c. Spot market transactions amounted to 2,836 GWh, translating to 10.1 percent of the total energy consumed in the Luzon and Visayas regions during the six months period while the remaining 89.9 percent of the total volume or equivalent to 25,248 GWh were transacted and settled outside the market.

d. Average Effective Spot Settlement Price (ESSP) for customers amounted to Php5,826 per MWh during the six months period.

e. Generation in Luzon and Visayas for the billing period November 2012 to April 2013 was dominated by coal power plants at 43.5% followed by natural gas plants at 31.8%. Geothermal contributed a share of 15.3%, hydro with 7.5%. Diesel powered power plants contributed about 1.6%, a minimum contribution of generation came from wind-based plants at 0.2%, and bio-fuel at 0.1%.

Table 3.12 Registration Update as of April 2013 (Luzon and Visayas)

CATEGORY		EXPECTED (Luz& Vis)	REGISTERED				APPLICAN		NOT REGISTERE	
			DIRECT		INDIRECT					
			LUZ	VIS	LUZ	VIS	LUZ	VIS	LUZ	VI
Generation Companies		56	**31**	**19**	**0**	**0**	**2**	**3**	**0**	**1**
Customer Trading Participants	Private DUs & LGUs	16	3	3	5	0	3	0	1	1
	ECs	72	26	25	1	3	2	0	0	0
	Bulk users	101	6	6	4	16	2	1	1	0
	Wholesale aggregators	7	7	0	0	0	0	0	0	0
Total Customer Trading Participant		**196**	**42**	34	69	19	28	1	2	1
TOTAL PARTICIPANTS/ APPLICANTS		**252**	**73**	**53**	**69**	**19**	**30**	**4**	**2**	**2**

3.3.2 Retail Competition and Open Access (RCOA)

The DOE spearheaded the formulation of the Retail Rules which provide the rules for the integration of the retail market in the operations and governance processes of the WESM, the management of transactions of Suppliers and CCs and the operation of the CRB.

3.3.3 Interim Mindanao Electricity Market (IMEM)

Mindanao has been continually under “red alert” status, which often resulted to rotating brownouts in some areas due to generation capacity deficiencies to meet the energy and ancillary services requirements. Brownouts have tremendously affected local business and ordinary household consumers. It has affected the growth and development in the region. Many investors have expressed concerns over the brownouts clamoring for a steady source of power for their operations.

Compared to Luzon and Visayas, the Mindanao grid suffers from intermittent outages lasting from two to six hours. This region-wide power supply deficiency results to frequent brownouts and power interruptions. Based on historical growth, the demand in the region would increase by an average of 4.6 percent annually over the next ten (10) years. In order to meet this demand, new capacities must be installed over the next decade.

Currently, Mindanao ECs have three options to cope with the perennial power supply situation in the region. These are: (1) to consider leasing or procuring modular generating sets having capacities of one (1) or two (2) MW; (2) to continue with the Interruptible Load Program (ILP) wherein entities with excess capacities can use their power generating facilities instead of sourcing power from the main grid, and in return be compensated for such gestures, based on ERC-approved compensation mechanism; and (3) to introduce the IMEM, which will serve as a trading platform where entities with excess capacities shall sell in the IMEM, subject to compensation based on the Price Determination Mechanism (PDM), duly approved by the ERC.

For the IMEM, a total of 348.9 MW was identified from potential additional supply sources to the grid. This is comprised of 165.9 MW of embedded generation and 183 MW of loads with self-generating capacity. Through a deregulated market based pricing scheme, excess power from embedded generating plants can be sold in the market during peak periods.

Recognizing the urgent need to address the current supply shortage in Mindanao, the DOE directed the PEMC to develop and implement the IMEM. The IMEM is an immediate solution developed by the DOE meant to address the deficiency of the supply in Mindanao.

The IMEM is a venue for the transparent and efficient utilization of all available capacities in the Mindanao grid to meet the supply deficiency. Unlike the WESM operating in Luzon and Visayas, the IMEM will be a day-ahead market and will address only the supply deficiency in the grid. It intends to draw out available generation capacities including embedded generators in the grid to alleviate the supply shortfall in Mindanao.

3.3.4 Market Share Monitoring

As shown in Figure 3.2, compliance to the 25 percent national grid installed capacity limitation was observed with the largest share at 19 percent by San Miguel Energy Company (SMEC), followed by PSALM at 18 percent. San Miguel group still dominates the generation sector in Luzon with a total installed capacity of 3,085 MW or 27 percent while its share to the national grid is 19 percent. In the Visayas, PSALM remains to have the biggest share of installed capacity at 35 percent or 716 MW while Global Business Power Corporation (GBPC) follows with 552 MW 27 percent share respectively. In Mindanao, the Government thru PSALM and NPC still dominate the generation business with 78 percent of the total capacity of the grid or equivalent to 1, 4 16 MW. Aboitiz Group is the next biggest generation company in Mindanao with a total capacity of 314 MW or 17 percent of the grid.

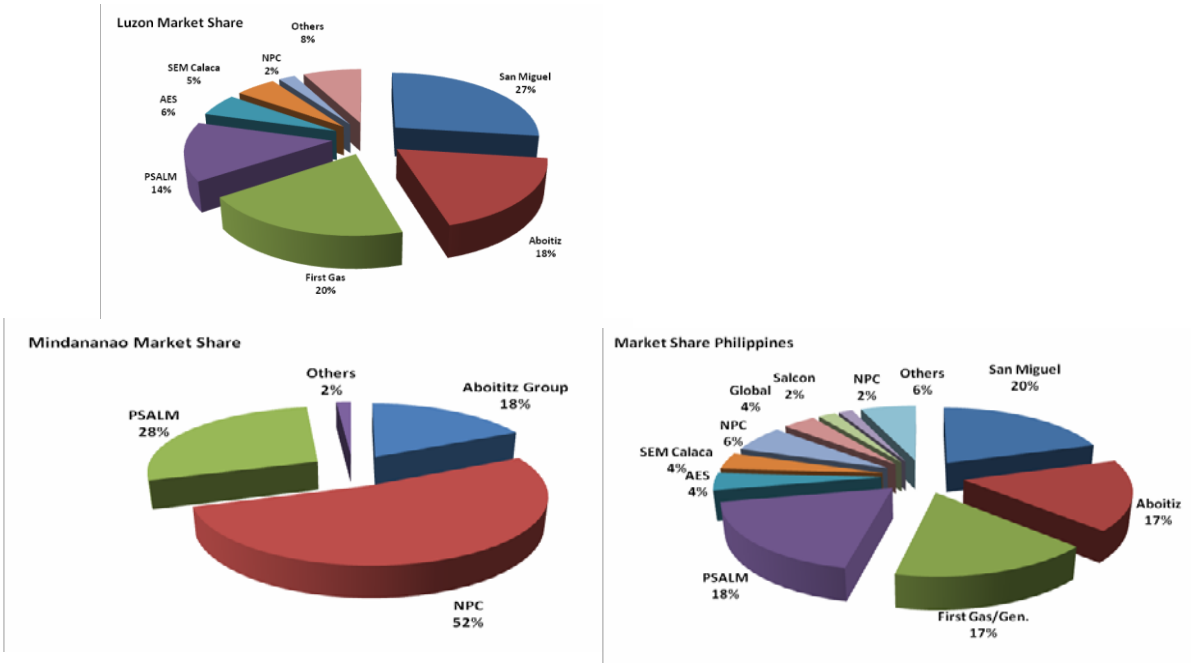


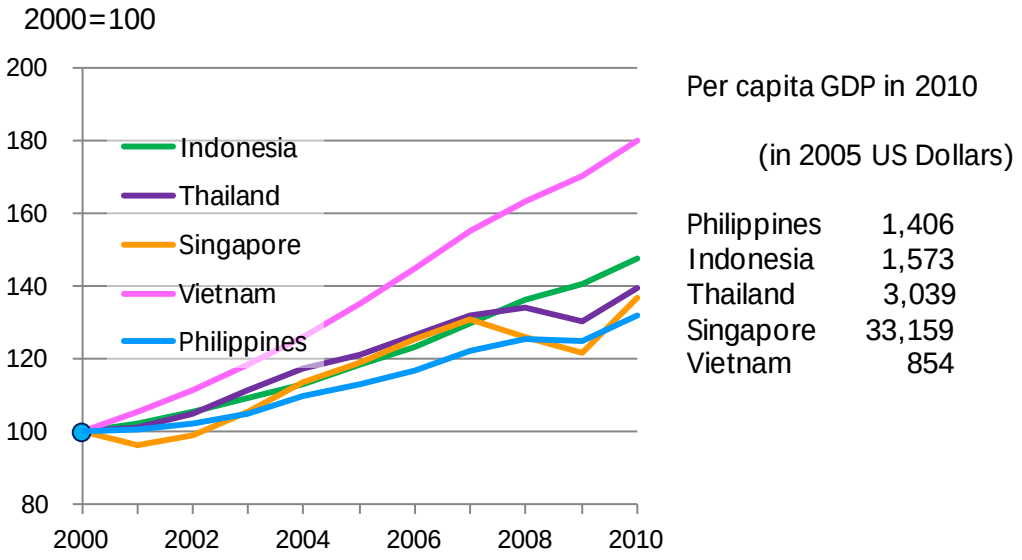
Figure 3.2 Installed Capacity Share 2013

Chapter 4 Energy Status of Selected ASEAN Countries

In this chapter, a gist of the study on the energy sector status of Indonesia, Singapore, Thailand and Vietnam are summarized. For the detail report, please refer to Appendix-A.

4.1 Current Status of Economy and energy in Selected ASEAN Countries

During the first decade of the 21st century, ASEAN countries have recorded steady economic growth exceeding 4% per annum, albeit the recession caused by the Lehman shock occurred in 2008. In the same period, GDP (in 2005 US dollars) of the Philippines increased 65% (annual 4.7%), Indonesia 77% (annual 5.3%), Thailand 53% (annual 3.9%), Singapore 81% (annual 5.6%) and Vietnam 113% (annual 7.1%).



Source: ADB

Figure 4.1 Growth of Per capita Income (in 2005 US Dollars)

Reflecting the strong economic growth, industrialization, and improvement of living standard, per capita energy consumption increased steadily in Vietnam and Thailand, while that for the Philippines recorded decline. In the Philippines, the energy consumption in terms of the total primary energy supply (TPES) remained at an almost same level (in 2011, it was merely 101% of that of 2000), as its population increased 23% in the same period.

Per capita energy consumption of Singapore (6.46 toe per person) was highest among Asian countries except for Brunei, maybe because of its energy intensive industry structure and hot and humid climate; it was 65% higher than that of Japan (3.90) in 2010. In contrast, that of the Philippines (0.44) was the lowest among Asian countries after overtaken by Vietnam in 2007. Same tendency is seen in the electricity consumption in these countries.

Except for Singapore, ASEAN countries are endowed with certain amount of natural resources. Indonesia and Vietnam are net energy exporters. Today, however, they are not sufficient to support ever increasing energy demand.

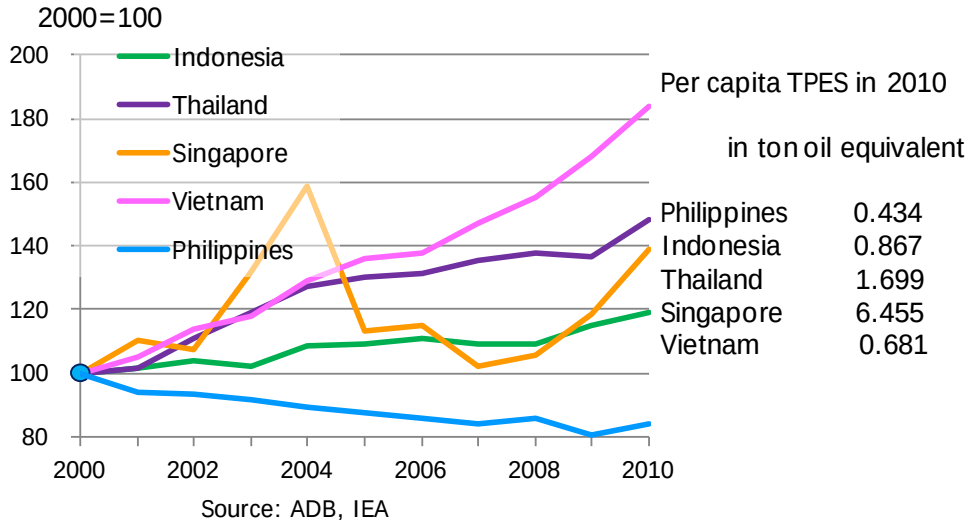


Figure 4.2 Growth of per capita TPES

Table 4.1 Major Indicators of Selected ASEAN Countries

Indicator	Unit	Philippines	Indonesia	Singapore	Thailand	Vietnam
GDP (Current Price)	Billion USD	**199.6**	708.0	227.4	341.1	106.4
Population	Million	**92.6**	237.6	5.1	67.3	86.9
GDP/Capita	USD/Person	**2,155**	2,979	44,789	5,067	1,224
Total Primary Energy Supply (TPES)	Million TOE	**40.5**	207.8	32.8	117.4	59.2
Energy self-sufficiency (total energy)	%	**57.9**	183.5	1.2	60.1	111.2
Electricity consumption	TWh	**55.3**	148.0	42.2	149.3	86.9
Power generation capacity	GW	**13.3**	32.9	10.6	31.5	17.5
CO2 Emission (energy origin)	Million ton-CO2	**134.6**	410.9	62.9	248.5	130.5
Per capita TPES	TOE/Person	**0.437**	0.875	6.456	1.745	0.681
Energy intensity per GDP	TOE/1,000 USD	**0.203**	0.294	0.144	0.344	0.557
Per capita Electricity Consumption	kWh/person	**597**	623	8,307	2,218	1,000
Electrification rate [2009]	%	**89.7**	64.5	100	99.3	97.6
Electricity Intensity per GDP	kWh/1,000 USD	**277**	209	185	438	817
Per capita CO2 Emissions (energy origin)	Ton-CO2/person	**1.454**	1.729	12.390	3.692	1.501

Source: ADB, IEA, APEC

Indonesia became a net oil importing country in 2004 due to increasing demand against stagnant oil production. Vietnam may follow the same pattern unless significant new discoveries. Both countries are also exporting coal, but are now considering curbing export to preserve resources for domestic consumption. Indonesia used to be the world biggest LNG exporting country. Facing growing

domestic demand, however, LNG export is being curtailed. Thailand, Vietnam and the Philippines are producing natural gas, but they are not sufficient to accommodate the growing demand. Since the Shale Revolution initiated in North America in the middle of the previous decade, abundant LNG supply is expected globally in future. Once LNG pricing formulas for the Asian market, which at present define the Asian LNG extremely expensive, are revised to bring closer to the world average, LNG may become a favorable option in pursuit of energy security and environmental sustainability.

Table 4.2 Energy Composition of ASEAN Countries (2012)

Figure 4 Energy Composition of ASEAN Countries (2012)

(million tonnes oil equivalent,%)

	Philippines		Indonesia		Thailand		Singapore		Vietnam		Total	
	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%
Oil	13.0	*42.9*	71.6	*44.9*	52.4	*44.6*	66.2	*89.5*	16.6	*32.0*	219.8	*50.7*
Natural Gas	3.1	*10.2*	32.2	*20.2*	46.1	*39.2*	7.5	*10.1*	8.5	*16.3*	97.4	*22.5*
Coal	9.4	*31.1*	50.4	*31.6*	16.0	*13.6*	0.0	*0.0*	14.9	*28.7*	90.7	*20.9*
Nuclear	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
Hydro	2.5	*8.1*	2.9	*1.8*	2.0	*1.7*	0.0	*0.0*	11.9	*23.0*	19.3	*4.4*
Renewables	2.3	*7.8*	2.2	*1.4*	1.2	*1.0*	0.3	*0.4*	0.0	*0.1*	6.0	*1.4*
Total	30.2	*100.0*	159.4	*100.0*	117.6	*100.0*	74.0	*100.0*	52.0	*100.0*	433.2	*100.0*

Source: BP Statistical Review of World Energy 2013

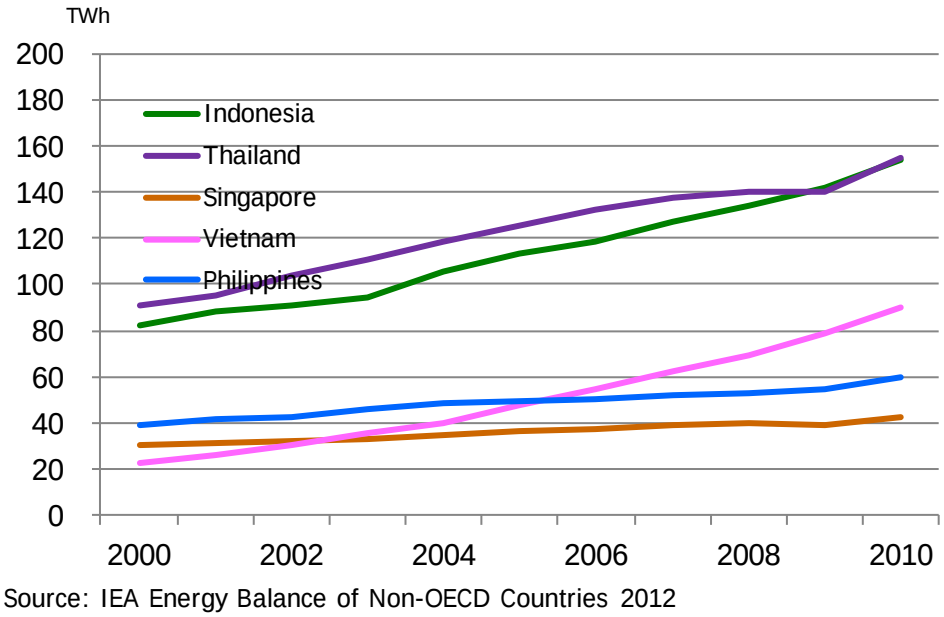
Among energy sources, oil is the predominant energy in ASEAN countries, followed by natural gas and coal. Nuclear is yet to be introduced. The 2011 accident at the Fukushima Dai-ichi nuclear plant in Japan has substantially slowed the movement toward nuclear in ASEAN countries, while proactive governments have become extremely cautious in developing this socially sensitive energy source. Hydro plays a significant role in Vietnam and the Philippines. Geothermal is significant in the Philippines and Indonesia, and additional projects will be developed extensively in these countries. New renewable energies such as solar, wind and micro-hydro power generation are still in an infant stage except for application in rural electrification.

4.2 Current Status of Electric Power Sector in Selected ASEAN Countries

Electricity consumption of ASEAN countries recorded robust growth during the decade up to 2011. That of the Philippines, Indonesia, Thailand, Singapore and Vietnam combined increased 95% or annual 6.3%. Except for Singapore, which is already in a matured economic stage and recorded annual 3.3% increase, electricity demand increase of the Philippines, at annual 4.2%, was the lowest among ASEAN countries. Vietnam recorded robust 13.7%.

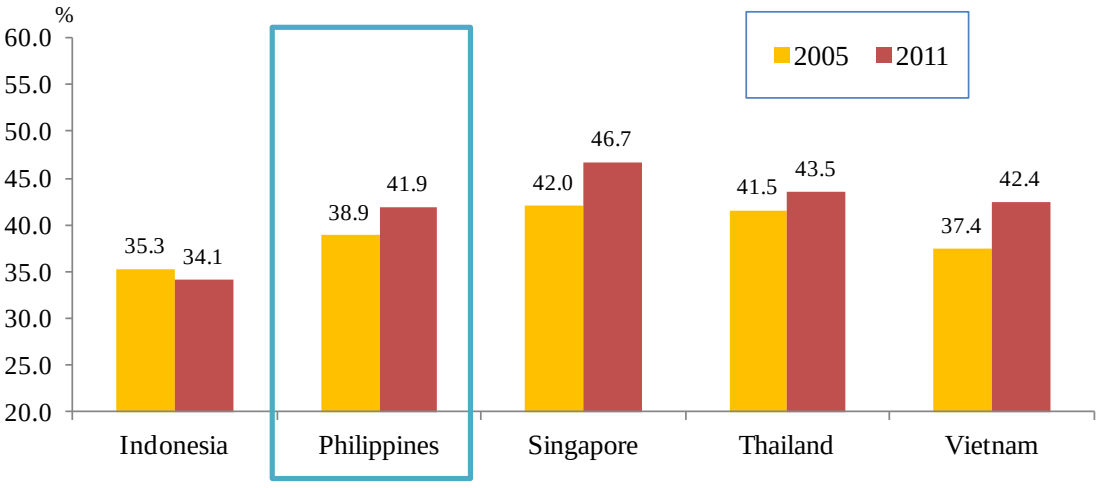
Efficiency of thermal power generation in these countries has been improving fast reflecting construction of new and advanced power plants. Singapore has achieved world class generating efficiency adopting combined cycle gas turbine (CCGT) plants extensively. In other countries, adoption of advanced coal- and gas-fired plants to accommodate increasing demand as well as replacing obsolete oil-fired plants has contributed to the remarkable efficiency improvement. To further improve efficiency by way of ramping up plant size while adding stabilities, curbing pollutant emissions and applying smart management and control for conservation, it is desirable to promote

integration of and/or interchange among regional grids. Electricity market design must be considered in a manner to bring such economic benefit.



Source: IEA Energy Balance of Non-OECD Countries 2012

Figure 4.3 Power Consumption of ASEAN Countries



Source: IEA Energy Balance Table of Non-OECD Countries

Figure 4.4 Efficiency of Thermal Power Plants in ASEAN Countries

Table 4.3 Energy Inputs for Power Generation in ASEAN Countries (2011)

(million tonnes oil equivalent,%)

	Philippines		Indonesia		Thailand		Singapore		Vietnam		Total	
	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%
Oil	0.80	*4.1*	10.35	*17.9*	0.44	*1.4*	1.89	*20.3*	1.27	*7.6*	14.7	*11.0*
Natural Gas	3.12	*16.0*	8.25	*14.3*	19.16	*61.1*	6.82	*73.3*	7.63	*45.9*	45.0	*33.4*
Coal	6.19	*31.6*	21.88	*37.9*	8.76	*28.0*	0.00	*0.0*	5.14	*30.9*	42.0	*31.2*
Nuclear	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	0.0	*0.0*
Hydro	0.83	*4.3*	1.07	*1.8*	0.70	*2.2*	0.00	*0.0*	2.57	*15.4*	5.2	*3.8*
Geothermal	8.55	*43.7*	16.11	*27.9*	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	24.7	*18.3*
Renewables	0.08	*0.4*	0.09	*0.1*	2.28	*7.3*	0.60	*6.5*	0.02	*0.1*	3.1	*2.3*
Total	19.58	*100.0*	57.75	*100.0*	31.35	*100.0*	9.31	*100.0*	16.61	*100.0*	134.6	*100.0*

Source: IEA Energy Balance of Non-OECD Countries 2012

Today, fossil fuels are dominant as energy sources for power generation. ASEAN countries are already heavily dependent on natural gas; in particular, Thailand and Singapore are worried about the high concentration in gas generation in terms of supply security and price vulnerability. However, role of natural gas may be appreciated in other countries, considering its cleanness and abundant availability in the international market. Geothermal as energy inputs for power generation is valued very high in the Philippines and Indonesia. We should note, however, that this is due to the IEA calculation formula that assumes the energy efficiency of geothermal power generation at merely 10%, artificially pushing up the apparent energy independence, a politically favored phenomenon. If we look to the electricity output, the share of geothermal is about 1/2 to 1/3 of those calculated for inputs. Development of other new renewable energy sources for power generation is still marginal yet.

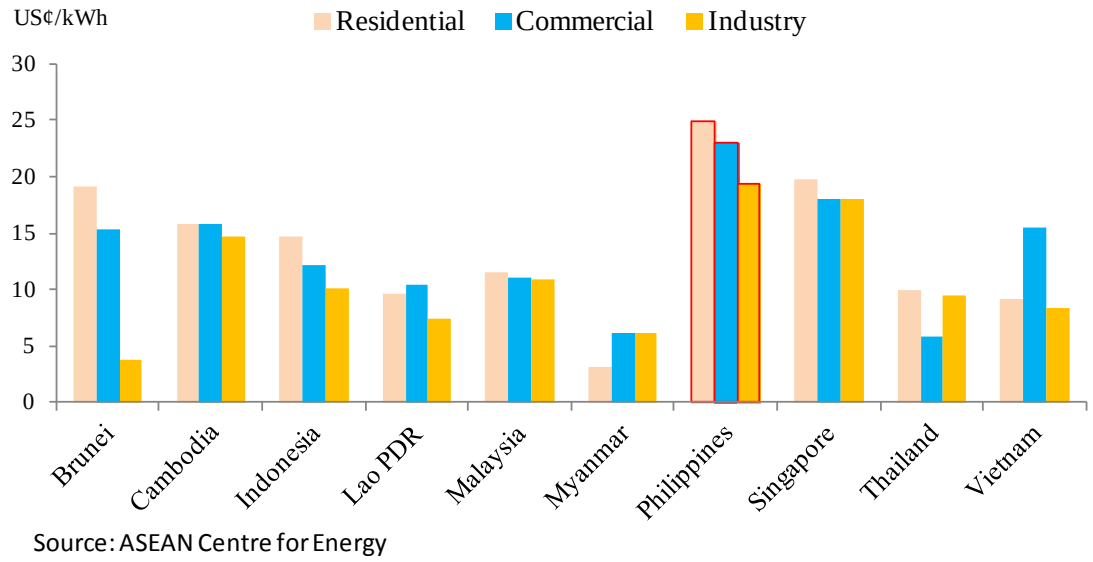


Figure 4.5 Electricity Prices

Electrification is almost completed in Singapore, Thailand and Vietnam (see Figure 4.1). The Philippines (89.7% in 2010) and Indonesia (64.5%) are still struggling toward this target. Being archipelago countries with a huge number of islands, electrifying all of them is an extremely heavy

task for the society.

Electricity being the fundamental element for the modern society, its price gives significant impact on peoples' daily life as well as industrial competitiveness. Among ASEAN countries, electricity prices are highest in the Philippines. While the electricity market in the Philippines is almost fully deregulated, subsidies or cross-subsidies are provided in other countries to curb electricity rates, resulting in a heavy financial burden for the government. It is always a big challenge how to settle the trade-off between social, political and economic objectives harmoniously keeping good balance among industrial viability, social welfare and financial burden.

4.3 Power Sector Reform in Progress

Power sector reform started in the world in the late 20th century, aiming at rationalization of the electricity system being run by heavily protected public utilities, with expectation to ensure quality, reliability, security and affordability of the electricity supply. In the early stage, however, abrupt privatization short of prudent consideration on fair and rational market design incurred various problems. Persisting wide area blackouts were experienced in California, New York and elsewhere in the United States, and brownouts in Europe. Resultantly, an excellent company Pacific Power and Gas, serving 1/3 of California, easily got bankrupted. Since then, electricity market system has been reviewed and revised from time to time, and now liberalized electricity markets with participation of many private players are prevailing worldwide. Architecture of electricity market evolves staring with the genesis, fixing defects and tuning conditions through the transition stage, and finally arriving at a mature stage where social objectives are largely achieved.

Except for Singapore, the Philippines implemented electricity market reform relatively earlier among Asian countries, enforcing the "Electric Power Industry Reform Act of 2001" (EPIRA), and privatized electric facilities and operations formerly owned and operated by the National Power Corporation (NPC). It was an across-the-board deregulation transferring all of the generation, transmission and distribution sectors to the private sector, giving up almost all of the policy measures for the government to effectively control this socially important sector. Electric market reform is also underway in Indonesia and Thailand, while their architectures are different from that of the Philippines as summarized in the following tables.

In principle, electricity market reform aims at securing stable supply at affordable prices, while implementing electrification of the country. Drivers for this are;

- Low efficiency of power sector
- Mismatch between tariffs and costs of electricity
- Increased investment in the sector
- Government suffering from ballooning financial difficulties
- Introduction of capital and technology from abroad

With regard to the objective to secure stable electricity supply, current status of policies adopted in ASEAN countries is summarized in Table 4.4. In Indonesia, Thailand and Vietnam, the government

shall intervene through the national power company, while such system is not adopted in the Philippines and Singapore. Only some indirect intervention can be implemented in the Philippines via various regulations such as on emission standard, efficiency standard, etc.

Table 4.4 Policies for Stable Electricity Supply

	Philippines	Indonesia	Singapore	Thailand	Vietnam
ESTABLISH NATINAL POLICY					
Prepare the long term Power Development Plan	○	○	○	○	○
EXECUTE NATIONAL POLICY					
Direct intervention through specific entity	-	National company PLN	-	National company EGAT	National company EVN
In-direct intervention by relevant regulations (emission standard, efficiency standard, etc.)	○	○	○	○	○
Type of power station (location, fuel, technology, capacity)	**Difficult to control**	Direct control as planned	Difficult to control	Direct control as planned	Direct control as planned
INVITE PRIVATE SECTOR INVESTMENT					
Tender notice for investors	-	○	-	○	○
Price signal derived from wholesale market	○ **active enough?**	-	○ active enough?	-	-
Provide confidence for profitability of investment	-	Long-term PPA	"Vesting contract"	Long-term PPA	Long-term PPA

With regard to the electricity supply at affordable prices, current status of mechanisms adopted in ASEAN countries is as shown in Table 4.5.

Table 4.5 10 Mechanisms for Realizing Affordable Prices

	Philippines	Indonesia	Singapore	Thailand	Vietnam
GENERATION / WHOLESALE SECTOR					
Liberalize and establish wholesale market for competition	○ **active enough?**	-	○ active enough?	-	-
Competitive bidding for selecting IPP	-	○	-	○	○
Wholesale price control	-	??	"Vesting contract"	??	??
RETAIL SECTOR					
Liberalize to introduce competition	○ **1MW<**	-	○ 1MWh/month<	-	-
Retail price control	○ **<1MW**	○	○ <1MWh/month	○	○

Also, policies for electrification are summarized in Table 4.6. As shown in Table 4.1, Singapore has completed electrification and Thailand and Vietnam have accomplished high electrification ratios. However, being archipelago countries, electrification ratios are still low in the Philippines and Indonesia, while both countries are now implementing ambitious state-led programs for rural electrification.

In the Philippines, electrification used to be counted on barangay basis (barangay is the smallest administrative unit in the Philippines like township or village) and a barangay was deemed to have been electrified when electricity was brought to any part of it. At the same time, sitio (isolated settlement of farmers, fishers and indigenous people) were not counted on the statistics.

The Aquino Administration took office in 2010 decided to accelerate rural electrification and has injected a substantial amount from the Malampaya Fund in addition to the Universal Charge (collected on top of the electricity tariff or directly from auto-generators and used for the national electrification plan).[25] In 2013, this policy was further accelerated with enforcement of the Act Strengthening the National Electrification Administration. There are about 33,000 sitios in the Philippines. The Department of Energy (DOE) and National Electrification Administration (NEA), have raised their rural electrification goal to 10,394 sitios before the end of 2013 from the original 7,000 under the Sitio Electrification Program (SEP). This will bring the aggregate number of sitios provided with electricity to 18,077. By 2014, the target will be an additional 7,107 sitios and by 2015, another 7,257, thus to complete rural electrification by the end of 2015. The electrification program has been changed from village basis to individual house basis. For those houses difficult to link to a central grid, every measure is being mobilized such as mini-grids and SHS (Solar House System).

Table 4.6 Policies for Electrification

	Philippines	Indonesia	Singapore	Thailand	Vietnam
ESTABLISH NATINAL POLICY					
Prepare national plan, target	○	○	○	○	○
EXECUTE NATIONAL POLICY					
Direct intervention through specific entity	National organization NEA	National company PLN	-	National organization PEA	National company EVN

Also, policies for securing fuel supply are summarized in Table 4.7. As natural conditions, demographic distribution, economic development stage, social aspiration, cultural orientation and other elements are diverse among countries, we cannot apply uniform policies in pursuit of the above policy objectives. At the same time, global circumstances surrounding fuel supply, energy price, environmental aspiration as well as technology evolve as time goes on. In this context, it is necessary and valuable to visit present policies of various countries, exchange views and opinions on them and improve the energy/electricity system from time to time.

[25] Three out of 10 particular energy projects for which the Malampaya Fund was intensively injected since 2010 were projects for rural electrification, namely, missionary electrification, barangay line enhancement and sitio electrification projects.

Table 4.7 Policies for Securing fuel Supply

	Philippines	Indonesia	Singapore	Thailand	Vietnam
ESTABLISH NATINAL POLICY					
Prepare national plan, target	○	○	○	○	○
EXECUTE NATIONAL POLICY					
Direct intervention through specific entity	National company PNOC	National company Pertamina	National company Temasek & Singapore LNG	National company PTT	National company Petrovietnam

Chapter 5 Energy Policy Dialogue with ASEAN Countries

The Energy Sector Reform Dialogue between Philippines and other ASEAN countries (Indonesia, Thailand and Vietnam) held in Manila from 29 August through 4 September 2013. Singapore could not join the dialogue because of scheduling constraints despite their strong willingness to participate. This chapter summarizes the official statements, presentations and discussions made Please refer to Anex-Ⅱ for detail discussion.

In his keynote address at the opening session, Hon. Carlos Jericho L. Petilla, Secretary of the Department of Energy of the Republic of the Philippines, thanked ASEAN delegates and explained that the objective of the DOE for the Energy Sector Reform Dialogue is to share problems and practices with neighboring ASEAN countries and collaborate in solving problems and challenges facing their energy sectors.

Mr. Takahiro Sasaki, Chief Representative of the Philippine Office of JICA gave his message to the officials that JICA is hosting the Dialogue to contribute to the development of dynamic and vibrant SEA, in particular, to policy making for the energy sector, in general, and in power industry, in particular, so that the energy sector will function efficiently to meet the demand of growing economies.

Mr. Hisashi Hoshi, JICA Study Team Leader of IEEJ, noted that electricity industry is a dynamic industry sector and needs to keep looking for changes to respond to the challenges and achieve the objectives sector such as reducing electricity tariff and ensuring security of power supply.

5.1 Presentation of Philippine Department of Energy

DOE Secretary Carlos Jericho L. Petilla presented and discussed the Philippine energy sector reforms focusing on the following issues:

- Structure of the Philippine power industry before and after the enactment of the Electric Power Industry Reform Act of 2001 or EPIRA
- Rationale and objectives of Energy Sector Reform
- Role of the government in the reform implementation
- Status of reform implementation

Following his opening remarks, present status of the electricity market reform was explained by several high officials of the DOE as below.

Under the EPIRA Law, functional and business unbundling has been conducted with competitive generation, regulated transmission, regulated distribution and competitive retail supply. Major activities thereunder are;

- Establishment of Wholesale Electricity Spot Market (WESM)
- Privatization of the NPC generating assets

- Opening up of high voltage transmission lines for easy access of distributors and large customers including

Present status of the electricity market reform is;

1) As mandated by EPIRA, the NPC rates were unbundled in 26 March 2002 while the unbundling of Distribution Utilities (DUs) rates were completed in June 2003.
2) Inter-grid (Luzon, Visayas and Mindanao Grids) cross subsidies were removed in September 2002. Intra-grid and inter-class (of customers) cross-subsidies were removed in October 2005.
3) The government now practically has zero subsidies; subsidies for NPC and Transco in national budget are only US$350million per year in total while they are provided only for the CAPEX to extend distribution lines for rural electrification.
4) The Wholesale Electricity Spot Market (WESM) has been functioning for almost seven years to date. Luzon commercial operation started on 26 June 2006 while Integration of Visayas Grid was completed on 26 December 2010. Likewise, the Philippine Electricity Market Corporation (PEMC) will soon start the operation of the Interim Mindanao Electricity Market. The WESM is being fine-tuned through the audits and review of the market rules.
5) EPIRA requires privatization of at least 70% of the NPC generation assets and transfer to IPP Administrators of at least 70% of the NPC IPP Contracts before retail competition is declared by ERC. The PSALM has so far achieved 79.56% privatization of the NPC power plants and 76.85% of the NPC IPP contracts. Privatization of Transco is implemented through an O&M concession. The NGCP was granted franchise by Congress after it won the bid for the O&M concessionaire of Transco.
6) Having complied with all the pre-requisites, the ERC declared on 26 December 2012 introduction of open access in electricity distribution to start retail competition. The commercial operation of retail electricity market for customers with at least 1MW demand has been started but with only 2 months experiences. About 200 out of 900 contestable customers have registered at PEMC to participate in the competitive market.

Major challenges in the power sector reform of the Philippines are found in the areas as listed below:

1) Government cannot (directly) control when and whether private sector should invest in new generating capacity. To illustrate proper guidance, the DOE is strengthening demand forecasting to be more convincing for the private sector to respond to the future requirements as forecasted.
2) People complain about high prices of electricity, while the Government cannot control the deregulated prices in generation and supply sector. The DOE is trying to provide more transparent information about electricity prices to manage complaints and make people understand.
3) There are concerns expressed by some customers that the available capacity is deficient to warrant an effective competition. DOE is waiting for actions of large customers in power supply contracting.

5.2 High Level Sessions

High-level dialogues were held separately with Indonesia, Thailand and Vietnam and their outlines are summarized below.

5.2.1 Indonesia

Senior Officials of the Ministry of Energy and Mineral Resources (MEMR) explained present status of the energy market as follows:

a. Current status of the energy sector in Indonesia was explained with data on energy indicators, trends in power and energy consumption, energy resources, energy mix and installed capacity and infrastructure in generation and transmission. Electricity demand is increasing rapidly while electrification ratio is still at 76.5%, a low accomplishment reflecting the archipelagic nature of the country.
b. Electricity law No. 30/2009 (new law) is the legal framework. Market liberalization is now limited at the level of IPP selection. Government can control IPPs at the procurement stage through bidding process. Government still gives guarantee in the PPA, while the government keeps the authority in issuing licenses and setting the tariff; whoever gives the license also sets the tariff (for national and local).
c. Government Regulation No. 14/2012 sets the framework for centralized planning of power sector and private sector participation to ensure security of power supply. IPPs are selected through a competitive bidding process. PPA and selling prices are reviewed and regulated by the government.
d. Uniform tariff is set by the Parliament and local authorities. Different tariff are found only in different areas depending on resources used in the area. Tariff has subsidies from government. In 2011, the average electricity price was Rp1.251/kWh, while about Rp93.18 Trillion of subsidy was provided by the government.
e. Ministerial Regulation 17/2012 was issued to set a ceiling price for renewable energy (but higher than the tariff from traditional fuel) to increase the share of RE. Another Ministerial Regulation (No. 22/2012) provides the Feed-In Tariff for RE.

The delegation explained that the serious challenge of Indonesia is how to reduce the subsidies while still controlling the electricity prices to be affordable for consumers.

Following the presentation of the Indonesian delegation, various issues such as accomplishment of optimum power mix and removal of subsidies were actively discussed as summarized in Anex-Ⅱ.

5.2.2 Thailand

Senior Officials of the Office of the Energy Regulatory Commission (ERC) and Electricity Generating Authority of Thailand (EGAT) made presentation on the energy sector status of Thailand as follows:

a. Energy sector reform started in 2007 through Energy Industry Act, which separates roles of

policy making and regulation. Energy Regulatory Commission (ERC) was established as regulator under Ministry of Energy, and a single buyer power market was established. The Act aims at promoting public participation in the energy market, while ERC defines its strategy as to encourage local communities, general public, energy consumers and energy industry operators to participate in the development of Thailand's energy systems. Bidding rounds for IPPs implemented under the new regime resulted in a substantial addition of generating capacity. On the other hand, the gas industry remains a monopoly with supply via gas pipelines coming from Gulf of Thailand and some imports from Myanmar.

b. A policy statement of the Council of Ministers was delivered by PM Yingluck Shinawatra to the National Assembly on 23 August 2011 as follows:
   - Promote and enhance energy industry to generate national income. Investment in energy infrastructure will be increased to make Thailand the hub of regional energy business.
   - Reinforce energy security through the exploration and development of energy resources, both domestic and abroad. Diversification of energy resources and types shall also be pursued.
   - Regulate energy prices to ensure fairness and to reflect actual costs.
   - Support the production, use, research and development of renewable and alternative energy sources, with target of replacing at least 25% of the fossil fuel consumption within 10 years.
   - Promote energy conservation through reduction of energy intensity per GDP by 25% within 20 years.

c. Principles of energy pricing in Thailand is as follows:
   - Thailand has formal tariff setting process for electricity and gas. Electricity rate is uniform tariff but cost reflective and is implemented through Financial Transfer Mechanism across utilities.
   - The Automatic Tariff Adjustment (Ft) is applied as a mechanism for adjusting the power tariff so that it reflects the actual fuel cost for power generation at a given period of time. Ft will be adjusted in line with changes in EGAT fuel cost , the power purchase cost and the impact of policy expense which are beyond control of the Power Utilities.
   - Measures to manage impact of rising prices on low income customers include cross subsidies among customer categories. Residential customers consuming less than 50 kWh/month are fully (100%) subsidized by other customers. About 3-4 Billion Baht/year are contributed by other customers.
   - Power Development Fund imposed to industry players managed by ERC is used to channel tariff subsidies.

d. RE development is incentivized through Tariff Adder and Feed in Tariff which produced good response from players (SPP and VSPPs). More than 10,000 MW has been achieved in the installed capacity of renewable power generation. In addition, Smart Grid is under consideration to support introduction of intermittent and decentralized generation.

Following the above presentation, various issues such as lowering electricity cost and application of Power Development Fund were actively discussed as summarized in Anex-Ⅱ.

5.2.3 Vietnam

Senior Officials of the Ministry of Industry and Trade (MOIT) presented on the current status of the energy sector of Vietnam as follows:

a. With the high GDP growth rate of Vietnam from 2006-2012 (annual 5 – 7%) and energy consumption growth showed corresponding high trend (9.4%). Electricity peak demand during the same period grew at 12.2%. The electric power industry is governed by the Ministry of Industry and Trade (MOIT) with the General Directorate of Energy (GDE) in charge of planning and policy making while the Electricity Regulatory Authority of Vietnam (ERAV) regulates the power industry.
b. Vietnam has restructured its power industry from a vertically integrated model with EVN as the monopoly company for generation, transmission and distribution into a structure that will allow competition in generation. Currently the companies in the Vietnam Competitive Generation Market are the EVN generators (some owned and some equitized), BOT generators, and IPPs. EVN still dominates in the market.
c. Vietnam's Master Plan reflects the countries strategy for reliable and affordable power by pursuing more coal in the energy mix (48% by 2030) and by introducing nuclear energy to meet the growing demand.
d. The Prime Minister is responsible for the approval of the electricity retail tariff with MOIT setting the prices along supply chain. Contract prices are based on negotiation between parties but subject to the limitations set out by authorities.
e. Generation prices are based on annual approval by State Authority for SMHPs (Strategic multi-purpose hydro power plants), Contracts (PPA) for BOT power plants, imports and ancillary services and CfD and spot market price for other plants.
e. Transmission and distribution prices are based on the allowed revenue, set annually, determined according to Allowed Distribution Revenues of each PC and Performance Based Regulation (PBR) principle for a period of 3 to 5 years.
f. Renewable Energy promotion is implemented through avoided cost mechanism for small hydro power plants and co-generation facilities. Wind power development is also supported by a guaranteed price and fiscal incentives. Energy efficiency is promoted through a law which specifies the measures to meet efficiency targets and the obligations of organizations, households and individuals.

Following the above presentation, various issues such as rapid power development and power mix, role of other national energy companies and high electrification accomplishment were actively discussed as summarized in Anex-Ⅱ

5.3 Technical Sessions

Technical-level sessions were held at DOE on the next day of the High-level Policy Dialogues in order to deepen discussions on specific issues both parties are interested, which are summarized as below.

5.3.1 Indonesia

Philippines and Indonesian participants exchanged information and views on the specific topics as follows:

a. On geothermal energy development, Indonesia inquired on policies of Philippines that it has succeeded in increasing its geothermal share, while Indonesia has minimal response from power developers even FIT is already in place. Philippines offered help to Indonesia in geothermal development to benefit from experiences and expertise that has been developed over the years.
b. Both countries have problems in advancing large coal plants and nuclear energy due to social acceptability. Discussions were made how to consider introduction of these energy sources.
c. Subsidy in electricity tariff is quite controversial in Indonesia as some says it is better to provide subsidy while some seeks to reduce and remove subsidies. The government wants to reduce subsidies. In contrast, Philippines has no subsidy at all. Philippines also requested contact persons to get more information on the Oil Fund mechanism.
d. Indonesian strategy for system loss reduction and collection efficiency improvement includes the use of prepaid meters and enforcement of a law on theft with penalties as much as 3 times the bill of stolen electricity. Indonesia has achieved a single digit system loss rate of 9.27% today.

5.3.2 Thailand

The following topics were mainly discussed between Philippines and Thailand:

a. Thailand has interconnection with other countries (Lao PDR, Cambodia, Myanmar, Malaysia and China) mainly to import energy (electricity) to take advantage of abundant resources in neighboring countries. So far all cross-border interconnections of Thailand are based on bilateral contracts. There is a plan to establish sub-regional market in the Greater Mekong Sub-region (GMS). Thailand look forward to participate in it, but there is no definite plan and timeline yet.
b. Thailand is presently conducting surveys on energy efficiency of appliances and uses of electricity.
c. Thailand achieved a very high level of electrification (99.8%). Thailand has practically accomplished a 100%, but because there are always new households and developments, the 0.2% was estimated to account for the lag to catch up.
d. Price Adder and FIT are applied for promotion of RE and so far good responses are obtained from players. Subsidy for RE is provided not from the government but from consumers as universal levy.
e. Although natural gas regulation in Thailand is open, PTT controls the industry as a monopoly. EGAT is studying its own LNG imports. ERC is planning to develop third party access code for

pipelines since the transport facilities are presently owned by PTT. Priority of gas use is for electricity, but not for residential and small users.

f. Both countries have problems in social acceptability of nuclear power plant.

g. In Thailand, free electricity is provided to residential customers with consumption of up to 50 kWh/month. Also, Thailand ERC sets the criteria for the host community benefits (e.g., 3 km radius from the location of power plant).

h. Electricity market liberalization was stopped in 2003 due to opposition from consumer protection groups. EGAT remains a government agency/entity and has not been corporatized. EGAT will remain in control for at least 50% of the power mix. Thailand plans to increase coal in the future power mix, and now the type of the power plant is specified in the bidding documents for IPP procurement.

5.3.3 Vietnam

The Vietnamese delegation presented details on the electricity market reform starting from the initial reforms (drivers, framework and key elements of reform), the progress and accomplishments, and the future plans.

a. The Electricity Law of Vietnam provides the roadmap for the electricity market reform in 3 phases (Phase 1 – competitive generation market, Phase 2 – competitive wholesale power market, and Phase 3 – competitive retail power market. The main drivers for the reform are (a) lack of efficient pricing, (b) lack of investment, and (c) need for cost recovery to maintain viability of power sector.

b. The Key elements of the electricity market reform in Vietnam are unbundling of the state power company EVN and privatization of power entities thorough equitization and development of Power Market based on principles of transparency, choice, and sustainable electricity system.

c. The Prime Minister is responsible for the approval of retail tariff. MOIT for approval for the transfer prices along the supply chain (transmission and distribution prices and other fees). Contract prices are based on negotiation between parties but subject to the limitations set out by authorities.

d. In its efforts to reform the power market, Vietnam has developed regulatory framework, established 3 generation companies (June 2012), a separate transmission company, and 5 distribution companies, while EVN is still major generator with more than 50% of the total capacity. The Vietnam Competitive Generation Market was put in full operation in July 2012: combination of spot market which is gross cost-based pool and termed PPAs between generation companies and Single Buyer in form of Contract for Difference (CfDs) with high initial coverage (90-95%). Vietnam aims at establishment of competitive wholesale market (2015-2022) where distribution utilities are free to choose any generation company for power supply; and competitive retail market (2022 onwards).

The biggest challenge facing Vietnam is how to raise a huge volume of capital that is needed for investment in generation (USD110 Billion from 2011-2030) and transmission network (USD156

Billion from 2011-2030).

Following the above presentation, active discussion was made on the following issues as summarized in Appendix-I:

- Privatization/Equitization in Vietnam
- Energy/Power Development Planning
- Private Sector Response to Energy Plan and Security of Supply
- Rationalization of Small Electric Cooperatives
- Philippine WESM
- Role of the government in awarding power plant (IPP Selection)
- Communication strategy for power plant construction
- Electricity and Fuel pricing in Vietnam

5.4 Synthesis of Dialogue

The synthesis of the dialogue during the 4-day activities may be summarized as follows.[26]

1) Shared Concerns and Perspectives
   - Adequacy of supply to meet the growing demand of developing economies
   - Electricity prices that must be affordable to consumers and support industrial and commercial activities of the economy
   - Lack of government financial resources. Hence, the reliance to private sector for capital investment in energy sector
   - Electrification is an important tool for social development
   - Renewable energy and energy efficiency must be pursued for sustainable development of the energy sector, that is, to cope with the global warming.

2) Electricity Market Reform
   - Indonesia and Thailand remains in controlled/regulated market. Security of supply and affordability of electricity prices are pursued through competitive selection of IPPs and regulatory approval of contracts (PPAs). Thailand has well defined policy and process for the single buyer market.
   - Philippines and Vietnam have liberalized the generation sector and are creating competition in power supply.

3) Strategies to Control Prices.
   - Except the Philippines, subsidy is used to control the prices.
   - Vietnam has “hidden” subsidy through the non-recognition of costs incurred in the past by government in building the infrastructure. In addition, coal price for power generation is regulated at 85% of the average domestic price.

4) Strategies for Sustainable Development and Environment.

[26] This synthesis was prepared by Prof. Rowaldo del Mundo, JICA Study team member of IEEJ, at the closing of the 4-day activity held at the Philippine DOE, with minor amendment and additions.

- All the four countries have policies and programs to promote renewable energy and energy efficiency.
- The programs provide fiscal incentives and some forms of guarantees in prices (e.g., Feed in Tariff for RE)

Through the policy dialogue, it is found that the four countries have similar as well as different conditions, experiences, strategies, and results in their respective pursuit of energy sector reforms. To support sound economic development in which energy and electricity play an essential role, each country must continue to seek effective reforms addressing the changing situations.

To this end, it is very important to clarify the role of government to control the desired results of reforms through policy making, planning, regulation, and supervision of the market There is wisdom in sharing experiences (both good and bad) to learn from each other to solve problems and to build on each other strength. So the dialogue at high level and middle level (technical) of government bureaucracy must be continued.

Chapter 6　Energy Sector Dialogue in Japan and Related Activities

As the Phase 2 of the Energy Sector Dialogue and related activities, the Philippine DOE Delegation headed by Hon. Carlos Jericho L Petilla, Secretary of the Department of Energy, visited Japan from 15 through 18 October, 2013. The delegation visited Deputy Minister of Ministry of Foreign Affairs (MOFA) and high officials at the Japan Bank for International Cooperation (JBIC), Japan International Cooperation Agency (JICA), industry representatives, and also energy /electricity related facilities including Roppongi District Heating/Cooling System, a most advanced coal thermal plant and an LNG receiving terminal in the Tokyo Bay area. The highlight of the activities was the "Investment Symposium for Energy Sector in the Philippines - Current Status and Future Prospects of Electricity and Gas Fields -." The Symposium was held on October 16, 2013 at Grand Hyatt Tokyo inviting more than 150 participants from among Japanese government officers, industry experts and investors.

Following the opening remarks of the Symposium, Hon. Carlos Jericho L Petilla, Secretary of the Department of Energy, ardently explained the audience about the present status of and investment opportunities in the energy sector of the Philippines in his keynote address "Current Status and Future Investment Opportunities of the Philippines Energy Sector". The gist of the presentation is summarized below.

Then, in the following session for "Japan's Power Generating Technologies and Challenges of Business Deployment in Overseas," experts from Japanese industry made presentations on

- Clean Coal Technology Development in Hitachi
- Advanced Gas Turbine Combined Cycle Power Plant for Philippine Market
- Geothermal Power Plant Business / Fuji Electric
- Challenges of Business Deployment in Overseas

After the second session, a networking meeting was held between the Philippine DOE Delegation and Japanese participants.

6.1　Opening Remarks

After the welcome address by Mr. Hisashi Hoshi, Director of IEEJ, Undersecretary Mrs. Loreta Ayson gave the opening remarks on behalf of the Philippine DOE Delegation. The highlights of the message from the Philippine DOE are as below:

a. The Philippines has restructured the power industry 12 years ago which reformed the electricity market into a competitive market. To date, modest gains have been achieved but with challenges.
b. The PPP program in the Philippines is an investor-friendly framework which may interest the Japanese government and companies. DOE hopes that Japan will take interest in the Philippine energy sector as favorable investment destination.
c. DOE looks forward to the report of the JICA-IEEJ Study team on the Policy Dialogues and Symposium to enhance the policies in the energy sector of the Philippines and attract investments.

6.2 Presentation of the DOE Secretary Carlos Jericho Petilla

Secretary Petilla started his presentation saying that investment opportunities are found in the Philippines in every energy sector such as power, oil & gas, coal, natural gas, e-vehicles, and renewable energy. DOE also has various investor's support program. Among others, he insisted that the government puts efforts for transparency to promote fair competition, enhance investment and ensure public understanding.

Situation and opportunities in each sector are as summarized below:

1) Electric Power Industry

People complain when there is no (or lack of) power. Later they will complain on the high price of power. Philippines has high price of electricity but during the recent AMEM meeting, the Energy Ministers of other countries including Indonesia has told him that they want to copy the Philippine model on how government can remove subsidies in electricity prices. Forecasting demand has become more challenging due to changes in economic growth trend vis-à-vis the 3-5 year time lag of project implementation.

Philippine power grid is divided into 3 major power grids. These are the Luzon, Visayas and Mindanao Grids. Total dependable capacity in the Philippines is presently 17,000 MW.

- The Luzon Grid has 767.4 MW "committed" projects for near future construction which are mainly coal and diesel power plants, and 10,152.5 MW "indicative (proposed or announced)" projects. The investors must submit papers to DOE before the Secretary transfer them to the list of the committed projects. The DOE also gives its commitment to the investors' committed project.
- Visayas Grid with demand of 2,000 MW has 429 MW committed projects.
- Mindanao presently has power deficiency but will have enough power in 2015. There are 2,530 MW indicative projects. Petro-Brunei is interested to put up LNG facilities for peak shaving. Mindanao which is a separate grid (from Luzon and Visayas Grid) launched the Interim Mindanao Electricity Market (IMEM) on September 26, 2013 and is expected to start commercial operation on November 26, 2013.

The National Power Corporation is not allowed by law to build any more power plants. The government thrust is to privatize all generation assets of NPC. So far about 80% of the assets are already disposed. The Philippine competitive power market is 7 years old. The DOE plans to introduce a co-optimized reserve market by March 26, 2014.

2) Oil and Gas Sector

There are 26 service contracts for the upstream oil and gas exploration. DOE is conducting in first quarter of 2014 the fifth Philippine Energy Contracting Round (PECR 5) to award more oil and gas service contracts. The Philippine National Oil Company (PNOC) will capitalize to

provide comfort to investors but preferably with limited participation like 10% equity in Joint Ventures.

3) Coal Sector

There are several potential coal mines in the Philippines and the DOE is currently reviewing and cancelling service contracts because those who have been awarded did not move for development. The DOE will award the service contracts to investors who will move fast.

4) Situation and Opportunities in Natural Gas

Malampaya gas field will ran out of gas in 14 years and no due drilling is happening because of the Philippine-China dispute in the West Philippine Sea (South China Sea). The Philippines must prepare to import LNG to secure natural gas supply to more than 2,000 MW of the existing natural gas power plants. For this, LNG terminals are necessary.

DOE is preparing a Natural Gas Master Plan. The master plan will provide policy and regulatory direction for investments in natural gas supply including when and where to put up the facilities.

5) E-vehicles

Presently there are 523 existing e-trikes. The Philippines has bid for 3,000 units for year 1 (2014) of the e-vehicle program. There are 4 bidders to design, develop and manufacture the Philippine e-trikes; two of the 4 bidders are Japanese companies. In Year 2 to 5,there will be additional 15,000 to 30,000 units of e-trikes annually. After e-trikes (3-wheels), programs for the e-cars (4-wheels) will follow.

6) Renewable Energy

Presently it takes 2 years to process applications before awarding RE service contracts. DOE will trim down the process to 45 days. RE shall require 60/40 Philippine/Foreign ratio in equity because they are indigenous resources. Solar and Wind FIT program is oversubscribed even the policy is first come first serve basis, where investor must develop first before FIT eligibility certificate is issued.

7) DOE's Investor Support

There are 166 permits necessary for foreign investors from development to operation of power plants. The DOE could not do away with many of the administrative requirements. DOE will assign a staff to work with investors to obtain the permits from other government agencies and local governments.

6.3 Q&A for DOE Secretary Petilla's Presentation

Following the presentation, active discussions were made during the Q & A session as outlined below:

1. What is the expression of DOE's commitment to "committed" projects?

   When DOE puts the project in the list of "committed projects," it is a statement to other investors that they are "crowded out" already. The DOE commits to help in obtaining permits, in importation, getting tax incentives, etc. to ensure that the project will be implemented

2. Unlike in 1990's when the IPPs could own a 100% equity of a power company, the new law has the requirement of a 60/40 domestic/foreign capital ratio.

   The policy has not changed. In the case of the IPP program, the power plant projects were BOT, so the plants will eventually be turned-over to NPC. At the same time, NPC is not allowed anymore to sign PPA.

3. How efficiency in the electricity sector and the market be improved? How will efficiency improvement reduce the electricity price? How much is the expected reduction?

   For the power generation, we expect that the technology will introduce price reduction. For example, the highest price from a coal power plant is Php6.88/kWh which is from a long-term contract signed long time ago. Now the cheapest one from among coal plants is the latest plant of GNPower recently commissioned which is only Php4/kWh.

   The DOE has also a transparency program (www.kuryente.com) to enhance competition, since "No information – No competition". This policy is increasingly showing positive results in the energy market. DOE expects Php1-2/kWh cost reduction in future.

4. For the Reserve Market, who will bear the cost? Would price not go up again? What is the discussion within the government on how this will be paid?

   There will be no government subsidy. Philippines cannot afford to have a situation like Indonesia that a 23% of the national budget is subsidy. The DOE Secretary believes that subsidy across-the-board is "anti-poor" in its nature because it gives more subsidies to the rich who consumes more.

5. The EPIRA experience showed that strong capacity for regulation is very important in achieving the desired outcome of policies. What do we expect from the master plan for LNG which will have policy and regulatory statements?

   Policy and regulatory should work together in a small market (say less than 25,000 MW). Regulation should support to transform the industry towards market driven. We cannot have immediate "free market".

The LNG master plan currently being reviewed will provide direction where to put the facilities consistent to national objectives.

6. Regarding Nuclear power, the Philippines has cancelled the only nuclear plant while countries in SEA are introducing nuclear power in their countries.

The BNPP have been completed (not cancelled) but never operated. The DOE's policy is to give nuclear a level playing field. It will be treated in the same manner as other sources of power like coal. It will be discussed a lot in public and people will decide.

If the electricity price of MEARLCO for consumers is Php11.50/kWh and an addition of nuclear would not reduce greatly the price, consumers may not favor it. The Philippines is also watching Japan regarding its steps in view of the recent nuclear plant incident in Fukushima.

7. The private sector may face risk in PPP. Do you consider any guarantee for the private sector?

PPP in power generation is market-driven. The 20 year contracts of distribution utility companies who are monopoly and franchised will provide the guarantee but not the government. Investors should study the risks of contracting with 130 DUs all over the country. The DOE is now shaping-up Electric Cooperatives that are considered by GENCOs as risky.

8. Why Diesel and not solar?

Philippine DOE is not encouraging diesel. In the off-grid areas, however, there will still be a need for frequency regulating or load following power plant and will most likely be provided by diesel plants. We would like to accelerate introduction of LNG for peaking.

There is a plan to provide roof solar power in schools for 1,600 MW in capacity and it will start in 2014 for the first 300 MW. DOE is finalizing the business model.

Chapter 7 Findings on ASEAN Energy Sector Reform

7.1 Identified differences and Issues

The primary purpose of the Policy Dialogue on Energy Sector Reform conducted under this program was to identify the similarities and differences in the role of the government on the electric power sector reform among ASEAN countries and share experiences to explore for potential measures to further ensure sound development of the power sector in the Philippines. The primary finding is that, in the energy sector management, the role of the government is relatively small in the Philippines compared to other ASEAN countries.

Upon enforcement of the EPIRA law in 2001, Philippines has successfully implemented liberalization and privatization of the electricity sector, while some other countries have slowed down their liberalization process. Philippines has been trying to minimize the government control over the market, while Indonesia, Thailand and Vietnam are controlling the market with substantial intervention to direct the energy sector toward the political objectives.

The Policy Dialogues has highlighted the differences in energy market management among ASEAN countries, which are mainly found in three areas, namely, national plan, financing and affordable access to electricity.

- *National plan*

Philippines and all invited countries have national plans for energy sector development. All invited countries have governmental function to lead the power development program through national power companies. Philippines also has power development plan, but it remains presentation of the future plan with no mandate for direct intervention in or administrative guidance for the market. Such architecture is common among matured economies. However, effectiveness of the national energy plan is relatively weak compared with other ASEAN countries.

- *Financing*

The Philippines government does not provide financial assistances for electricity sector development like other ASEAN countries such as institutional financing, government guarantee, or instruments to introduce foreign funds. Small/medium projects can be accommodated by local capitals and private banks. However, problems are encountered in financing large scale projects such as large scale advanced coal plants and large hydro stations that need a huge fund and/or longer credit due to longer construction and cost recovery period.

- *Affordable access*

The electricity price in the Philippines is decided through market competition without

governmental intervention. However, it is notable that all the invited countries more or less intervene in the electricity market and keep electric tariff substantially lower even after their subsidies are considered. The Philippine government is not given mandate or instrument to directly work to ensure cheaper cost and price.

ASEAN countries provide direct support for electrification while electricity tariffs are much lower in invited countries. Indonesia and Philippines both being archipelago with difficulties to link dispersed consumers, accomplishment of electrification is similar. Indonesian government aims to improve rural electrification ambitiously. Also, as explained in Chapter 4, the government of the Philippines is presently implementing a robust program on rural electrification mobilizing the Malampaya Fund. However, commonly for both countries, access to isolated settlements and small islands are difficult and costly.

Introducing competitive market environment, the Philippines has been successful to enhance efficiencies in the electricity sector and energy savings at end users, and has significantly reduced government spending. However, several policy objectives are pursued only indirectly. The Policy Dialogue has revealed defective aspects that may be considered for policy action to ensure sound development of the power sector as the fundamental platform of the economy. The following summarizes findings through the Policy Dialogue.

7.2 Indonesia

7.2.1 Feature of energy policy in Indonesia

1) Electric Power Market Structure

Electric power industry in Indonesia is under the supervision of the central and local governments, and the national power company (Persahaan Listrik Negara, hereinafter referred to as “PLN”) is assigned to conduct electricity business representing the national policy. Local state companies, private companies and cooperatives are also able to enter the electricity market. Particularly, the government is promoting investment from the private sector allowing participation as IPPs in the power generation sector and PPUs (Private Power Utility) in the power distribution sector. However, in a real sense, the national power company PLN is mandated to play a leading role as an executing body of the national electricity policy.

2) Stable Supply of Electricity, Sound Power Source Development

Stable electricity supply is an important national policy, and the Ministry of Energy and Mineral Resources (MEMR) sets out the policy plan called RUKN (Electricity Supply Business Plan) to be approved by the House of Representatives. Based on this RUKN, the national company PLN sets up its own business plan called RUPTL. It develops investment plans for the new power stations and transmission & distribution network based on the demand outlook for the next 10 years, as well as

targets for cost reduction, energy efficiency improvement and other important policy objectives. By this way, the national policy of Indonesia is directly executed in the market through PLN, while its achievement is occasionally something else.

Fuel mix of power generation is an important policy target. This is because economics would not always meet with policies for enhancing energy security or mitigating environmental burden, may not support rural electrification or introduction of renewable energies. Indonesia aims to reduce oil dependence by way of increased use of coal and natural gas as fuel for power generation; this policy is stipulated in the RUKN set out by the central government. Other important national policies are also incorporated in the RUPTL of the PLN, such as rural electrification mobilizing the national budget and priorities given to indigenous geothermal and hydro among various renewable energy sources.

New power stations are constructed in two major streams; one is development by PLN and the other development by private investors, or so called IPPs. PLN's development plan is of course in line with the national fuel mix policy. IPPs also follow the national fuel mix policy, since each IPP tender is prepared by PLN for certain designated type of fuel resources and plant size following the national policy. In this way, the fuel mix policy of Indonesia is controlled and implemented in the electricity market via PLN.

In conduct of IPP businesses, PLN provides IPPs with long term power purchase agreements (PPA). Thus, IPP investors are able to secure future cost recovery and profit, which is an essential condition for a decision to invest a huge amount of fund. With PPAs providing confidence for IPP investors, Indonesia is promoting investment from the private sector.

3) Affordable, Lower Electricity Rate

With a view to lower electricity rates, Indonesia is promoting use of domestic lignite and geothermal resources in development of new power generation plants. Although Indonesia is rich in lignite, its high moisture content has hindered its use. However, applying modern technologies, its use is beneficial in lowering the power generation cost because of the lower prices compared with high quality coals. Also, being a volcanic country, Indonesia is endowed with rich geothermal resources yet to be tapped. The government is promoting development of geothermal power stations which are expected as stable and relatively low cost power sources. These policies are incorporated in the program known as Fast Track Program-1 (2006-2009, 10GW, Coal-fired) and Program-2 (2010-2014, 10GW, Geothermal, Coal-fires, etc), and PLN functions as the policy implementation body.

In Indonesia, IPPs account for about 20% of the total power supply. PLN contracts long term PPAs with IPPs, but purchases electricity through a bidding process. Thus, PLN secures competitive prices for its electricity procurement.

In Indonesia, same electricity tariff had been applied nationwide. Upon enforcement of Law No.30/2009, it became possible to set different electricity rates in respect of regional specific conditions such as electricity supply cost and income level. In Indonesia, electricity tariff has

traditionally been set at a below cost level to protect lower income people. Resultantly, insufficient cost recovery has brought a huge amount of debt piling up as a serious burden for PLN. In order to improve the situation, the central government aims to raise electricity tariff in a phased plan.

4) Rural Electrification

Indonesia's electrification ratio was 76.5% in 2012. RUKN set up in 2008 aims a target to achieve 90% in 2020. Rural electrification is decided to be implemented by the national budget, and, according to the Medium Term Development Plan of MEMR, the General Electricity Office (DJK) of MEMR and PLN are implementing electricity development building generating sources and transmission/distribution networks. While provincial states, private companies or cooperatives are allowed to participate in the electricity business, PLN is designated as the responsible body with mandate for rural electrification.

7.2.2 Implication for Philippines

The feature of the Indonesian electric industry, in comparison with the Philippines, is that the national company PLN is given extensive authorities throughout the electricity supply chain from power generation, transmission/delivery network through to rural electrification. While both countries set out the national electric policy, their apparent difference is the existence of the executing entity with strong mandate that directly implements the government policies.

For example, in case of developing a new power station, after establishing some policy, the Philippine government is in a position just to make announcement and wait for investment decisions of private investors. Or, to control such decisions, the Philippine government is able to only set up new regulations or standards for indirect intervention such as on the fuel selection or a thermal efficiency target of a new power station. On the other hand, in Indonesia, the government can directly control the startup date, fuel type and thermal efficiency of a new power station via PLN as a tool for policy-implementation. That is to say, probability of policy execution is apparently higher in Indonesia.

From a view point of securing private sector investment, Indonesia provides support for IPP investors by providing purchase guarantees for the amount and price of the electricity to be generated. In contrast, there is no mechanism in the Philippines mitigating the risk associated with IPP projects. They are forced to privately conclude contract(s) with distributors on their own risk, but distributors are reluctant to commit long term purchase that is definitely needed by power suppliers to justify a huge and long term investment. For the eyes of investors, therefore, Indonesia may look much less risky as a country for an IPP project.

7.3. Thailand

7.3.1 Feature of energy policy in Thailand

1) Electric Power Market Structure

Electric power market in Thailand is under the supervision of the Ministry of Energy and the independent regulator ERC (Energy Regulatory Commission). The transmission sector is monopolized by the national company EGAT (Electricity Generating Authority of Thailand). The distribution and retail sector is monopolized by the two national companies MEA (Metropolitan Electricity Authority) for the metropolitan area covering the greater Bangkok and PEA (Provincial Electricity Authority) for the other areas. Although the power generation sector was dominated by EGAT in the past, the private IPPs have now increased to surpass the share of EGAT (IPP: 55% vs. EGAT: 45% as of June 2013).

2) Stable Supply of Electricity, Sound Power Source Development

In principle, the Ministry of Energy is responsible for preparation of the Power Development Plan, while the national company EGAT is deeply involved in its preparatory work. The latest document, "Power Development Plan 2010 revision 3," illustrates development plans for new power stations and transmission network expansion. Thailand's power sector is featured with its high dependency on natural gas exceeding 60%. In view of the extremely high gas dependence and insufficient domestic resources, the government plans to diversify fuel sources to use coal, renewable energy and nuclear; this policy is incorporated in the latest power development plan.

There are two major streams to construct new power stations; one is direct development conducted by EGAT, and the other is power plant construction by private investors, so called IPPs. The former is of course in line with the national fuel mix policy, while the latter also follows the national fuel mix policy, as IPP tenders are offered by EGAT for certain type of fuel conditioned after the national policy. In this way, the fuel mix policy of Thailand is structured in the market through EGAT.

IPP projects are implemented based on the long term power purchase agreement (PPA) signed between EGAT and IPP investors, which provides basis for the cost recovery and future profit. This is the same mechanism as applied in Indonesia.

3) Affordable, Lower Electricity Rate

In Thailand, IPPs account for more than a half of the total electricity supply. As EGAT procures electricity from IPPs under the long term PPAs, electricity prices are decided at competitive prices through bidding process. Thus, EGAT is able to secure electricity at competitive prices.

In order to control the generation cost at low, Thailand has promoted use of domestically available natural gas and lignite. However, facing limited availability of the domestic natural gas resources and strong opposition from residents against coal-fired power plant, Thailand may have to increase use of imported fuels. Thus, fuel cost, comprising a significant part of power generating cost, should be exposed to international energy price fluctuations in future.

Electricity rate is regulated by ERC with a cost-base principle. Since EGAT, MEA and PEA are not exposed to competitive pressures, strict monitoring and price review by ERC are needed to control the electricity tariff at a reasonable rate.

Cross subsidy among customers are provided for the low income families. A part of the electricity tariff collected from richer consumers such as large industries is transferred to tiny residential consumers whose consumption is less than 50kWh monthly.

4) Rural Electrification

Electrification ratio is 99.8% as reported in August 2013, while the remaining tiny portion represents new requirements at land development sites. For financing rural electrification activities, cross subsidy among national entities is provided. Certain amount of money is transferred from EGAT and MEA to the Power Development Fund, and then PEA uses the fund for rural electrification.

7.3.2 Implication for the Philippine

The feature of the Thai electric industry, in comparison with the Philippines, is that the national company EGAT, MPA and PEA are given an extensive authority throughout the electricity supply chain from power generation, transmission/distribution network through to rural electrification. While both countries set out the national electric policy, their apparent difference is the existence of the executing entities that directly implement the government policies. Thus, probability of policy execution is higher in Thailand.

From a view point of securing private sector investment, likewise with Indonesia, Thailand provides support for IPP investors by providing purchase guarantees for the amount and price of the electricity to be generated. For the eyes of investors, therefore, Indonesia may look much less risky as a country for an IPP project.

7.4 Vietnam

7.4.1 Feature of energy policy in Vietnam

1) Electric Power Market Structure

Electric power market in Vietnam is under the supervision of General Directorate of Energy and the independent regulator Electricity Regulatory Authority of Vietnam (ERAV), both are under the Ministry of Industry and Trade (MOIT). The transmission & distribution sectors are monopolized by the national company EVN (Vietnam Electricity). However in the generation sector, private investments through BOT (Built, Operate and Transfer) and IPP are gradually increasing their share because of declining investment capability of EVN. Vietnam is currently under the process of electricity market reform through unbundling of EVN, creation of wholesale market and liberalization of the retail market as experienced in the Philippines; a part of generating plants and distribution activities of EVN are being capitalized and these shares are sold but not exceeding the majority limit.

2) Stable Supply of Electricity, Sound Power Source Development

Power development plan is set up by MOIT. The latest document, Power Development Plan 7, illustrates development plans for new power stations and transmission network expansion. To meet a sharply growing electricity demand, the government plans to maximize the use of domestically available resources in both demand centers in the north and south of the country, in particular coal.

There are three major streams to construct new power stations; one is direct development made by EVN, and the others are power plant construction by private investors through IPPs and BOTs solicited by EVN. The former is of course in line with the national fuel mix policy, while the latter also follow the national fuel mix policy, as IPP and BOT tenders are offered by EVN for certain type of fuel conditioned after the national policy set out by MOIT. In this way, the fuel mix policy of Vietnam is structured in the market through EVN.

However, a large amount of debt is piling up at EVN arising from under recovery of cost continued for a long period, posing concerns on their future investment ability. EVN has been accruing deficit as the balance of increasing cost while retail tariff were kept low. This may also threaten even payment of EVN for the electricity purchased from BOTs and IPPs. Therefore, the government is expecting greatly on national companies such as Petrovietnem (charge of oil & gas) and Vinacomin (charge of coal) who have capabilities and fuels for power generation to participate in new power station development, in addition to general promotion of IPPs and BOPs.

A long term power purchase agreement (PPA) between EVN and BOT/IPP investor functions as a measure for securing investment from the private sector. This is the same mechanism observed in Indonesia and Thailand. In future, however, the government plans to reform the electricity market and establish Vietnam Competitive Generation Market (VCGM) to trade electricity through the wholesale market.

3) Affordable, Lower Electricity Rate

In order to lower the electricity cost, Vietnam is promoting use of cheap fuel, in particular domestic coal. The government plans to increase the share of coal in the power generation mix up to more than half by 2030 from about 20% at present. This policy target will be implemented either through the direct investment by EVN or private sector investments controlled by EVN.

In Vietnam, IPPs account for about 20% of the total electricity supply. As EVN procures electricity from IPPs under the long term PPAs, electricity prices are decided at competitive prices through bidding process. Thus, EVN is able to secure electricity at competitive prices. Nevertheless, the present electricity tariff is lower than the cost and this is eroding the investment capability of EVN, while the country needs to expand the electricity sector significantly to support its rapid economic development. Thus, Vietnam is needed to raise the electricity tariff to a reasonable level as soon as possible.

4) Rural Electrification

Electrification ratio of Vietnam was 98% in 2012. The Power Development Plan 7 sets a target to achieve a 100% by 2020. In Vietnam, “Commune,” a unit of small local society, has played a major role in rural electrification. However, so developed distribution networks sometime show technical inadequacy, and EVN is now taking over these businesses to rehabilitate the network.

7.4.2 Implication for the Philippines

The feature of the Vietnamese electric industry, in comparison with the Philippines, is that the national company EVN is given an extensive authority throughout the electricity supply chain from power generation, transmission/distribution network through to rural electrification. While both countries set out the national electric policy, their apparent difference is the existence of the executing entities that directly implement the government policies. Likewise with Indonesia and Thailand, probability of policy execution is higher in Vietnam.

At present, electricity market reform is in progress in Vietnam, as the Philippines has experienced, unbundling EVN and creating wholesale market and liberalizing retail business step by step. Thus the market situation may change in future. It is a common policy objective among ASEAN countries to realize stable electricity supply at affordable price while securing sufficient investment for development.

Chapter 8 Concluding Remarks

8.1 Findings of the Study

Findings of this Study mainly through two major functions, Policy Dialogues with ASEAN countries held in Manila and the Philippine Investment Symposium held in Tokyo, are summarized as below.

8.1.1 Policy Dialogue in the Philippines

The Policy Dialogue with ASEAN countries was held in Manila from August 29 through September 4, 2013; it was informative to identify similarities and differences in the energy sector reform, share experiences and exchange views and opinions. To date, the Philippines has successfully implemented power sector reform with minimized governmental market intervention, while in other ASEAN countries the government sector plays a significant role leading the electricity sector development. On the other hand, the Philippines energy sector faces following challenges.

a. While marketization has paved the way to the transparency of the true cost of electricity by unbundling the rates, electricity tariff remains highest among ASEAN countries.
b. While the economy is expanding rapidly, power sector development may run behind the trend and become shackles to the sustainable economic development.
c. Rural electrification has to overcome difficult and costly access to isolated settlements and islands.

On these issues, the present status of the Philippines is as follows.

a. The electricity market may not be functioning well. It is necessary to vitalize the market ensuring fair and even-handed competition, and in the back ground, promoting investment to provide sufficient supply capacity to compete. Presently national plans illustrate the government goal of power development, but the government is given least mandate to directly intervene or issue administrative guidance to direct the power sector to follow the plan except for the approval of electricity tariff by the ERC.
b. Except for rural electrification, the Philippines government does not provide financial assistances or subsidies for electricity sector development such as institutional financing, government guarantee, or instruments to introduce foreign funds, while foreign equity ownership is regulated.
c. The Philippines government is presently implementing a robust program on rural electrification mobilizing the Malampaya Fund. However, access to isolated settlements and small islands are difficult and costly.
d. Success of the Retail Competition & Open Access (RCOA) to promote genuine competition has yet to be realized until fully operationalized.

Applicable policy options on the above observation are discussed in the following sections to upgrade the energy sector reform.

The Policy Dialogue was informative to recognize various aspects of the energy sector reform in the ASEAN countries, and exchange views and opinions. For the future dialogue, however, following points may need to be considered.

a. With longer preparatory period and discussion time, participants will be able to develop more closely-focused discussion.
b. Participants may also be invited from countries outside the ASEAN region where power sector liberalization has been implemented to share their views and experiences.

8.1.2 Investment Symposium in Japan

The Investment Symposium for Energy Sector in the Philippines was held on October 16, 2013, in Tokyo inviting Japanese government officers, industry experts and investors. In his opening remarks, Energy Secretary Hon. Carlos Jericho L Petilla explained the present status of and investment opportunities in the energy sector of the Philippines as follows:

a. The Philippines has restructured its power industry 12 years ago with enforcement of the EPIRA Law. The main part of the electricity industry has been liberalized, and now the government pays virtually no subsidies.
b. There are complaints among people on high electricity tariff.
c. The Philippines provides investor-friendly framework and welcomes Japanese investment in the energy sector. The DOE will provide support for investors to facilitate necessary permits from various government agencies.

Among others, he insisted that the government puts efforts for transparency to promote fair competition, enhance investment and ensure public understanding.

The Symposium was held with recognition that inviting active investment is crucial to secure stable electricity supply while realizing reasonable electricity tariff. The electricity price is kept high in the Philippines due to rapid demand increase against limitative market competition. Some investors showed concerns on the investment environment for foreign investors such as restriction on the foreign share holding as well as cumbersome numerous procedures and permits, while the DOE is trying to streamline the bureaucratic formality and provide supports.

The Symposium was informative to recognize the current status of the Philippines energy sector and investment environment as well as available technology options for electricity development. For the future plan of similar conference, however, following points may be considered.

a. With longer preparatory period and more concrete investment promotion plans, participants may be able to develop more closely-focused discussion.
b. Matching with local partners will be crucial to lead to actual investment actions.

8.1.3 Challenges facing the Electricity Sector and the Role of Government

The Philippines has successfully implemented power sector reform in terms that;

a. The electricity sector is almost fully liberalized with least government intervention, and

b. The government virtually pays no subsidy for electricity supply.[27]

However, the government is facing the following problems;

a. Despite the marketization, electricity tariff remains highest among ASEAN countries, and
b. While the economy is expanding rapidly, power sector development may drop behind and become shackles to the sustainable economic development.

These issues may be interpreted as questions how to guide the economy for long term investment in view of the following points;

1) Directing the market reform to realize internationally competitive electricity tariff by way of introducing mechanisms to enhance fair and even-handed competition.
2) Guiding the private sector, or the market, toward active investment to ensure sufficient power supply with optimal power mix along the time line as scheduled in the national plan, which is the most important factor to keep active market competition in the long run.
3) Constructing interconnections among regional grids, which will expand the electricity market size and make it possible to benefit from economy of scale.
4) Facilitating development of basic infrastructure to construct a desirable fuel supply system such as natural gas import terminals and pipelines.
5) Facilitating introduction of advanced technologies such as high thermal efficiency plants, clean coal technologies, renewable energies, etc.
6) Promoting investment and enhancing incentives in capital intensive long term projects such as hydro power which requires a longer construction period, hence longer financial credit.
7) Promoting rural electrification in isolated settlements and small islands which are sub-commercial.

In particular, fair and reasonable electricity tariff must be realized so that domestic industry maintains international competitive edge and citizens can use electricity at affordable prices. To this end;

1) The electricity tariff must be monitored from time to time if it is fair and affordable.
2) Market competition must be kept fair and active.
3) Political system should be prepared for action if remedy is needed to the above.

The above role 1) is already being performed by the DOE. However, it is questionable if the functions or mechanisms for items 2 and 3 are properly installed and working in the present system.

Monitoring is the fast track retail price mechanism to ensure fair and affordable electricity tariff. Then, to facilitate effective competition, a sufficient number of even-handed players must exist on the both sides of supply and demand in the market. And, in the back ground, a sufficient amount of investment should be being continuously incurred according to the market force to bring ample and rational supply. If any inappropriate situation is found, it should be reported publicly and remedial

[27] However, there are cross-subsidies such as Lifeline Rate given to low-income captive market endusers and Universal Charge to collect funds for rural electrification.

action must be taken. It is necessary to review if such system is working well in the Philippines.

To enhance investment in the power sector, it will be necessary to reassess the degree of government involvement in preparation of national plan, provision of institutional financing and approaches to affordable access, while the role of the government changes according to development status of an economy. When an economy is in a developing stage and its energy demand is expanding fast, such economy needs to develop the energy supply sector rapidly and in a large scale. However, in an early stage, private sector of such economy would not yet be equipped with sufficient technical as well as financial abilities to plan and implement big projects. On the other hand, good investment opportunities may be found elsewhere in the economy but not only in the energy sector, and thus capital fund would not necessarily or swiftly flow toward the socially required investments. Thus, insufficient supply status may prevail and market forces would not work well to realize fair and sound prices in the laggard sectors. This situation may gradually be mitigated as an economy grows and its private sector accumulates technical and financial abilities. When an economy reaches a matured stage, market principle will work better in pursuit of social objectives.

Thus, during the development stage, the government may play certain role to ensure development of the energy sector, which is the fundamental platform of an economy and influences every sector from industry to household. The sound development of the energy sector with assured probability and time line is the key for the sustainable economic development. To this end, proper planning and timely investment are most important. It is usual that the government of a developing economy takes measures such as national plan, direct intervention and financial assistance. Responding to the necessity, these measures will be executed strongly or softly. As an economy evolves toward a matured stage, government intervention will be softened save for socially required norms such as universal services and environmental regulations that would constrain profitability of the electricity business.

For improvements, the present portfolio of energy policies in the Philippines, their priorities and working mechanism should be reexamined in view of the social and economic development requirement.

8.2 Direction of Governmental Actions

8.2.1 Several Observations for Improvement

Materialization of reasonable price is the present serious national concern of the Philippines to keep the competitive edge of other domestic industries as well as the comfort of the citizens' life. Also, since the power sector is the platform of the economy, it is essential to develop it in a comprehensive manner along the time schedule coherent with the national economic development. It is of course important to keep in mind its nature of being public utilities to serve for the benefit of the whole society. The following summarize several observations to approach these issues.

Enhancing Market Competition

Market liberalization is expected to materialize efficient business development and reduced prices through competition. In the background, however, strong supply force must exist to bring sufficient competition. This mechanism looks not working well in the Philippines, while all the invited countries supply electricity at a lower tariff than the Philippines even after their subsidies are considered. Is this because the production and distribution costs are higher, electricity business is too much profitable, or price competition system is not working well? These points must be reviewed carefully while measures for the cost reduction are already discussed in the previous section.

To ensure fair and affordable prices as public utility service, it will be necessary to continuously monitor important issues such as,

a. Level and movement of the market prices if they are too high, too low or too vulnerable.
b. Competition condition if a sufficient number of even-handed players are participating and acting fairly in the market.
c. Business environment and profitability if players are enjoying excess profits or incurring undue losses.
d. Possibility if the present market mechanism and movement allows developing innovative technologies and businesses.

Reports covering these points may be reviewed from time to time by the committee comprising relevant government offices, industries, academies and other stakeholders. Then, if any remedial action is needed, some government office, most likely the DOE, may have the key role for improvement.

For example, under the present mechanism, the electricity price to be contracted under a PPA must be approved by the ERC in the Philippines. This rule looks fair. However, it should be examined if this system functions flexibly enough to solicit participation of more efficient and/or cheaper plants, while giving signals to obsolete or expensive plants to retire.

Ensuring Optimum Power Development

Ample and efficient supply capacity is the platform for fair competition and reasonable price. To this end, the power development plan must be prepared to optimize the electricity supply structure in the long run. It should be noted that a power plant, once built, will be locked-in for a long period in the national power mix while the efficiency and environmental characteristics of the plant could not be improved significantly during its operational life. Power development plan must be implemented as scheduled since the delay in electricity construction will greatly affect development of other sectors in the economy.

The electricity sector is an integrated system comprising various sub-sectors, and all of them must be developed in a coherent manner. Then, economics of individual projects in different sub-sectors are not same. Private capitals may flow toward the projects with higher profit potential and less

uncertainties, but would not easily move to the projects with lower profit prospect and high uncertainties. In order to implement coherent development of a comprehensive plan, it is necessary to prepare a mechanism which assures proper capital flows to all the sub-sectors. Such mechanism must be prepared with the following functions:

a. To prepare ample capital flows into the power sector
b. To assure fair return on investment
c. To reduce uncertainties on investment

In other words,

a. To prepare open investment rules to invite ample capital flows as well as institutional finance to support the private sector to go for large scale and long term investment
b. To reinforce the WESM as a fair and transparent market where ample amount of electricity shall be traded with assurance of fair but not too excessive return on investment
c. To remove bureaucratic barriers for investment procedure and also mitigate the uncertainty on the sale and price level of the electricity to be generated by the private sector investment.

In the area where market mechanism does not work well, it may be necessary to create a state core entity that will carry the responsibility to implement policy objectives with sufficient mandate, budget and capability. Of course, the overall plan must be managed coherently.

The Philippines has successfully implemented electricity sector liberalization. However, liberalized market does not necessarily guarantee efficiency improvement, hence cheaper cost in the long run, as investment fund needs to compete with shorter term, more attractive investment opportunities available elsewhere in the economy. In addition, to optimize the power supply structure in the long run, it is necessary to introduce efficient and cleaner plants even if a large amount of investment is required. Small projects may be accommodated by local private banks, while problems are found in financing large scale projects such as clean/advanced coal plants of 1GW or greater class. These plants will contribute to substantial efficiency improvement and are indeed cheaper in the long run. However, providing a huge amount of fund with long term credit may be beyond the capacity or favour of local private banks in developing countries when government support is not available; the Philippines is not an exception. Institutional finance is an old fashioned policy tool, but very effective to ensure large scale construction at controlled cost. Introduction of foreign funds and investments are also well known measures to promote investment.

While the payout period of a bigger project may be longer, investors need to have a firm prospect on the sale and price level of their electricity to be generated throughout the project period before finalizing the investment decision. In Indonesia, Thailand and Vietnam, long term PPAs are functioning to provide this required assurance, while national companies are playing significant role to lead power development. However in the Philippines the electricity market has been liberalized in a form to virtually prohibit monopolized activities of the state-owned National Power Company. Therefore, it is necessary to create a different mechanism in its electricity market system to mitigate future uncertainties for investment.

Aggregation of Demand

To ensure fair competition between sellers and purchasers, at the same time to enable lager scale transaction to enjoy economy of scale in investment, it is desirable to have greater players on both sides. However, this is far from the reality in the Philippines on the purchasers' side. Except for the case of MERALCO, other power purchasers such as electric cooperatives are extremely small against the desirable size on the generators side.

Table 7.1 shows the extremes in Distribution Utilities in the Philippines. MERALCO is the biggest seller of electricity having 32,771 GWh sales in 2012 being 55.35% share of the market. With about 75% load factor, MERALCO's demand is about 5,000 MW. The 120 Electric Cooperatives, on the other hand, have total sales of 13,595 GWh representing 22.96% of the market. This translates to average of 113 GWh sales per EC with an average demand of only 22 MW. The other Private Distribution Utilities (PDUs) share is only 7.79% having average sales of 243 GWh per DU and average demand of 43 MW. The combined sales of MERALCO and other PDUs represent 63% of the market.

Table 8.1 Electricity Demand of Distribution Utilities (2012 Sales)

Utility	Sales (GWh)	Load Factor	Demand (MW)	Share
Meralco	32,771	(75%)	(4,988)	55.35%
Electric Cooperatives	13,595	(60%)	(2,586)	22.96%
Other Private DUs	4,610*	(65%)	(809)	7.79%
Directly Connected Customers	4,325*	(65%)	(760)	7.30%
Economic Zones	3,911*	(75%)	(595)	6.60%
Total	**59,211**		**(9,738)**	**100.00%**

* Estimate based on 2009 data assuming hypothetical load factors.
Source: DOE, NEA, MERALCO

The estimate of the demand of the Distribution Utilities is shown in the Table below:

Table 8.2 Estimated Demand of Distribution Utilities (2012)

Utility	No. of DUs	GWh/DU	Load Factor*	MW/DU**
Meralco	1	32,771	75%	4,988
ECs	120	113	60%	22
Other PDUs	19	243	65%	43

* Assumed load factor
** Estimated average demand per DU

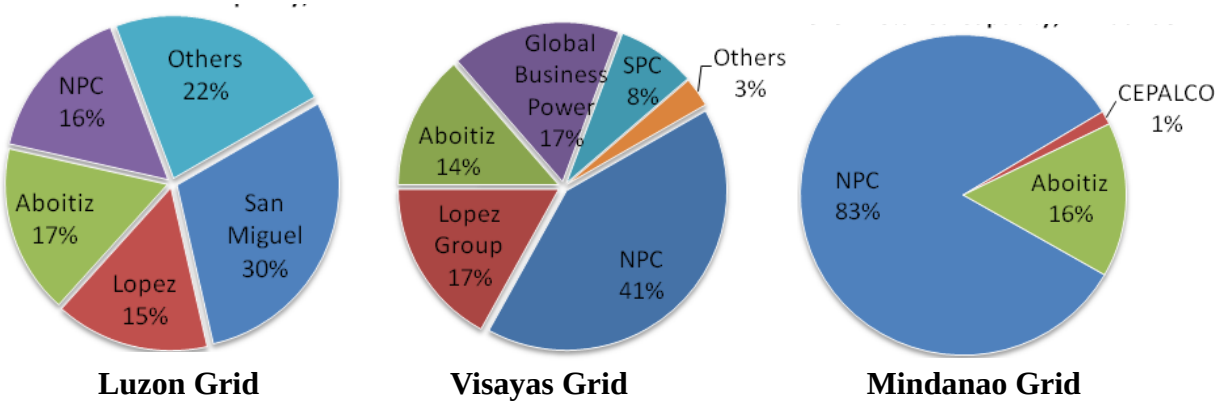
MERALCO has the natural economy of scale and market power which can be used to negotiate for the lowest electricity prices. It can also sign long-term power supply contract that could provide

efficient power generation from advanced technologies on 1 GW scale that can also reduce the electricity price. One of the challenges is how to compel MERALCO to specify such technologies when they pursue their long-term power supply contracts since the government cannot directly intervene. In addition, MERALCO has affiliated generation companies. It also created its own generation company (MERALCO PowerGen Corp. or MGEN).

The Electric Cooperatives and other private DUs (except for Davao Light and Power Company in Mindanao), on the other hand, do not have the economy of scale for their power supply contracting to specify a requirement to be supplied from new power plants in addition to weak negotiating position. In this regard, aggregation of these smaller power purchasers may work to strengthen their competitive power and at the same time enables to consider larger size contract to materialize economy of scale.

Cross-ownership between Generation and Distribution Companies

The electricity market in the Philippines is a virtual monopoly. The sales of MERALCO and other private DUs in 2012 constitute at least 63% of the market. These Distribution Utilities have affiliate Generation Companies which is allowed under the EPIRA Law. DUs can purchase power from their affiliates up to 50% of their demand. Hence, there is no incentive for these private DUs to seek for the lowest possible price when they contract their own affiliates or with each other since their own generation companies stands to benefit in contracts with higher prices. Incidentally, the share of the 3 largest generation companies in the Luzon Grid who are affiliated with private Distribution Utilities is at 62% as shown in figure below.



Source: UPNEC based on DOE and ERC data

Figure 8.1 Control of Installed Generating Capacity as of 2011

The cross-ownership between the Generation Companies and Distribution Utilities is threatening market competition. If a generation company is in a position to have certain dominant power in the market, it would be tempted to curb investment in supply capacity that would weaken supplier's position. Such situation can be remedied by legislative amendment that will prohibit such cross-ownership. Administrative and regulatory reforms can also be pursued to avoid self-dealing between affiliated Generation Companies and Distribution Utilities by mandating the DUs to subject

their uncontracted demand to a competitive bidding for power supply contract. A mechanism that will determine the volume of uncontracted demand of Distribution Utilities for short-term and long-term contracts must be put in place. The volume for short-term contracts may be sourced from existing power plants while the long-term power supply contracts must specify the supply from new generating capacity and its timing for power generation until the market reaches certain comfortable status. This reform proposal can solve not only the cross-ownership problem; it can also solve the supply security problem. This is the kind of reform that was pursued in Latin America particularly Brazil and Chile when their Wholesale Electricity Spot Market (WESM) did not produce new capacity in time to meet the growing demand for electricity.

Utilization of Indigenous Resources

Indigenous energy resources such as natural gas and geothermal may have also roles in reducing electricity prices in a sense that prices and supply of these resources could be controlled by domestic legislation. Currently, the price of the Malampaya natural gas is indexed to international oil prices. Even the geothermal steam which cannot be traded in the international market is indexed with coal prices. The Philippines has lost the potential to manage the security of supply since this indexation was not insulated the country from the volatility of fuel prices in the international market. Moreover, the Philippines may also consider import/export and local consumption pricing policies like Indonesia which uses the local resources to maintain lower prices.

Such government directive may be executed especially when the resource market shows abnormal movement and damages the economy. When oil prices showed skyrocketing rise in the middle of the 2000s, many oil producing countries have introduced windfall profit tax to absorb the excess profit of the private participants. Asian natural gas price has kept an extreme upward deviation from the global trend after the Fukushima-Daiichi nuclear plant accident in 2011 in Japan. These incidents may have to be reviewed carefully to keep the electricity price fair and competitive. If excessive increases in profit are found in resource developers, the government may absorb such amount and create Indigenous Resource Fund to lower electricity tariff, which will be used for construction of energy infrastructure such as transmission/linkage lines and natural gas import facilities as well as promotion of renewable energies. In doing so, we should carefully consider how the energy market other than electricity market should be kept fair and equitable.

8.2.2 Optional Approaches

Based on the above discussion, several optional approaches to issues relating to the energy sector reform are summarized below.

Enhancing Market Competition

On the supply side of the wholesale market, power generators are guarded by the long term PPAs contracted with the former NPC and not exposed to competition. IPPs contracted with distributors are also exempted from competition. Thus, only a limited amount of electricity is supplied to WESM,

while competition is not sufficient to reduce electricity price. To solve this situation, suppliers may be obligated to sell a sufficient quantity of electricity at WESM so that the overall electricity tariff will be more elastically adjusted from time to time. At the same time, WESM must offer attractive prices for generators sufficient to support additional investment. Or, the other way around, the approved long term PPA price may be reviewed more strictly to encourage trading at WESM.

As a regulatory measure, "Vesting Contract" of Singapore is suggestive. [28] This scheme provides certain assurance of future price locking-in certain portion of the generated electricity to the long term marginal cost to avoid extremely high or low prices compared. The rest of the electricity is traded freely at the wholesale market. After observing stable market price movements, Singapore has decided to reduce the vested contract ratio from the initial 65% to 50% in 2013 and further down to 40% in 2014 and promote competition at the wholesale market.

As an option to enhance competition, "Marketers" or middlemen of electricity trading are introduced in Europe and the USA. However, in view of the market size and difficulty of interconnection with neighboring countries, a sufficient number of Marketers could not be secured immediately in the Philippines to function the market well.

On the demand side of the wholesale market, policy measures enhancing retail competition are installed in the Philippines in 2013 through the commercial implementation of the Retail Competition & Open Access (RCOA). Performance of this mechanism should be monitored carefully until fully operationalized.

In future, the Philippines may consider expanding the coverage of deregulation. Then, the possible new entrants to the market as well as consumers' behavior should be carefully examined. Active competition can be expected on the large consumers, as they are cost sensitive and may respond positively while they are attractive customers for Retail Electricity Supplier (RES). On the other hand, small consumers like household are largely not cost sensitive and are not attractive customers for RES; there is a risk that sufficient competition would not come up even if market is deregulated. Considering such fundamental behavior of consumers, the market must be designed to assure stable electricity supply and fair and equitable treatment of various consumers.

Reducing Uncertainties for Investment

For the purpose to reduce uncertainties on the sales amount and price of electricity to be generated under a new project, so as to enhance investment, following are the examples of market reform to be examined.

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[28] Singapore started the vesting regime in 2004 with the vesting contract level at 65% of the total electricity demand and to be reviewed every two years. The vested part of the electricity sold at the wholesale market shall be applied either the price the Administration deems as the long term marginal cost or the wholesale market price, whichever is higher. If the wholesale price is lower than the long term marginal cost, the balance of them shall be paid to the electricity operator. The vesting ratio was reduced to 55% in 2007 as the power supply increased. It was increased to 60% for 2011 facing soaring natural gas price, but again reduced to 55% next year. After an in-depth assessment conducted in 2013, it was decided to reduce the ratio to 50% from July 2013 and further down to 40% from January 2014.
http://www.ema.gov.sg/page/91/id:134/

The “Vesting Contract” applied in Singapore provides guarantees on the future electricity selling price. This system works to lock-in the future selling price for the generated electricity, while Vesting Contract is reviewed annually. Adding some coefficient(s) in the formula such as to reflect changes in Price Index or fuel cost, it will be possible to install an automatic adjustment mechanism toward the target price that works for a longer period, and shall work as price guarantee for IPP investors.

In Europe, “Capacity Mechanism” or “Capacity payment” is being considered, which may give another idea. This is to pay additional fee for the standby power plants to promote investment for this kind of power plants. As the operation rate of standby power plant is naturally very low, no one would invest on such low profitable plant unless certain external support or obligatory rules.

In addition, a variant formula of Feed-In Tariff (FIT) or Renewable Portfolio Standard (RPS) may be considered in guiding investments to a desirable power mix ensuring power source diversification and responding to environmental concerns. It is worried that a relatively small-sized, less efficient coal-fired power plant may become most competitive in the Philippines. Then, a new rule may be set for distribution utilities to purchase certain part of electricity from gas-fired thermal generators that qualifies certain standard relating to fuel efficiency and GHG emissions. Applying such rule, it will be possible to contain the electricity purchase price conducting peer review on the cost, while it is also able to avoid upsurge of unnecessary capacity by setting some ceiling on such purchase year by year.

Aggregating Demand

The small ECs in the Philippines have recently shown a response that demonstrated reduction in electricity prices is possible through joint action in power supply contracting to achieve economy of scale. Twenty (20) ECs in Mindanao bidden 330 MW of their aggregated demand and eventually signed a power supply contract at Php4.09/kWh. It was noted that prior to the aggregation efforts, the ECs have received individually offers from local IPPs to supply base load power from Php5.50/kWh to Php6.80/kWh on a take-it or leave-it basis which compels them to pursue the joint action. In Central Luzon, the 12 ECs also aggregated and bidden jointly in October 2013 a 300 MW base load demand. The lowest offer that they received is Php3.70/kWh. The contracting of ECs which have no affiliated generation companies through competitive process resulted in substantially lower prices compared to MERALCO’s power supply contracts of Php4.50/kWh to Php5.50/kWh. Of course, these ECs have to procure electricity for their demand above the base load. If the electricity market is sufficiently liquid and ECs are able to procure additional electricity at a reasonable price, such demand aggregation will lower the electricity tariff significantly while the whole industry will be able to enjoy economy of scale. When a new contract is made with new suppliers going to construct new generators, this will cause excess capacity at the existing generators that has lost contract and will enhance market competition, so as to create a market position desirable as above.

The joint action of small ECs can be institutionalized by National Electrification Administration (NEA) by issuing policy guidelines mandating and even organizing the power supply aggregation of

Electric Cooperatives and subject their uncontracted aggregated demand to competitive bidding process.

Some Other Thoughts

Reducing Power Rates in Economic Zones by Government Investment and Financing

As shown in Table 7.1, the electricity consumption of the Economic Zones in the Philippines in 2012 is estimated at 3,911 GWh which represents about 6.6% of the total electricity consumption. This translates to about 600 MW demand. It is estimated that there is at least 100 to 200 MW of power demand in each major economic zone. While the Philippine government "no subsidy" policy is laudable in the long-term, it has been losing competitiveness with neighboring countries in the short-term. The Economic Zones has been created to attract industrial investors. It can attract more investors if the power rates can be reduced to a more competitive level through strategic investment of government corporations in power generation. Government corporations and authorities (BCDA, PEZA, CDC, etc.) can pursue joint ventures with IPPs or invest in projects of IPPs to supply power to locators in the Economic Zones. The investment of the government corporations need not get an equity internal rate of return as high as the commercial investors which is said to be around 20% in the Philippines. If an EIRR of the government corporation enough to recover its investment and get a risk-free return (e.g., 7%) is applied together with institutional finance providing low interest loans, it will be quite effective to deal a lower power rates in Economic Zones.

Aggregation of Directly Connected Customers and Contestable Customers

The consumption of Directly Connected Customers in 2012 is estimated at 4,325 GWh. The total demand could reach about 600 MW. The contestable customers (i.e., large users of electricity with more than 1 MW demand connected to the distribution systems) who are eligible to choose their own suppliers under the Retail Competition and Open Access regime[29] will also result in substantial demand that can be aggregated. In MERALCO franchise alone, the consumption of eligible contestable customers is about 40% of the total sales. This is about 1,800 MW demand. The Directly Connected Customers and Contestable Customers may be organized to pursue power supply aggregation similar to the Electric Cooperatives as mentioned above. Such arrangement may be sought, for example, through industry associations.

Indigenous Resource Fund and Infrastructure Construction

In view that an extremely high natural gas price is prevailing in the Asian market, excessive profit may be occurring at the indigenous resource producers while pushing up fuel prices for power generation. Then, such excessive profit may be absorbed by way of windfall profit tax and be used as Indigenous Resource Fund for infrastructure construction such as natural gas import terminals and gas pipelines. Similar concept may be considered if geothermal projects become excessively profitable

[29] End-users with electricity demand of one megawatt (1000 kW) or more may opt to avail power from their chosen supplier of electricity as the commercial implementation of the Retail Competition and Open Access (RCOA) has taken effect as of 26 June 2013.

due to the price mechanism applied; excessive profits may be diverted to infrastructure construction that will reduce electricity tariff such as transmission/delivery lines.

Infrastructure Construction by Expertise State Entity

For construction of energy infrastructure, in Vietnam, other sector national companies (Petrovietnam and Vinacomin) are expected to make contribution. Likewise, promoting gasification of the electricity sector in the Philippines, other national entity such as PNOC with specific expertise may be able to construct LNG import terminals and gas pipelines to alleviate the financial and technical burden of the power sector in the initial investment.

8.3 Conclusion and Recommendation

8.3.1 Multi-stakeholder Energy Roundtable

The Philippines is facing challenges in its electricity market management to assure materialization of optimum power mix as well as reasonable electricity tariff in pursuit of sustainable development. In particular, Undersecretary Loreta Ayson insisted at the meeting with the Study Team on November 14, 2013 that the most urgent issue is to sort out innovative measures to lower the electricity tariff. To this end, the present electricity market system and its performance should be reviewed and possibility of the role of the government should be evaluated in the following areas.

a. Review of the present market system if it properly functions as provided in EPIRA to bring fair and reasonable prices in the areas such as electricity tariff evaluation, monitoring and guidance
b. Implementation of power development plan focusing on optimal power mix and sorting out measures to enhance investment to orderly implement the plan
c. Restructuring of the electricity market system to enhance long term investment and facilitate fair and sound market competition with ample even-handed players enhancing aggregation of individual demand as provided in EPIRA and separation of linked players
d. Examining benefits of government involvement in certain energy projects such as natural gas infrastructure construction and power supply project at special economic zones
e. Exploring ways to raise Indigenous Resource Fund and utilize for reduction of electricity tariff

In-depth studies on the above elements shall be conducted to identify present impediments or inconsistencies, to sort out remedy measures, and to define appropriate direction and degree of the additional energy market reform.

To implement this, multi-stakeholder Energy Roundtable may be assembled inviting experts widely from among industries, academies and government offices. National experts and researchers will present self-motivated studies at the Roundtable. This is an important element when results are transformed into political action; a kind of advisory paper prepared solely by foreign researchers may appear intrusive for nationals as a basis of policy actions, although modest support may be sought from international resources.

The Roundtable should widely cover various aspects of the society from geographical, political, cultural, economic, technical, and environmental viewpoints to formulate national consensus. This approach may be implemented by way of;

a. Qualified research institutes and academies in the Philippines will conduct studies for policy actions on the several specified issues, in particular high electricity tariff.
b. Energy Roundtable will discuss study results and evaluate them.
c. Energy Roundtable shall formulate national consensus on the next action for the energy market reform

The DOE may act as the secretariat of the Roundtable; select specific areas for study, provide necessary information and advice, and also chair the Roundtable, while relevant government departments, academies, industries and other stakeholders shall participate. Discussion results shall be formulated into policy recommendations as a consensus of the participants.

At the same time, as the new policy action must incorporate the global trend on energy and environment, exchanges with foreign countries, in particular neighboring ASEAN countries are important. In this regard, the DOE should continue the bilateral and multilateral dialogues with them as experienced under this program.

8.3.2 Next Steps

Based on the above discussion, we wish to recommend the following actions.

1) DOE will examine the value of setting up Energy Roundtable in the Philippines with a view to review energy market reform. If deemed valuable, DOE will set up Energy Roundtable inviting various stakeholders from among government offices, industries and academies.
2) DOE, as secretariat of the Energy Roundtable, will identify necessary study items, such as discussed in this Study, and invite in-depth studies for policy actions from among national researchers and experts.
3) Energy Roundtable will from time to time gather and discuss desirable policy actions. Once consensus is formed, recommendation for policy action shall be formulated and submitted to the government.

In addition to the above, the DOE should continue bilateral and multilateral dialogue among ASEAN countries for regular exchange of information and opinions on energy sector policy. Next step should probably be to initiate actions to schedule a region-wide dialogue with relevant officials and entities in the ASEAN.

Annex-I

Background Paper for
Energy Policy Dialogue in Manila
August/September 2013

Energy Status of Selected ASEAN Countries

Philippines

Indonesia

Thailand

Singapore

Vietnam

August 2013

Japan International Cooperation Agency

The Institute of Energy Economics, Japan

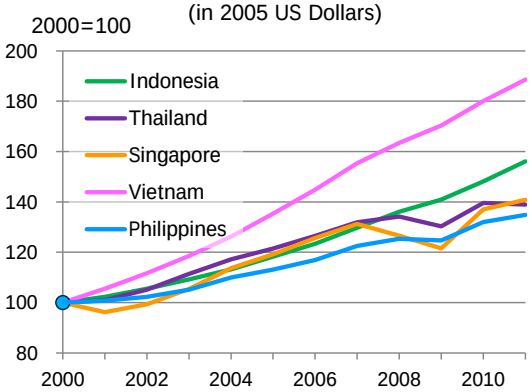
Contents

Executive Summary

1. Current Status of Economy and energy in Selected ASEAN Countries

During the first decade of the 21st century, ASEAN countries have recorded steady economic growth exceeding 4% per annum, albeit the recession caused by the Lehman shock occurred in 2008. In the same period, GDP (in 2005 US dollars) of the Philippines increased 65% (annual 4.7%), Indonesia 77% (annual 5.3%), Thailand 53% (annual 3.9%), Singapore 81% (annual 5.6%) and Vietnam 113% (annual 7.1%).

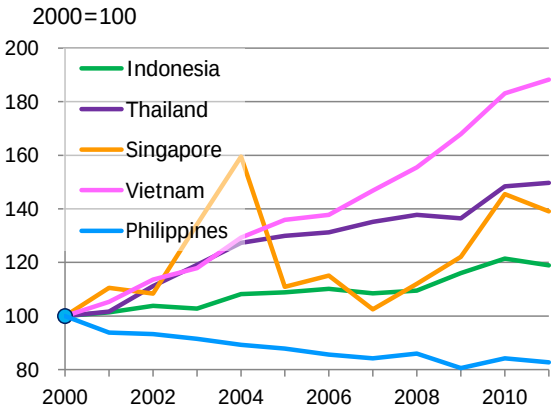
Figure 1 Growth of Per capita GDP
(in 2005 US Dollars)



Source: ADB

Reflecting the strong economic growth, industrialization, and improvement of living standard, per capita energy consumption increased steadily in Vietnam and Thailand, while that for the Philippines recorded decline. In the Philippines, the energy consumption in terms of the total primary energy supply (TPES) remained at an almost same level (in 2011, it was merely 101% of that of 2000), as its population increased 23% in the same period.

Figure 2 Growth of Per capita TPES



Source: ADB, IEA

Per capita energy consumption of Singapore (6.46 toe per person) was highest among Asian countries except for Brunei, maybe because of its energy intensive industry structure and hot climate; it was 65% higher than that of Japan (3.90) in 2010. In contrast, that of the Philippines (0.44) was the lowest among Asian countries after overtaken by Vietnam in 2007. Same tendency is seen in the electricity consumption.

Except for Singapore, ASEAN countries are endowed with certain amount of natural resources. Indonesia and Vietnam are net energy exporters. However, they are not sufficient to support increasing demand.

Indonesia became a net oil importing country in 2004 due to increasing demand against stagnant oil production. Vietnam may follow the same pattern unless significant new discoveries. Both countries are also exporting coal, but are now considering curbing export to preserve resources for domestic consumption. Indonesia used to be the world biggest

LNG exporting country. Facing growing domestic demand, however, LNG export is being curtailed. Thailand, Vietnam and the Philippines are producing natural gas, but they are not sufficient to accommodate the growing demand. Since the Shale Revolution initiated in North America in the middle of the previous decade, abundant LNG supply is expected globally in future. Once LNG pricing formulas for the Asian market, which at present define the Asian LNG extremely expensive, are revised, LNG may become a favorable option in pursuit of energy security and environmental sustainability.

Figure 3 Major Indicators of Selected ASEAN Countries

Indicator	Unit	Philippines	Indonesia	Singapore	Thailand	Vietnam
GDP (Current Price)	Billion USD	**199.6**	708.0	227.4	341.1	106.4
Population	Million	**92.6**	237.6	5.1	67.3	86.9
GDP/Capita	USD/Person	**2,155**	2,979	44,789	5,067	1,224
Total Primary Energy Supply (TPES)	Million TOE	**40.5**	207.8	32.8	117.4	59.2
Energy self-sufficiency (total energy)	%	**57.9**	183.5	1.2	60.1	111.2
Electricity consumption	TWh	**55.3**	148.0	42.2	149.3	86.9
Power generation capacity	GW	**13.3**	32.9	10.6	31.5	17.5
CO2 Emission (energy origin)	Million ton-CO2	**134.6**	410.9	62.9	248.5	130.5
Per capita TPES	TOE/Person	**0.437**	0.875	6.456	1.745	0.681
Energy intensity per GDP	TOE/1,000 USD	**0.203**	0.294	0.144	0.344	0.557
Per capita Electricity Consumption	kWh/person	**597**	623	8,307	2,218	1,000
Electrification rate [2009]	%	**89.7**	64.5	100	99.3	97.6
Electricity Intensity per GDP	kWh/1,000 USD	**277**	209	185	438	817
Per capita CO2 Emissions (energy origin)	Ton-CO2/person	**1.454**	1.729	12.390	3.692	1.501

Source: ADB, IEA, APEC

Figure 4 Energy Composition of ASEAN Countries (2012)

(million tonnes oil equivalent,%)

	Philippines		Indonesia		Thailand		Singapore		Vietnam		Total	
	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%
Oil	13.0	*42.9*	71.6	*44.9*	52.4	*44.6*	66.2	*89.5*	16.6	*32.0*	219.8	*50.7*
Natural Gas	3.1	*10.2*	32.2	*20.2*	46.1	*39.2*	7.5	*10.1*	8.5	*16.3*	97.4	*22.5*
Coal	9.4	*31.1*	50.4	*31.6*	16.0	*13.6*	0.0	*0.0*	14.9	*28.7*	90.7	*20.9*
Nuclear	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
Hydro	2.5	*8.1*	2.9	*1.8*	2.0	*1.7*	0.0	*0.0*	11.9	*23.0*	19.3	*4.4*
Renewables	2.3	*7.8*	2.2	*1.4*	1.2	*1.0*	0.3	*0.4*	0.0	*0.1*	6.0	*1.4*
Total	30.2	*100.0*	159.4	*100.0*	117.6	*100.0*	74.0	*100.0*	52.0	*100.0*	433.2	*100.0*

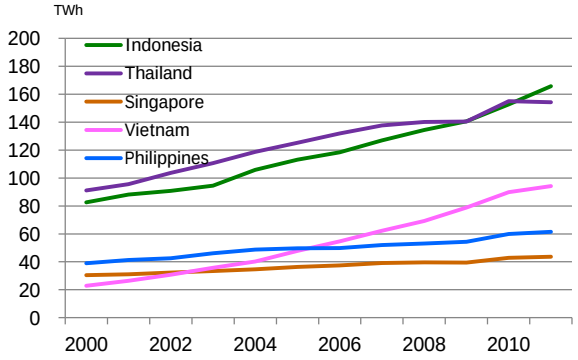
Source: BP Statistical Review of World Energy 2013

Among energy sources, oil is the predominant energy in ASEAN countries, followed by natural gas and coal. Nuclear is yet to be introduced. Hydro plays a significant role in Vietnam and the Philippines. Geothermal is significant in the Philippines and Indonesia, and additional projects will be developed extensively in these countries. New renewable energies such as solar, wind and micro-hydro power generation are still in the infant stage except for application in rural electrification.

2. Current Status of Electric Power Sector in Selected ASEAN Countries

Electricity consumption of ASEAN countries recorded robust growth during the decade up to 2011. That of the Philippines, Indonesia, Thailand, Singapore and Vietnam combined increased 95% or annual 6.3%. Except for Singapore, which is already in a matured stage and recorded annual 3.3% increase, electricity demand increase of the Philippines, at annual 4.2%, was the lowest among ASEAN countries. Vietnam recorded robust 13.7%.

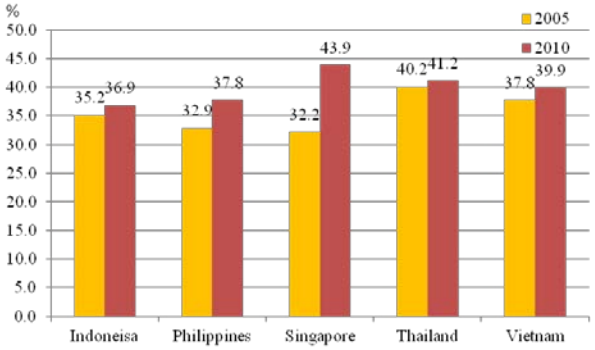
Figure 5 Power Consumption of ASEAN Countries



Source: IEA Energy Balance of Non-OECD Countries 2012

Efficiency of thermal power generation in these countries has been improving fast reflecting construction of new and advanced power plants. Singapore has achieved world class generating efficiency adopting combined cycle gas turbine (CCGT) plants extensively. In other countries, adoption of advanced coal- and gas-fired plants to accommodate increasing demand as well as replacing obsolete oil-fired plants has contributed to the remarkable efficiency improvement. To further improve efficiency by way of ramping up plant size while curbing pollutant emissions and applying smart management ad control, it is desirable to promote integration of and/or interchange among regional grids. Electricity market design must be considered in a manner to bring such economic benefit.

Figure 6 Efficiency of Thermal Plants



Source: IEA

Figure 7 Energy Inputs for Power Generation in ASEAN Countries (2011)

(million tonnes oil equivalent,%)

	Philippines		Indonesia		Thailand		Singapore		Vietnam		Total	
	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%
Oil	0.80	*4.1*	10.35	*17.9*	0.44	*1.4*	1.89	*20.3*	1.27	*7.6*	14.7	*11.0*
Natural Gas	3.12	*16.0*	8.25	*14.3*	19.16	*61.1*	6.82	*73.3*	7.63	*45.9*	45.0	*33.4*
Coal	6.19	*31.6*	21.88	*37.9*	8.76	*28.0*	0.00	*0.0*	5.14	*30.9*	42.0	*31.2*
Nuclear	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	0.0	*0.0*
Hydro	0.83	*4.3*	1.07	*1.8*	0.70	*2.2*	0.00	*0.0*	2.57	*15.4*	5.2	*3.8*
Geothermal	8.55	*43.7*	16.11	*27.9*	0.00	*0.0*	0.00	*0.0*	0.00	*0.0*	24.7	*18.3*
Renewables	0.08	*0.4*	0.09	*0.1*	2.28	*7.3*	0.60	*6.5*	0.02	*0.1*	3.1	*2.3*
Total	19.58	*100.0*	57.75	*100.0*	31.35	*100.0*	9.31	*100.0*	16.61	*100.0*	134.6	*100.0*

Source: IEA Energy Balance of Non-OECD Countries 2012

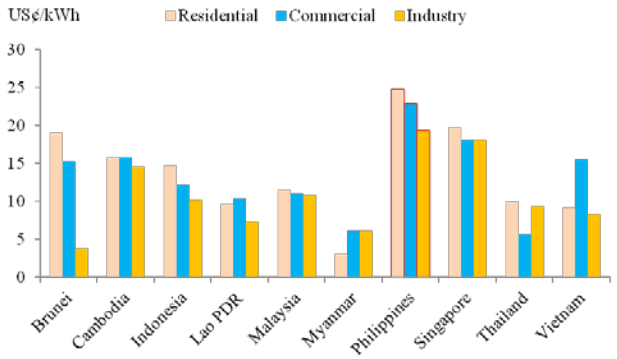
Fossil fuels are dominant as energy sources for power generation. ASEAN countries are already heavily dependent on natural gas, in particular Thailand and Singapore. However,

role of natural gas may be appreciated in other countries, considering its cleanness and abundant availability in the international market. Geothermal as energy inputs for power generation is valued very high in the Philippines and Indonesia. We should note, however, that this is due to the IEA calculation formula that assumes the energy efficiency of geothermal power generation at merely 10%. If we look to the electricity output, the share of geothermal is about 1/2 to 1/3 of those calculated for inputs. Development of other new renewable energy sources for power generation is still marginal yet.

Electrification is almost completed in Singapore, Thailand and Vietnam (see Figure 3). The Philippines (89.7% in 2010) and Indonesia (64.5%) are still struggling toward this target. Being archipelago countries with a huge number of islands, electrifying all of them is a very heavy task for the society.

Electricity being the fundamental element for the modern society, its price gives significant impact on peoples' daily life as well as industrial competitiveness. Among ASEAN countries, electricity prices are highest in the Philippines. While the electricity market in the Philippines is almost fully deregulated, subsidies or cross-subsidies are provided in other countries to curb electricity rates, resulting in a heavy financial burden for the government. It is always a big challenge how to settle the trade-off between social, political and economic objectives harmoniously.

Figure 8 Electricity Prices



Source: ASEAN Centre for Energy

3. Power Sector Reform in Progress

Power sector reform started in the world in the late 20th century, aiming at rationalization of the electricity system being run by heavily protected public utilities, with expectation to ensure quality, reliability, security and affordability of the electricity supply. In the early stage, however, abrupt privatization short of prudent consideration on fair and rational market design incurred various problems. Persisting wide area blackouts were experienced in California, New York and elsewhere in the United States, and brownouts in Europe. An excellent company Pacific Power and Gas, serving 1/3 of California, easily got bankrupted. Since then, electricity market system has been reviewed and revised from time to time, and now liberalized electricity markets with participation of many private players are prevailing worldwide. Architecture of electricity market evolves staring with the genesis, fixing defects and tuning conditions through the transition stage, and finally arriving at a mature stage where social objectives are largely achieved.

Except for Singapore, the Philippines implemented electricity market reform relatively

earlier among Asian countries, enforcing the "Electric Power Industry Reform Act of 2001" (EPIRA), and privatized facilities and operations formerly owned and operated by the National Power Corporation (NPC). It was an across-the-board deregulation transferring all of the generation, transmission and delivery sectors to the private sector. Electric market reform is also underway in Indonesia and Thailand, while their architectures are different from that of the Philippines as summarized in the following tables.

In principle, electricity market reform aims at securing stable supply at affordable prices, while implementing electrification of the country. Drivers for this are;

- Low efficiency of power sector
- Mismatch between tariffs and costs of electricity
- Increased investment in the sector
- Government suffering from financial difficulties
- Introduction of capital and technology from abroad

With regard to the objective to secure stable electricity supply, current status of policies adopted in ASEAN countries is as shown in Figure 9. In Indonesia, Thailand and Vietnam, the government shall intervene through the national power company, while such system is not adopted in the Philippines and Singapore. Only indirect intervention will be implemented via various regulations such as on emission standard, efficiency standard, etc.

Figure 9 Policies for Stable Electricity Supply

	Philippines	Indonesia	Singapore	Thailand	Vietnam
ESTABLISH NATINAL POLICY					
Prepare the long term Power Development Plan	○	○	○	○	○
EXECUTE NATIONAL POLICY					
Direct intervention through specific entity	-	National company PLN	-	National company EGAT	National company EVN
In-direct intervention by relevant regulations (emission standard, efficiency standard, etc.)	○	○	○	○	○
Type of power station (location, fuel, technology, capacity)	Difficult to control	Direct control as planned	Difficult to control	Direct control as planned	Direct control as planned
INVITE PRIVATE SECTOR INVESTMENT					
Tender notice for investors	-	○	-	○	○
Price signal derived from wholesale market	○ active enough?	-	○ active enough?	-	-
Provide confidence for profitability of investment	-	Long-term PPA	"Vesting contract"	Long-term PPA	Long-term PPA

With regard to the electricity supply at affordable prices, current status of mechanisms adopted in ASEAN countries is as shown in Figure 10. Also, policies for electrification and securing fuel supply are summarized in Figures 11 and 12, respectively.

Figure 10 Mechanisms for Realizing Affordable Prices

	Philippines	Indonesia	Singapore	Thailand	Vietnam
GENERATION / WHOLESALE SECTOR					
Liberalize and establish wholesale market for competition	○ active enough?	-	○ active enough?	-	-
Competitive bidding for selecting IPP	-	○	-	○	○
Wholesale price control	-	??	"Vesting contract"	??	??
RETAIL SECTOR					
Liberalize to introduce competition	○ 1MW<	-	○ 1MWh/month<	-	-
Retail price control	○ <1MW	○	○ <1MWh/month	○	○

Figure 11 Policies for Electrification

	Philippines	Indonesia	Singapore	Thailand	Vietnam
ESTABLISH NATINAL POLICY					
Prepare national plan, target	○	○	○	○	○
EXECUTE NATIONAL POLICY					
Direct intervention through specific entity	National organization NEA	National company PLN	-	National organization PEA	National company EVN

Figure 12 Policies for Securing fuel Supply

	Philippines	Indonesia	Singapore	Thailand	Vietnam
ESTABLISH NATINAL POLICY					
Prepare national plan, target	○	○	○	○	○
EXECUTE NATIONAL POLICY					
Direct intervention through specific entity	National company PNOC	National company Pertamina	National company Temasek & Singapore LNG	National company PTT	National company Petrovietnam

As natural conditions, demographic distribution, economic development stage, social aspiration, cultural orientation and other elements are diverse among countries, we cannot apply uniform policies in pursuit of the above policy objectives. At the same time, global circumstances surrounding fuel supply, energy price, environmental aspiration as well as technology evolve as time goes on. In this context, it is necessary and valuable to visit present policies of various countries, exchange views and opinions on them and improve the energy/electricity system from time to time.

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Philippines

Key Indicators (2011)

1) GDP (at Current Prices)	Billion US Dollars	224.8
2) Population (as of 1 July)	Million person	94.2
3) Per capita GDP	US Dollars/person	2386
4) Total Primary Energy Supply(TPES)	Million tonnes oil equivalent (MTOE)	40.5
5) Energy Self-supply Ratio	-	59.1%
6) Electricity Consumption	Tera- WH (TWH)	56.1
7) Power Generation Capacity	Million kW	13.3(2010)
8) CO_2 Emissions (energy origin)	Million tons CO2 equivalent (Mt-CO2)	134.6(2010)
9) Per capita Primary Energy Supply	TOE/person	0.429
10) Energy Intensity per GDP	TOE/Thousand USD	0.180
11) Per capita Electricity Consumption	kWh/person	596
12) Electrification rate[2012]	-	79%1
13) Electricity Intensity per GDP	kWh/Thousand USD	250
14) Per capita CO_2 Emissions (energy origin)	Ton-CO2/person	1.454(2010)
15) Primary Energy Supply Composition	Coal	20.9%
	Oil	30.7%
	Natural Gas	8.1%
	Nuclear	0.0%
	Hydro	2.1%
	Geothermal	21.1%
	Other Renewables	17.1%
16) Energy Self-sufficiency	Total	59.1%
	Coal	43.0%
	Oil	6.2%
	Natural Gas	100.0%

Source 1) – 3): ADB Key Indicators 2012, 4)-6), 14), 15): IEA Energy Balances of Non-OECD Countries 2012, 7) APEC Energy Statistics 2010, 8) IEA CO_2 Emissions from Fuel Combustion 2012

1 According to the DOE of the Philippines, electrification achievement was 99.98% at village level and 79% at household level in 2012.

1. Current Status and Challenges in Energy Sector

1.1 Energy Policies

a. Overall Policy

The Department of Energy (DOE) of the Republic of the Philippines put together the 2012-2030 Philippine Energy Plan (PEP 2012-2030) in October 2012, and launched it in December 2012 in time for the annual celebration of the National Energy Consciousness Month (NECM). Succeeding the basic structure of its predecessor, the PEP 2009-2030, PEP 2012-2030 highlighted a policy vision that seeks to:

- ensure energy security;
- promote efficient use of energy across all economic as well as public sectors;
- reduce the dependence on oil by developing and promoting the use of energy with low environmental impact.

More specifically, in order to build a largely decarbonized society, the plan advocates measures such as a 10 percent annual energy savings continuing to 2030 and, in the transport sector in particular, promotion of alternative fuels by increasing the number of CNG vehicles and electric vehicles, as well as higher application of biofuel blends, bringing the ratio of cars running on alternative fuels up to 30% by 2030 as a result of these efforts. Moreover, the DOE aspires to raise the renewable-energy based power generation capacity threefold by 2030.

b. Coal

The Philippine coal industry is administered through the Coal Development Act of 1976, known as Presidential Decree No.972 and enacted in 1976. The Act promotes the exploration, development, production and utilization of coal and at the same time stipulates the rules and regulations concerning a coal operating contract system. Under the Act, the government retains ownership of coal resources, while operators, through the contract system, are given the right to explore, develop, exploit and market the coal based on certain pre-agreed conditions for a specific period of time.

The DOE launches a Philippine Energy Contracting Round (PECR) from time to time as occasion arises. Through the PECR, the DOE has been awarding development and investment contracts on oil, natural gas, coal, and geothermal energy, which totaled to 38 Service Contracts as of 2011. The DOE plans to increase the number of awarded contracts to 117 by 2030. It also plans to encourage coal development and investment and to actively develop coal resources in the future as an alternative to imported petroleum fuels. In line with the above plans, the PEP 2012-2030 sets forth a program in which the Philippine National Oil Company Exploration Corporation (PNOC-EC), in cooperation with private coal developing enterprises, will endeavor to increase the nation's coal production from 3.5

million tons of oil equivalent (Mtoe) in 2010 to 6.9 Mtoe by 2035.

c. Oil

The DOE, based on the PEP 2012-2030, intends to encourage participation of private enterprises through the mechanism of the PECR discussed above, and to eventually achieve an annual indigenous oil production level of 8,590,000 barrels (bbl) or approximately 23,500 barrels per day (b/d) by 2030.

In the area of downstream oil sector, the Downstream Oil Industry Deregulation Act: RA 8479, enacted in 1998, liberalized the industry and deregulated product prices excluding kerosene and gasoline, and repealed the compulsory stockpiling obligation although this was later imposed again. To ensure the adequate local supply of petroleum products, the DOE is mandated to monitor the activities of the domestic downstream oil industry including product prices on a daily basis.

d. Natural Gas

In line with the program in the PEP 2012-2030, the DOE intends to bring the annual natural gas production level to 294 billion cubic feet (Bcf), and that of condensate to 87,580,000 bbl or approximately 240,000 b/d by 2030.

For the downstream gas business, the Interim Rules and Regulations Governing the Transmission, Distribution and Supply of Natural Gas established in August 2002 by the DOE laid down the basic framework of the industry. The intended function of the above regulation is to classify the gas downstream business into three sectors of transmission (business of long-distance transport by high-pressure pipelines), distribution (business of transport to provide users with gas through low-pressure pipelines), and supply (business to sell, broker, or market gas through authorized retailers). In the above organization, the DOE is mandated to grant business permits to relevant participants, whereas the Energy Regulatory Commission (ERC) is to regulate and authorize the gas pricing. With the above two institutions striving for fostering the natural gas industry, it is expected that the self-sufficiency rate of energy resources be improved by maximizing the utilization of gas resources.

e. Electric Power

The Electricity Power Industry Reform Act: RA 9136 (EPIRA) enacted in June 2001 embodied major reforms, wherein new entry was allowed for private sector participants into the power generation and retail supply sectors whereas the power transmission and distribution sectors remained as regulated monopoly. The transmission company is owned by government but the operation and maintenance is privatized through concession agreement. Distribution utilities remained as it had been privately owned either as investor-owned corporation or consumer-owned non-profit cooperatives. As a result of the restructuring as elaborated later, power generation assets previously owned by National

Power Corporation (NPC) were privatized while NPC's unit operating its transmission facilities was taken over by a newly created National Transmission Corporation (TRANSCO),

Also as a part of the reform, the Wholesale Electricity Spot Market (WESM), which is a commodity market where electricity is traded hourly, was created in the main Philippine islands of Luzon (in 2006) and Visayas (in 2010). An Interim Mindanao Electricity Market is expected to be launched by the end of 2013. The WESM is operated and governed by the Philippine Electricity Market Corporation (PEMC) incorporated by the DOE.

In December 2011, the Energy Regulatory Commission (ERC) decided to liberalize part of the electricity retail, which made it possible for large customers in the two main islands of Luzon and Visayas to buy electricity directly from retail electricity suppliers without going through existing distribution companies. It is further planned to progressively relax the scope of so-called bulk power users who are operating large factories and are qualified for such supply options. With these measures the monopoly hitherto enjoyed by existing distribution utilities was put to an end.

After the enforcement of EPIRA, the efforts to expand power access for people domiciled in rural regions have been carried out under the Expanded Rural Electrification (ER) Program. Present achievement is 99.98% for barangay[2] level (as of 31 August 2012), 71% at sitio[3] level (as of 30 June 2012) and 79% at household level (as of 31 December 2012). The electrification targets are set to bring the rural ("sitio") electrification rate to 100% by 2015 and the household electrification rate to 90% by 2017.

f. Nuclear Energy

With regard to the Philippine's position on nuclear power, in June 2009, when then President Gloria Macapagal-Arroyo visited Japan, it was hinted that, in order to reduce the burden on the economy due to fuel imports, she would consider nuclear power as one of the long-term options of fuel for power generation and therefore would not rule out its use as a solution to power shortage. The current President Benigno Aquino III also takes a position open to discuss nuclear options. However, after the IAEA inspection and assessment of the mothballed Bataan Nuclear Power Plant (PWR, 621 MW), its rehabilitation plan was officially turned down in July 2010 being too much complicated.

1.2 Energy Supply and Demand

Energy consumption of the Philippines has stayed at almost same level during the first decade of the 21st century as shown in Figure-1, despite the steady economic growth of

[2] A barangay is the smallest administrative division in the Philippines

[3] A sitio in the Philippines is a territorial enclave that forms a part of barangay.

annual 4.7%. According to the BP Statistical Review of 2013, however, energy consumption recorded relatively high growth of annual 3.3% and 4.7% in 2011 and 2012, respectively, reflecting the economy's strong growth recorded in these years. This new trend must be watched carefully in formulation of the future energy plan and policy.

Philippine produces coal, natural gas and geothermal energy in addition to a small amount of crude oil. In the recent years, increase of domestic coal production has contributed to improve its energy self-sufficiency. Natural gas from the Camago-Malampaya gas field is being produced at a plateau level. However, new discoveries are needed to maintain or increase the natural gas use. Under the circumstance, LNG import plans are considered building import terminals at Batangas or Bataan Peninsula in the outskirts of Manila.

Figure 1 : Total Primary Energy Supply

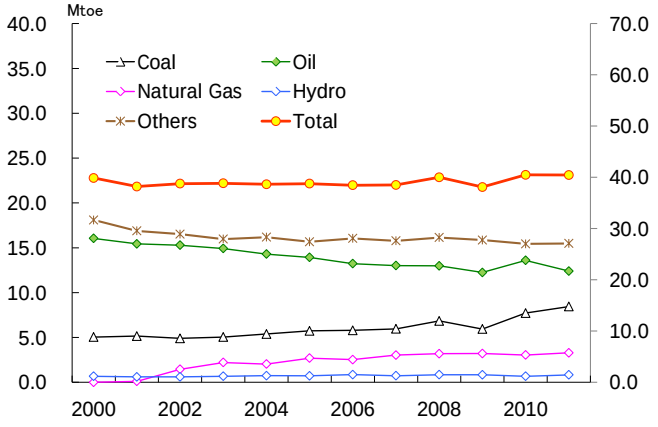
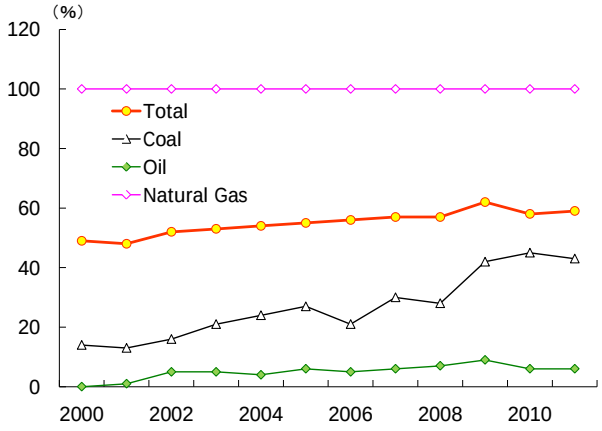


Figure 2 : Self Sufficiency of Fossil Fuel

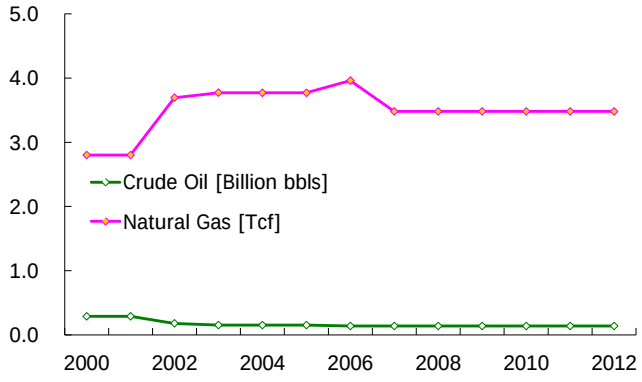


Source: IEA, Energy Balances 2012, edition.

1.3 Energy Resources

The Philippines is endowed with only a limited amount of fossil energy resources; main producers are the Camago-Malampaya gas field offshore Palawan and the Semirara coal mine on a small island located 350km south of Manila. Despite exploration campaigns lead by the DOE, oil and gas exploration is not yet successful to achieve the ambitious target. As the Semirara coal is highly alkaline, and needs to be diluted with imported coal up to 70%, its consumption has been limited. Then, coal export stated in 2007. Coupled with start-up of a

Figure 3: Proven Reserves Since 2000



Source: DOE/EIA, Philippines Country Analysis Briefs

coal thermal plant in Mindanao in 2006, domestic coal production began increasing. Proven coal reserves of the country is mere 440 million tons, therefore the current production exceeding 7 million tons per year would be over pace, unless new resources are discovered and developed.

2. Current Status and Challenges in Power Sector

2.1 Power Utility Systems

The electricity services in the Philippines began a process of reforms toward liberalization in line with EPIRA, which came into effect in June 2001. The main Structural reform of EPIRA was three-fold, i.e. to divide and privatize the power generation and transmission assets owned by NPC; to make the market mechanism function by the creation of a wholesale market; and to optimize electricity rates by encouraging healthy competition in the two areas of supply and demand through liberalization of the retail market. In the above process, the DOE is charged with planning and policy making related to electric utilities, whereas the Energy Regulatory Commission (ERC) is responsible for monitoring of the proper operation of EPIRA, such as price and market regulation.

In a more detailed description of the Philippine's electric utility system, its power generation activity is carried out by NPC and independent power producers (IPP). On the privatization of power plants owned by NPC, the Power Sector Assets and Liabilities Management (PSALM) is responsible for its administration. Juristically, the PSALM is set to exist for a period of 25 years from the effectivity of EPIRA, and all assets and liabilities held by it are to be divested or otherwise privatized by the expiration of its term of existence. As of October 2012, generation plants with a total rated capacity of 4,362.23MW had been privatized across the nation. Of the above, Luzon and Visayas accounted for the majority with a total generation capacity of 4,157.13MW, which represents the privatization level of 86.5%[4].

Concerning the power transmission business, the National Transmission Corporation (TRANSCO) was created under EPIRA to own and operate the power transmission assets of NPC. Subsequently, management of the national transmission network owned by the TRANSCO was taken over by a fully private National Grid Corporation of Philippines (NGCP) in 2008, when the latter won a public bidding for a concession contract. NGCP, a joint venture between State Grid Corp. of China and two Philippine investors, is in charge of developing and maintaining the nationwide transmission network as well as operating the national electricity grid for 25 years.

In addition to the above, as a part of the reform, the Wholesale Electricity Spot Market

[4] DOE: 21st Status Report on EPIRA Implementation

(WESM) was created in the main regions of Luzon (in 2006) and Visayas (in 2010). The WESM is operated and governed by the Philippine Electricity Market Corporation (PEMC) incorporated by the DOE as an independent entity. In WESM, all spot market transactions of IPP-generated power except bilateral contract quantities are settled in the market. Further, existing distributers are mandated by law to procure at least 10% of its electricity from WESM, where it is being studied to ultimately raise this ratio to 50% depending on the observed market trends.

The distribution of power in the Philippines is handled by so-called Distribution Utilities (DUs) who individually operate an exclusive franchise covering a particular geographical area and are made up with, in addition to 20 private electricity distributors such as Manila Electric Company (known as MERALCO) who supplies power to about 75% of the Luzon franchise area including the Metropolitan Manila, and as many as 120 small scale entities called Electrification Cooperatives (ECs). These DUs procure power by trading in WESM or through bilateral transactions with power producers to sell electricity to consumers in the respective supply area.

In the Philippines, in addition to the above-described measures, the practice of Retail Competition and Open Access (RCOA) has been introduced in steps, and its initial commercial application started as of June 26, 2013, where large users with an average monthly peak demand of 1 MW or more are given a choice of a supplier. As discussed earlier, a consumer of electricity hitherto has had no choice but to purchase power from the DU who has an exclusive franchise covering the area where that consumer is domiciled. After the introduction of RCOA, this system will be changed such that the transactions are directed to go through an authorized electricity trader called a Retail Electricity Supplier (RES). It is expected that, by allowing consumers to choose a RES with the most advantageous supply offer, it is expected to improve consumers' bargaining position which will eventually lead to more competitively priced electricity. It is planned to expand the eligibility of RCOA to end-users of 750kW or more in two years after its initial implementation, and eventually to general household consumers.

2.2 Power Supply and Demand

The amount of electricity generation in the Philippines increased at an average rate of 4.0% per year from 2000, reaching 72,922 GWh in 2012. From a regional perspective, power generation in Luzon at 52,312 GWh accounted for 71.7% of the 2012 national total, followed by Visayas's 11,483 GWh for 15.7%, and Mindanao's 9,127 GWh for 12.5%. In terms of power generation entities, while NPC and NPC-SPUG[5], NPC-IPP[6] put together took a share of 21.4%, an overwhelmingly high share of 78.6% was taken by Non-NPC power producers

[5] NPC-SPUG includes generation from power plants owned by NPC and operating in off-grid areas.

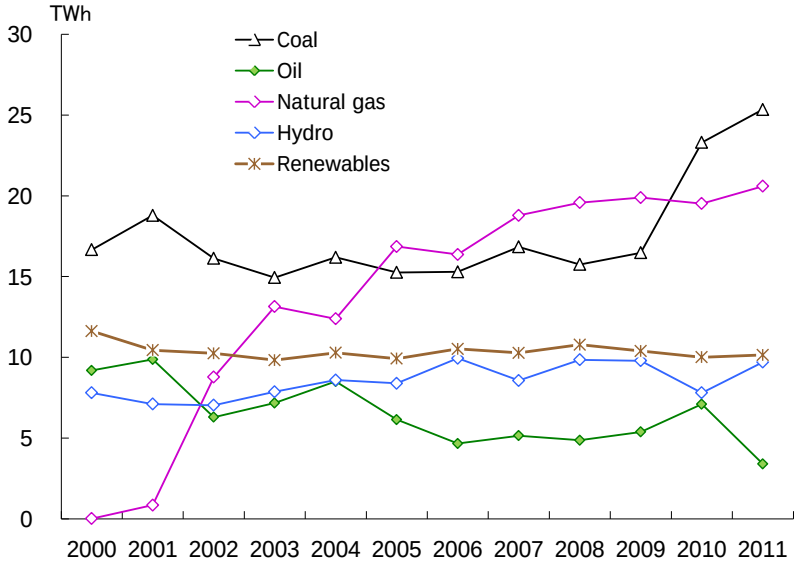
[6] NPC-IPP includes generation of IPPs with contract to NPC.

including privatized NPC-IPP.

It is noted that in 2001, when EPIRA was put into force, the ratio of Non-NPC was 10.1%, but as the privatization of NPC owned power plants progressed, the ratio of IPP has risen rapidly. With regard to generated quantity by source of power, coal with 28,265 GWh accounted for 38.8%, natural gas with 19,642 GWh and 26.9%, hydropower with 10,252 GWh and 14.1%, geothermal with 10,250 GWh and 14.1%, oil at 4,254 GWh and 5.8%, and other renewables at 259 GWh and 0.3%. Coal and natural gas combined accounted for 65.7% of the total. Behind the above picture is a fact that, based on the energy policy of the government to reduce the consumption of oil, shift of power generation fuel from oil to natural gas and coal had been actively carried forward, and as a result, the ratio of oil-fired thermal power was reduced significantly from its position where it occupied nearly half of the total generation in the 1990s.

Meanwhile, electricity sales in the Philippines registered an average annual growth of 4.1% from 2000, reaching 59,211 GWh in 2012. Further, electricity sales in Luzon embracing the demand center, Metropolitan Manila (National Capital Region), accounted for 74.4% of the national total. In terms of consumption by sector, 33.3% was for residential use at 19,695 GWh, 30.0% was for commercial use at 17,777 GWh, and 33.9% was for industrial use at 20,071 GWh, wherein the ratios of residential and industrial use are relatively high.

Figure 4 : Power Generation by Source



TWh

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal	16.7	18.8	16.1	14.9	16.2	15.3	15.3	16.8	15.7	16.5	23.3	25.3
Oil	9.2	9.9	6.3	7.2	8.5	6.1	4.7	5.1	4.9	5.4	7.1	3.4
Natural gas	0.0	0.8	8.8	13.1	12.4	16.9	16.4	18.8	19.6	19.9	19.5	20.6
Hydro	7.8	7.1	7.0	7.9	8.6	8.4	9.9	8.6	9.8	9.8	7.8	9.7
Renewables	11.6	10.4	10.2	9.8	10.3	9.9	10.5	10.3	10.8	10.4	10.0	10.1
Total	45.3	47.1	48.5	52.9	56.0	56.6	56.8	59.6	60.8	61.9	67.7	69.2

Source : IEA, Energy Balances of Non-OECD Countries 2012

2.3 Power Facilities

The installed generation capacity in the Philippines expanded at an annual rate of 2.2% from 13,185 MW in 2000 to 17,025 MW in 2012. However, in recent years, power development has not progressed well, as observed in certain years in which the generation capacity of retired facilities exceeded that of new builds, resulting in a net reduction in the total installed capacity from the previous year,

In addition, as the closing down of obsolete diesel generators as well as oil-fired power plants owned by NPC progressed since 2000, while power development was mainly driven through IPPs, there have been changes in power generation mix. The power generation mix in 2000 was made up of oil 37.8% (4,987 MW), hydro 17.5% (2,301 MW), geothermal 14.6% (1,931 MW), and coal 30.1% (3,963 MW), with oil-fired thermal power enjoying a leading position. However, since 2001 when natural gas production began at the Camago-Malampaya gas field and a number of IPPs started operation in succession, the share of oil-fired thermal power has been in decline, resulting in the 2012 power mix of: oil 18.1% (3,074 MW), hydro 20.7% (3,521 MW), geothermal 10.9% (1,848 MW), coal 32.7% (5,568 MW), natural gas 16.8% (2,862 MW), and other renewables 0.9% (153MW).

2.4 Power Development Plans

The latest energy program in the Philippines is the 2012-2030 Philippine Energy Plan (PEP 2012-2030), whereas the latest power development program is embodied in the Power Development Plan 2009-2030 (PDP 2009-2030).

The PEP 2012-2030 highlights the nation's policy thrusts including "Ensure Energy Security" as promoted through increased use of renewable energy as well as development of indigenous coal and oil resources, "Expand Energy Access", and "Promote Low-Carbon Future" through efficient energy use and utilization of clean fuel and technology.

On the long-term demand forecast, the PDP 2009-2030 projects that the country's power consumption will grow from 55,417 GWh in 2008 to 86,809 GWh in 2018, and 149,067 GWh in 2030. By region, electricity sales in Luzon region is projected to grow at an annual rate of 4.53% to 109,477 GWh in 2030, whereas demand in Visayas region will grow at a slightly higher rate of about 5%, to 19,121 GWh in 2030. Likewise, demand in the Mindanao island group will grow at the rate of 4.62% to 20,470 GWh in 2030. As a result of simulation studies based on the above demand projection, it was determined that an additional generation capacity of 17 GW is needed by 2030, with a regional breakdown of 11,900 MW for Luzon Grid, 2,150MW for Visayas Grid, and 2,500 MW for Mindanao Grid, respectively.

In the past, power development in the Philippines was carried out exclusively by NPC. However, since new entry of IPPs was allowed in 1993, and also as privatization of NPC's assets proceeded after enforcement of EPIRA in 2001, the share of NPC in the total generated power has been declining, which will remain so as new power development is driven chiefly

by IPPs.

The hydropower potential of the Philippines is estimated at 13,100 MW, according to the DOE, while the total of previously developed capacity was 3,521 MW as of 2012, leaving a sizable room for future development. The government intends to develop hydropower as a part of renewable energy development program, and plans to increase the capacity to 7,530 MW by 2030.

Meanwhile, in order to improve the energy self-sufficiency, the Philippine government has been promoting the development of gas fields, with plans to increase the production to 294 Bcf by 2030. Since the start of production in 2001, natural gas from the Camago-Malampaya gas field has been supplied to gas-fired power plants operating in the Province of Batangas, Island of Luzon, through undersea pipelines. While there are gas-fired power plants with a combined capacity of 2,862 MW currently in operation, First Gen Corp. is planning a gas-fired power station capable of generating 500 MW (1,300 MW, eventually) in San Gabriel[7]. In addition, in conjunction with the LNG terminal construction plan in Pagbliao, Energy World Corporation plans to build a 300 MW gas-fired power plant[8].Shell is also considering building a floating LNG import terminal near its refinery in Batangas.[9]

In the similar objective, the government has been actively developing coal resources as an alternative to petroleum fuel with a plan to increase the annual production to about 12 million tons by 2030. The installed capacity of coal-fired power plants has been increasing steadily in recent years, and development efforts continue as demonstrated for example by GN Power Corporation's project in Bataan Peninsula, Luzon Island to put a coal-fired 600 MW power station in operation in 2012.

Concerning geothermal power development, its resource potential has been estimated at 4,790 MW. Because of its low generation cost second only to hydropower and yet high capacity utilization rate, it is used as an important base load power. With existing capacity of 1,848 MW in 2012, leaving substantial room for future development, the government pressing on the development of geothermal power generation with plans to increase the installed capacity to 3,450 MW by 2030.

With regard to nuclear power generation, following the decision to build the Bataan Nuclear Power Plant (BNPP), its construction began in 1976 and was almost complete by 1984. However, the EDSA People Power Revolution that toppled the former president in 1986 targeted the BNPP plant as representing the former corrupt regime. Operation of the plant was suspended in 1986 as a political decision of President Corazon Aquino. The

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[7] First Gen unveils $2.3-b expansion, Manila Standard Today, 2013/3/4

[8] Philippines, Energy World HP, http://www.energyworldcorp.com/ud-phil.html

[9] http://www.rigzone.com/news/oil_gas/a/127227/Shell_Considers_Building_LNG_Import_Terminal_in_Philippines

Chernobyl accident happened same year gave encouraging reasons to opponents to the nuclear plant. It has been mothballed ever since. By 2010, while the government would not preclude the option of nuclear energy itself, it decided not to revitalize the BNPP, and has been contemplating on ways to utilize it including a sale.

On matters of renewable energy, in addition to formulating the National Renewable Energy Program (NREP) in 2008: the government enacted the Renewable Energy Act, setting forth technical standards and relevant business frameworks. In an effort to encourage introduction of renewable energy in the private sector, various tax measures are provided, such as an exemption of corporate income tax (for 7 years), an exemption of import duty on equipment (for 10 years),and a reduction on property tax and, in addition, a Feed-in Tariff (FIT) system has just been approved by the ERC in 2012.

2.5 Power Tariff and Subsidies

According to the provisions of EPIRA, electric utilities are required to clearly indicate the retail electricity charges with details on makeup. Specifically, retail electricity charges should be divided into three segments, i.e. Generation Charge, Transmission Charge, and Distribution Charge which is further divided into sub-components. In addition to generation, transmission and distribution charges as above, the retail electricity rate includes additional charge items such as System Loss charge, Universal charge, Taxes and Lifeline Discount charge. The System Loss charge is to compensate for power lost due to technical reasons or power theft, etc., where surcharges of up to 8.5% for private DUs in urban centers and 13% for Rural Electric Cooperatives are permitted. The Universal charge is imposed on all electricity users to shoulder expenses for rural ("Missionary") electrification, environmental protection (watershed management), and to pay the residual debt of NPC . There will be additional universal levy in the future such as stranded contract costs of NPC and DUs as well as the subsidy for Renewable Energy Feed-In-Tariff (FIT). Taxes such as franchise and real-properties are also passed-through charges. Finally, the Lifeline Discount which comes from other consumers of respective Distribution Utilities is designed to pass on the usage-based discount (subsidy) allowed for the marginalized or low-income captive end-users, as provided in EPIRA. There is no subsidy from the government.

In the preceding stage of formulating retail electricity bills, the generation, transmission, and distribution rates are controlled through several regulatory systems. Typically, there are three regulatory schemes, i.e. Return on Rate Base Methodology (RORB) based on costs, Performance-Based Ratemaking Methodology (PBR) based on the achievement on certain performance goals, and Cash Base Methodology (CB) for the purpose of securing the capital expenditures and variable charges.

The above regulatory schemes are applied as in the following

Table 1: Type of Utilities and Regulatory Scheme

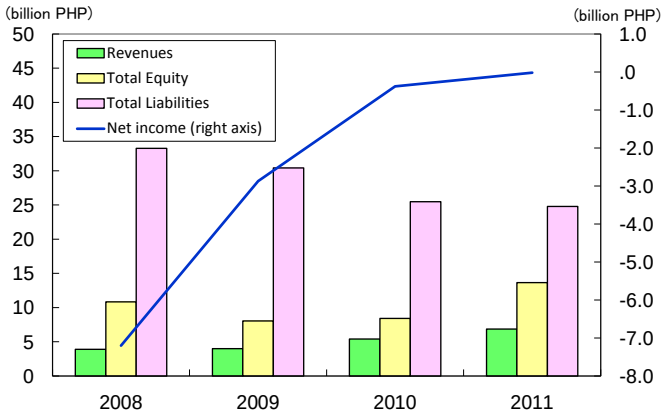
	Type of Utilities	Methodology
Generation	National Power Corporation (NPC)	RORB
	IPP Enterprises	Unregulated
Transmission	National Grid Corp. of Philippines (NGCP)	PBR
Distribution	Private DUs	PBR
	Electric Cooperatives (EC)	CB

In the Philippines, although there is no instituted system of government subsidies on electricity charges, the Lifeline Discount is provided to low-income end-users as discussed above. The discount was a limited-time measure applicable for 10 years from the effectivity of EPIRA, but as electricity prices did not fall after the enforcement of the act, the system is extended for 10 more years.

2.6 Financial Data on Individual Power Enterprises/Cooperatives

In the following, financial conditions are discussed on Manila Electric power Co. (MERALCO), a private distribution and retail company and National Power Corporation (NPC) among major power utilities, as their financial statements were made available.

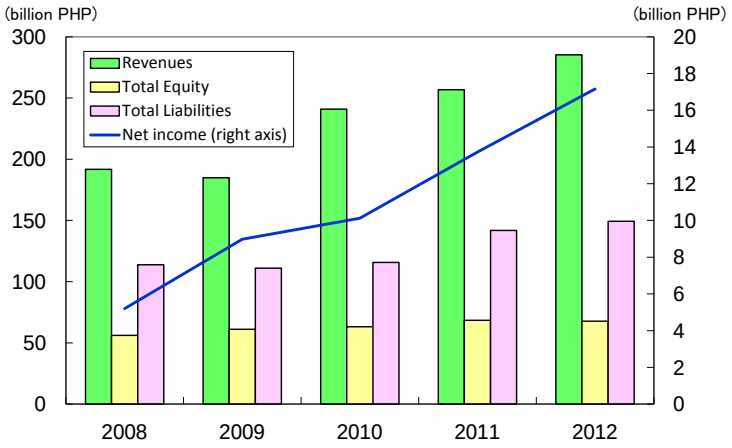
Figure 5: Financial condition of NPC



Source: NPC Annual Report

While NPC in recent years had registered sizable net deficits, in 2011 it was able to reduce the net deficit down to PhP 19 million. It is also in a heavily indebted state, but the amount of debt has decreased steadily every year.

Figure 6: Financial condition of MERALCO



Source: MERALCO Annual Report

Concerning the financial situation of MERALCO, its turnover level has grown 1.5 times from about PhP190 billion in 2008 to PhP285 billion in 2012. In line with the increase in sales, net income has also improved nearly threefold from PhP5.2 billion in 2008 to PhP17 billion. On the other hand, although its liabilities are on an increasing trend, MERALCO's financial standing remains in a good shape.

3. Other Noteworthy Issues

3.1 Environmental Regulations

a. Air Quality / Emission standards

The Philippines Clean Air Act of 1999 (Republic Act No. 8749) outlines the government's measures to reduce air pollution and incorporate environmental protection into its development plans. It sets emission standards for all motor vehicles and issues pollutant limitations for industry. Emissions limit values are laid down by the Department of Environment and Natural Resources as 'Implementing Rules and Regulations for Philippine Clean Air Act of 1999'. These rules and regulations shall apply to all industrial emitters and other establishments which are potential sources of air pollution.

Table 2 : National Emission Standards for Stationary Sources (Philippines)

Particulate matter

	Emission Sources		
	Fuel Burning Equipment		Other Stationary Sources
	Urban and Industrial Area	Other Area	
Emission limit, mg/m^3	150	200	200

SOx

	Existing Sources		New Sources	
	Fuel Burning Equipment	Other Sources	Fuel Burning Equipment	Other Sources
Emission limit, mg/m^3	1500 as SO_2	1000 as SO_2	700 as SO_2	200 as SO_2

NOx

	Fuel Burning Steam Generator		Other Sources[1]	
	Existing Sources	New Sources	Existing Sources	New Sources
Emission limit, mg/m^3	1500 as NO_2	1000 as NO_2	1000 as NO_2	500 as NO_2

Source: IEA Clean Coal Center Database

b. GHG

In 2009, the Philippine Climate Change Act of 2009: RA 9729 was passed, creating the Climate Change Commission. The Commission is a policy-making body attached to the Office of the President and tasked with coordinating, monitoring and evaluating programs and action plans relating to climate change. Headed by the President, the four-member Commission has the same status as a central government agency.

In 2011, after a resolution to approve it, the National Climate Change Action Plan (NCCAP) was announced. The instrument was considered a milestone in "green governance" that details the short, medium, and long-term plans of the government on this important issue.

3.2 Renewable Energy

a. Renewable Energy Policy

The Philippine's' target toward 2013 for installed generating capacity derived from

renewable energy ("RE" in short) consists of: 3,131 MW by geothermal, 5,468 MW by hydropower, 417 MW by wind, and 131 MW by biomass, solar and ocean combined.[10]

In 1967, the Geothermal Energy, Natural Gas and Methane Gas Law: RA 5092 was established with an objective to "Promote and regulate the exploration, development, exploitation and utilization of geothermal energy, natural gas and methane gas; to encourage its conservation; and for other purposes".

In 1977, Presidential Decree No. 1068 was announced for "Directing the acceleration of research, development and utilization of non-conventional energy resources and vesting in the energy development board powers and functions in connection therewith, and for other purposes."

In 1978, Presidential Decree No. 1442 was issued "to promote the exploration and development of geothermal resources."

In 1980, Proclamation No. 2036-A was issued for the purpose of "Establishing as reservation of PNOC Energy Development Corporation for geothermal exploration, exploitation and utilization the parcel of land situated in the provinces of Albay and Bacon, Sorsogon, Island of Luzon and prohibition of logging activities within the reservation."

In 1997, Executive Order No. 462 was announced for the purpose of "Enabling the private sector participation in the exploration, development, utilization and commercialization of ocean, solar, wind resources for power generation and other energy uses."

In 2008, the Renewable Energy Act: RA 9513 was established for "Promoting the development, utilization and commercialization of renewable energy resources".

In 2009, the National Renewable Energy Program (NREP) was announced. In support of the Renewable Energy Act, it serves as the country's roadmap for renewable energy planning. Its long-term goal is to increase renewable energy-based capacity for power generation as well as its non-power contribution to the primary energy mix. The NREP seeks to increase the RE-based power capacity of the country to 15,304 MW by 2030, almost triple its 2010 capacity of 5,439 MW.

b. FIT and Fiscal incentives

In July 2010, the Philippine Energy Regulatory Commission (ERC) promulgated the Feed-in-Tariff (FIT) System Rules pursuant to the Renewable Energy Act and its implementing rules. The FIT offers guaranteed payments on a fixed rate per kWh for 20 years from the start of operations for emerging RE sources.

In July 2012, the ERC approved the initial FITs to apply to power generated from RE

[10] Department of Energy, http://www.doe.gov.ph/renewable-energy-res

sources, specifically referring to Run-of-River Hydro, Biomass, Wind, and Solar, with the rates of: Hydro: 5.90, Biomass: 6.63, Wind: 8.53, Solar: 9.68, respectively in PhP/kWh. The ERC, however, deferred fixing the FIT rate for Ocean Thermal Energy Conversion (OTEC) Resource for further study and data gathering.[11]

The Renewable Portfolio Standards (RPS) requires the Distribution Utilities and electricity suppliers to purchase power with mandated percentage coming from RE. Associated with this is the tradable RE certification in the RE Market to be administered by PEMC.

Renewable Energy resources include Geothermal, Hydropower, Biomass and Ocean, Solar and Wind. Projects utilizing these resources may enjoy incentives or privileges such as enumerated below and applicable over a number of years[12]:

- Income tax holiday for seven years;
- Duty-free importation of RE machinery, equipment and materials including control and communication equipment;
- Special realty tax rates on equipment and machinery not exceeding 1.5% of their original cost less accumulated normal depreciation or net book value;
- Net operating loss during the first 3 years from the start of commercial operation which had not been previously deducted from gross income shall be carried over as deduction from gross income for the next 7 consecutive taxable years immediately following the year of such loss (NOLCO);
- Corporate tax rate of 10% on its net taxable income after 7 years of Income Tax Holiday (ITH);
- Accelerated depreciation of plant, machinery and equipment may be applied if the project fails to receive an ITH before full operation;
- 0% Value-Added Tax rate on the sale of fuel or power generated. Zero rated VAT on purchases of local supply of goods, properties and services needed by RE developers in the development, construction and installation of its plant facility as well as the exploration and development of RE resources and its conversion into power;
- Tax exemption from carbon credits;
- Cash incentive of Renewable Energy developers for Missionary Electrification. A cash generation-based incentive per kilowatt hour equivalent to 50% of the universal charge for the power needed to service missionary areas chargeable against the universal charge for missionary electrification;
- Tax credit on domestic capital equipment and services;
- Exemption from universal charge;

[11] ERC, 07/27/2012

[12] Philippine Trade and Investment Center in London, http://investphilippines.org.uk/incentives

- Option to pay transmission and wheeling charges of on a per kilowatt-hour basis at a cost equivalent to the average per kilowatt-hour rate of all other electricity transmitted through the grid.

3.3 Energy Efficiency and Conservation

According to the International Energy Agency's "*Energy Balances of Non-OECD Countries – 2012 Edition*", the Philippines' energy intensity defined as total primary energy supply per thousand 2005 US dollars of GDP (TPES/GDP) improved from 0.48 in 2000 to 0.31 in 2010. However, the level of energy efficiency of the Philippines in terms of TPES/GDP still leaves much to be improved when compared to, for example, 0.11 of Japan.

In 1992, the Department of Energy Act of 1992: RA 7638 was established. This Act was created to ensure a continuous, adequate, and economic supply of energy with the end in view of ultimately achieving self-reliance in the country's energy requirements through the integrated and intensive exploration, production, management, and development of the country's indigenous energy resources, and through the judicious conservation, renewal and efficient utilization of energy to keep pace with the country's growth and economic development and taking into consideration the active participation of the private sector in the various areas of energy resource development and to rationalize, integrate, and coordinate the various programs of the Government towards self-sufficiency and enhanced productivity in power and energy without sacrificing ecological concerns.

In 2004, the Administrative Order (AO) 110 was officially announced with the policy for "Directing the Institutionalization of a Government Energy Management Program (GEMP)" in support of RA 7638.

In 2005, the AO 126 was issued with intent of "Strengthening measures to address the extraordinary increase in world oil prices, directing the enhanced implementation of the Government's Energy Conservation Program".

In 2008, the Department Circular (DC) 2008-09-0004 was issued by the Secretary of the DOE. The objective of this DC was to "enforce the requirement for an Energy Service Company (ESCO) to apply for a certificate of accreditation with the DOE while engaging in any energy efficiency related performance contracting projects", in accordance with the provisions in RA 7638.

Starting in July 2008 the DOE embarked on the National Energy Efficiency and Conservation Program (NEECP). The NEECP provides a framework in the government's efforts to promote efficient and judicious utilization of energy as an essential strategy in rationalizing the country's demand for petroleum products and eventually lessening the impact of escalating prices to the economy.

In 2011, the government enhanced its energy efficiency drive with the launch of a new

campaign under a slogan of "Bright Now! Do Right, Be Bright".

The greatest challenge for the Philippines in promoting energy conservation is a slow progress in the development of a realistic and workable legal policy framework on energy efficiency and conservation. There used to be a law concerning energy conservation which came into force during the Marcos regime in response to heightened concerns in the wake of the 1973 oil crisis. However, the energy conservation law of the time, which was made into law in the National Assembly under the martial law, was revoked when the new Parliament was established and the new Constitution promulgated in 1987 following the (1st) EDSA Revolution. Since then, although bills have been submitted several times, one has yet to be established.

Indonesia

Key Indicators (2011)

1) GDP (at Current Prices)	Billion US Dollars	846.8
2) Population (as of 1 July)	Million person	241.6
3) Per capita GDP	US Dollars/person	3505
4) Total Primary Energy Supply(TPES)	Million tonnes oil equivalent (MTOE)	209.0
5) Energy Self-supply Ratio	-	188.8%
6) Electricity Consumption	Tera- WH (TWH)	159.9
7) Power Generation Capacity	Million kW	32.9(2010)
8) CO_2 Emissions (energy origin)	Million tons CO_2 equivalent (Mt-CO_2)	410.9(2010)
9) Per capita Primary Energy Supply	TOE/person	0.865
10) Energy Intensity per GDP	TOE/Thousand USD	0.247
11) Per capita Electricity Consumption	kWh/person	662
12) Electrification rate[2012]	-	75.56%13
13) Electricity Intensity per GDP	kWh/Thousand USD	189
14) Per capita CO_2 Emissions (energy origin)	Ton-CO_2/person	1.729(2010)
15) Primary Energy Supply Composition	Coal	15.1%
	Oil	34.8%
	Natural Gas	16.6 %
	Nuclear	0.0%
	Hydro	0.5%
	Geothermal	7.7%
	Other Renewables	25.4%
16) Energy Self-sufficiency	Total	188.8%
	Coal	657.3%
	Oil	63.5%
	Natural Gas	204.3%

Source 1) – 3): ADB Key Indicators 2012, 4)-6), 14), 15): IEA Energy Balances of Non-OECD Countries 2012, 7) APEC Energy Statistics 2010, 8) IEA CO_2 Emissions from Fuel Combustion 2012

13 Ministry of Energy and Mineral Resources, Indonesia, "Country Brief: Role of Government in Power Sector and Energy Market", August 2013, presentation at the Dialogue on Energy Sector Reform, Manila, Philippine.

1. Current Status and Challenges in Energy Sector

1.1 Energy Policies

a. Overall Policy

Until July 2007, there had been no single legislation to comprehensively govern the over-all energy matters of the Republic of Indonesia, where its regulatory framework was provided by separate laws such as the Oil and Gas Law, the Geothermal Law, or the Electricity Law for the control of respective energy source.

On 10 August 2007, Indonesia enacted the Law No. 30/2007 ("Energy Law"). The Law elucidates principles for the utilization of energy resources and final energy use, security of supply, and other crucial matters on energy, and addresses major policies including, among others:

- Control and management of all energy resources by the State;
- Guarantee of stable supply of energy (prioritizing domestic needs over exports);
- Provision of government assistance on energy access to less wealthy people;
- Development of domestic energy resources (to improve energy self-sufficiency);
- Definition of the new National Energy Policy;
- Creation of a National Energy Council (DEN);
- Development of National Energy Master Plan (for national and local levels)
- Government aids for supply and use of renewable energy and implementation of energy efficiency and conservation activities

Prior to the establishment of the Energy Law, a Presidential Regulation No.5/2006 on the National Energy Policy was in place, where it mandated national goals such as the following:

- Achieve energy elasticity to GDP of less than one by 2025;
- Develop coal, natural gas and renewable energy to reduce the share of oil in the primary energy consumption from 52% in 2004 to less than 20% by 2025.

b. Coal

Following the decision by the House of Representatives (DPR) in December 2008, the new Law on Mineral and Coal Mining: No. 4/2009 ("Mining Law") was enacted. The enforcement of the Mining Law has significantly changed the previous Indonesian regulatory regime that based mining administration on contract-based concessions. Under the new licensing framework, instead of Coal Contract of Work (CCoW) for foreign operators of the past, mining investors are required to obtain a Mining Business License (IUP), a Special Mining Business License (IUPK), or a People's Mining License (IPR), depending on the area designated for the specific mining operations. Compared to the preceding Mining Law, the design of the new law is to give priority to interests of the people

and the government. The business enterprises eligible for the license must be incorporated in Indonesia. As an additional requirement in the new regulation, foreign investors who operate through owned Indonesian companies must divest part of their interest to Indonesian interests. Finally, holders of an IUP/IUPK are required to pay, in addition to usual production royalty, an additional royalty of 10 percent of net profit, where the Central Government is entitled to receive 40% of this additional royalty while the balance by the relevant local governments.

In order to secure domestic supply especially of steam coal on which a surge in demand for power generation as well as other use is expected after 2010, the government of Indonesia is trying to suppress an unrestrained increase of coal exports by obligating producers to supply the domestic market in favor of exports.

c. Oil

Under the provision of the new Oil and Natural Gas Law of 2001 (Law No. 22/2001), upstream activities in oil and gas such as exploration are performed through Production Sharing Contracts (PSC) between the government and the company involved which may be state owned, branch of a foreign company or a private local company. Generally, the after-tax production split between the government and the PSC contractors for oil is 85:15, while in cases where incentive packages are offered for exploration in frontier or difficult areas, the split is 65:35.

Entry into the downstream (refining and marketing) oil sector by foreign capital is liberalized at least in theory, according to the new law mentioned above. However, in the refining business, foreign investment has not been progressing as concerns remain as to whether the system will be administered as proclaimed.

Pertamina maintained its retail and distribution monopoly for petroleum products until July 2004, when the first licenses for retail sale of petroleum products were granted to BP and Petronas of Malaysia. However, despite the government promise to open the sector to full competition, progress so far has been slow due to obstacles such as retail price controls by various regulations.

d. Natural Gas

As in the case with oil, upstream gas business is performed through PSC between the government and the company involved. The after-tax production split between the government and the PSC contractors for gas normally is 70:30, while in cases where incentive packages are offered, the split is 60:40.

Entry into the downstream gas sector by foreign capital is liberalized according to the new law mentioned above. In view of the need to reduce its dependence of domestic demand on oil and in consideration for the environment (as exemplified by initiatives such as Blue Sky Project), Indonesia is promoting natural gas as an alternative and has taken the

following measures to accelerate the expansion of natural gas utilization:

- Promote efficient use in all stages of gas processing, including flare gas reduction through self-consumption;
- Reduction of oil consumption in the country through fuel switching;
- Reduce government subsidies for petroleum products.

e. Electric Power

In July 2006, in order to cope with the persisting power shortage, the government launched the first stage of a so-called "Crash Program" (also known as "Fast Track Program", see Section 3.3 (b)) to add 10 GW of new generation capacity by 2010 with a focus on construction of coal-fired power plants. Thereafter, in January 2010, the second stage Crash Program was announced targeting another 10 GW to be added during 2010 - 2014, with an aim of introducing renewable energy such as hydropower and geothermal power. However, all of the projects of the first stage program delayed due to a spate of financial as well as technical troubles experienced on the part of contractors, except one is running on schedule. As of June 2013, a total of 5,005 MW of power plants under FTPI were in the commercial operation (50% of the total capacity of the projects).

To carry out efficient investment operations through long years required for the power plant development, the state-owned power utility, Perusahaan Listrik Negara (PT PLN (Persero) or simply, PLN) has been publishing an Electricity Power Supply Business Plan (RUPTL) with a ten-year planning span. In the RUPTL 2010-2019, PLN projected that power generation in the country should double from 170 TWh in 2010 to 377 TWh in 2019, where coal-fired power plants would take more than 50% of the total power generated in 2011 and, after around 2014, geothermal power would account for about 10% of the total.

However, in view of delays in the construction of coal-fired, geothermal, as well as hydroelectric power plants, and PLN has revised above targets, and announced in the RUPTL 2012-2021 following objectives and targets to fulfill the nation-wide electricity demand and to improve the efficiency of the power grid:

- Elimination of incidents of power shortages in some areas, and acquisition of generating capacity to meet the demand at a minimal cost;
- Reduction of basic generation costs through more appropriate fuel-mix: by reducing the use of petroleum fuel to bring the share of oil-fired power to 1% of the total power generation in 2021;
- Increased use of new and renewable energy, in particular, geothermal, hydropower, and so forth;
- Achievement of electrification rate pledged in the National Electricity General Plan (RUKN);
- Achievement of reliability and quality of electricity to become better

- Achievement of the losses of transmission and delivery to become better

f. Nuclear Energy

Based on calculation conducted by PLN, nuclear power plant (NPP) cannot compete with other types of power plant, such as a 1,000 MW supercritical coal power plant. The Fukushima Daiichi NPP accident in March 2011 has led to an escalation of opposition to develop nuclear energy for power generation. The decision to build a nuclear power plant is not solely based on economic and energy circumstances, but also other circumstances such as political, security, social, cultural, and environmental. With these multi-dimensional aspects, the Government of Indonesia has decided to develop NPP as the last option after all of renewable energies have been utilized.

1.2 Energy Supply and Demand

Energy consumption of Indonesia has recorded moderate increase of annual 2.8% during the first decade of the 21st century. With vast land and many scattered islands, electrification is highly challenging policy objective.

Figure 1 : Total Primary Energy Supply

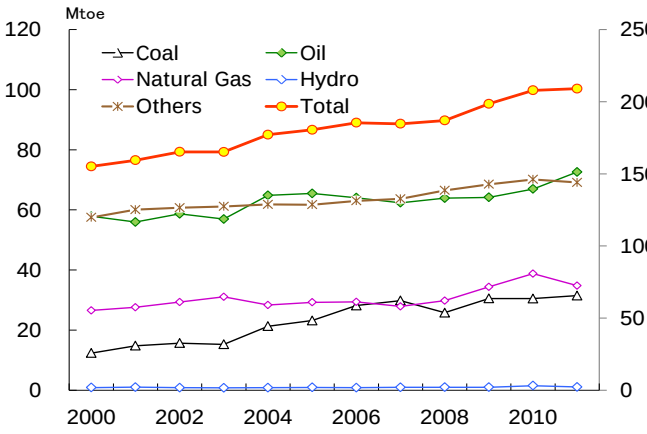
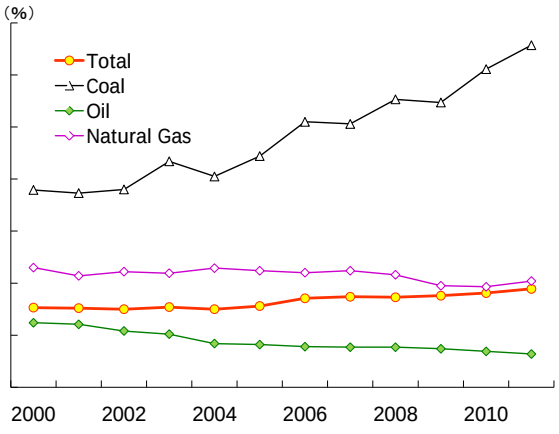


Figure 2 : Self Sufficiency of Fossil Fuel



Source: IEA, Energy Balances - 2012 Edition.

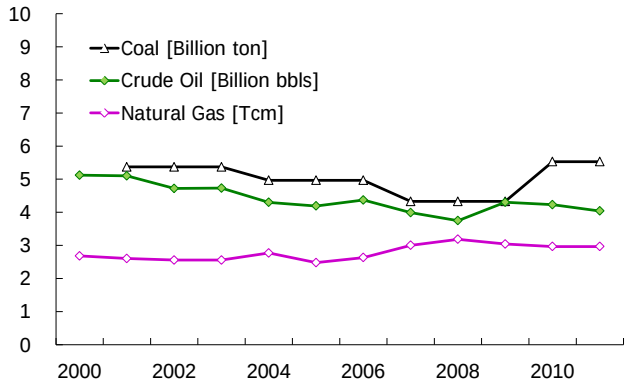
Oil is the largest energy source together with traditional renewable energies which are still dominant in rural areas. Indonesia used to be a crude oil export center of East Asia; however, it has become a net oil importing country in 2004. Reduction of oil dependence is one of important issues in its energy policy. Indonesia also used to be the world largest LNG exporting country, while expanding domestic use of piped natural gas. As adjacent gas resources become insufficient to accommodate increasing demand, Indonesia introduced its first Floating Storage & Regasification Unit (FSRU) in 2012 to utilize domestic and imported LNG. This system will be further deployed in Java and Sumatra supporting increasing gas use. Indonesia has developed coal resources quite rapidly during the same

decade, and has become the world largest steaming coal exporting country. With this backdrop, domestic coal consumption is increasing steadily mainly for power generation and industrial use.

1.3 Energy Resources

In Indonesia, proven reserve of oil has been decreasing steadily, while that of natural gas is leveling off and that of coal has reversed its decreasing trend recently. Oil and gas reserves of Indonesia stand almost same with these of Malaysia despite the fact that the country extends over the 6 times greater territories than that of Malaysia. Incentivizing search and development of natural resources is one of the important energy policy objectives.

Figure 3 : Proven Reserves Since 2000



Source: BP Statistical Review of World Energy, June 2012

2. Current Status and Challenges in Power Sector

2.1 Power Utility Systems

the Indonesian electricity sector is regulated by the Ministry of Energy and Mineral Resources (MEMR) and, under the supervision of MEMR, the state-owned utility, Perusahaan Listrik Negara (PLN), is charged with the power supply activities covering the entire nation.

MEMR is responsible for all matters concerning natural resources and energy, and for the power sector, it is tasked with planning and regulations related to power supply infrastructure development, supply/demand planning, and technical standardization as well as policy development related to energy conservation and renewable energy.

Meanwhile, since 1995 PLN has been working on the separation of the power supply and distribution business units as well as a spin-off of its power generation business units through the gradual process of structural reforms; nevertheless, its vertically integrated corporate structure has remained unchanged in principle.

In the Java-Bali region where power infrastructure is well developed, PLN owns two subsidiaries of power generation company, namely Indonesia Power (IP) and Pembangkitan Java Bali (PJB). Meanwhile, its power supply and distribution unit operates Java-Bali Distribution and Load Control Center (PLN P3B Java-Bali) and five other distribution offices that are separated as business units (BUs). Further, in the Sumatra region, power

generation, transmission and distribution functions are separated as BUs, while in other regions, supply services are operated by vertically integrated regional offices.

In addition to the above two power generation subsidiaries, PLN owns a total of ten subsidiary companies, including geothermal power generation related companies and power supply companies in certain special districts. The two specialized supply companies are: PLN Batam (established in 2000) that serves the Free Trade Zone (FTZ) located on an island about 20 km off Singapore's south coast, and PLN Tarakan (established in 2003), whose business area covers Tarakan Island, East Kalimantan.

Table 1 : Main Power Utility Operations by Region

Function	Java-Bali Region	Sumatra Region	Other Regions
Generation	IP PJB IPPs	North Sumatra Power Plant (BU) South Sumatra Power Plant (BU) IPPs	Regional Offices (9) [Vertically Integrated]
Transmission, Distribution	P3B Java-Bali	P3B Sumatra	PLN Batam PLN Tarakan
Distribution, Retail	Distribution Offices (5)	Regional Offices (7)	[PLN Subsidiaries]

Source: Japan Electric Power Information Center

In Indonesia, entry of Independent Power Producers (IPPs) into the field of power generation has been permitted since 1992. Currently, in the power generation business in Indonesia, PLN and its subsidiaries account for over 80% of the total installed capacity, while IPPs handle the rest. The entire electric power generated by the IPPs must be sold to PLN by regulation, where direct sales to consumers by IPPs can only be made in the special business area after obtaining license and approval from Ministry of Energy & Mineral Resources. In addition, except for a few cases such as the sale of electricity to regions experiencing a power supply crisis or power generated from renewable energy, the power sales to PLN must be performed through competitive bidding in principle.

2.2 Power Supply and Demand

Reflecting a robust economic growth, electricity demand in Indonesia has steadily increased in recent years. Between 2000 and 2011, electricity sales expanded at an average annual rate of 6.5 percent, from 79,165 GWh to 157,993 GWh[14] .

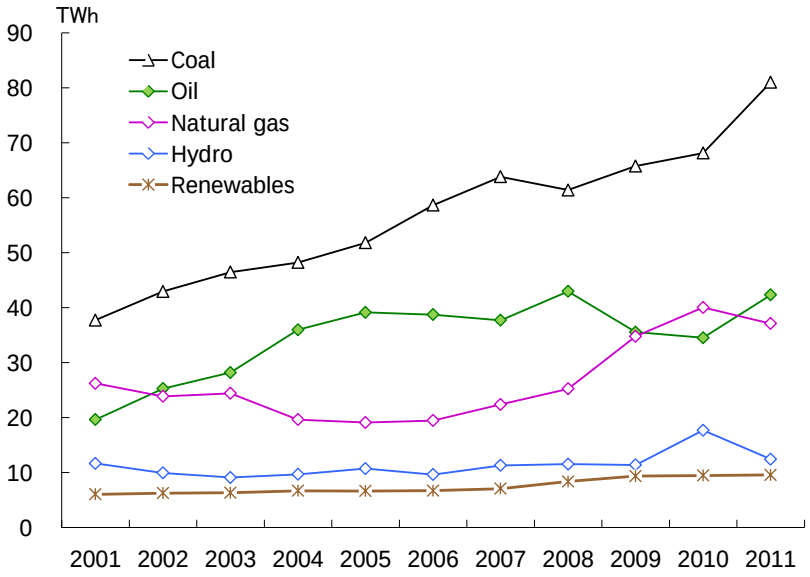
In terms of sector-wise growth rate, residential use registered an increase of 7.1%,

[14] Ministry of Energy and Mineral Resources (ESDM), Handbook of Energy & Economic Statistics of Indonesia 2012

commercial 9.4%, and industrial 4.4%, with consumer demand like commercial and residential use showing particularly high growth. With respect to electricity demand by region, Java-Bali region was the largest at 120,817 GWh, accounting for an overwhelmingly large share of 76.5 percent of the 2011 national total.

Meanwhile, the total combined power generated by PLN, IPPs, and Captive Power (i.e. industries that produce power for self-consumption) was 183,419 GWh in 2011, in which IPPs and Captive Power accounted for 22.2% or 40,679 GWh. The amount of power generated by PLN grew at an annual rate of 4.9% from 84,190 GWh in 2000 to 142,739 GWh in 2011. In the 2011 power generation mix, coal-fired power accounted for the greatest share of 38.5% at 54,950 GWh, followed by 28.3% by Combined Cycle Gas Turbine (CCGT) generation with 40,410 GWh.

Figure 4 : Indonesia's Power Mix by Energy Source



TWh

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal	34.0	37.7	42.9	46.5	48.2	51.8	58.6	63.8	61.4	65.8	68.1	81.0
Oil	18.3	19.6	25.3	28.2	36.0	39.1	38.7	37.7	42.9	35.5	34.5	42.3
Natural gas	26.1	26.2	23.8	24.4	19.6	19.1	19.4	22.4	25.2	34.8	40.0	37.1
Hydro	10.0	11.7	9.9	9.1	9.7	10.7	9.6	11.3	11.5	11.4	17.7	12.4
Renewables	4.9	6.0	6.2	6.3	6.7	6.6	6.7	7.1	8.4	9.4	9.5	9.6
Total	93.3	101.3	108.2	114.5	120.2	127.4	133.1	142.2	149.4	156.8	169.8	182.4

Source : IEA, Energy Balances of Non-OECD Countries 2012

Elsewhere, the amount of power purchased from IPPs and Captive Power showed a high annual growth of 14.5% from 9,135 GWh in 2000 to 40,679 GWh in 2011. This is due to the active power development by IPPs as encouraged by the government policy. Of the source of purchased power, coal-fired power plants account for the largest share of 64% with 26,050 GWh in 2011.

2.3 Power Facilities

The total installed generation capacity in Indonesia was 31,656 MW as of 2010, in which IPPs contributed 4,761 MW or about 15% of the total[15] . The annual average growth rate of installed capacity during the 2010 to 2003 period was 3.6%, a low value compared to the growth of electricity demand in the same period at about 7%. In Indonesia, in line with the breaking-with-oil policy by the central government, so-called "Crash Programs" have been in progress to accelerate power development mainly through renewable energy as well as coal-fired power, albeit the effort has yet to result in a situation where the power development succeeded to catch up with the continuing growth in demand.

The composition of power generation capacity by facility type in 2010 is: 29.9% steam power (oil-fired, coal-fired, and gas-fired), 11.1% hydropower, 10.2% gas turbine, 22.0% combined-cycle gas turbine, 1.4% geothermal, 10.4% diesel generator sets, and 15.0% IPPs.

Meanwhile, the majority of capital investment by the IPPs tends to concentrate in the Java-Bali System. Of the power generation facilities owned by IPPs as of 2010, a capacity of 3,997 MW representing 84% of the total is located in Java-Bali region, and the remaining 16% (764 MW) is present in the outer islands. Indonesia is an island nation, and since significant population as well as economic disparities exist between rural and urban areas, promotion of rural electrification by private capital under the future IPP development plans is not easy in outer island region where decent economic viability can hardly be expected[16].

2.4 Power Development Plans

For the power development plan in Indonesia, a so-called National Electricity General Plan (RUKN) is formulated by the MEMR incorporating the relevant energy and environmental policies with a 20-year planning span. Then, referring back to the RUKN above, PLN prepares a Master Plan of Electricity Supply (RUPTL) with more detailed description of its supply plans with a 10-year span.

According to the RUPTL 2011-2020 that elucidates the power development plans for the indicated period, PLN projected that power demand in the country should grow at an average annual rate of 8.7% during the plan period, reaching 358 TWh in 2021, at which time the peak electricity demand is projected to be 61,750 MW after growing at an annual rate of 8.5% during the plan period.

From a regional perspective, demand for Java-Bali System is projected to be 259 TWh in 2021 at an average annual growth rate (AAGR) of 7.9%. On the other hand, Eastern and

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[15] PT PLN, Statistics 2010 and Annual Report 2010

[16] Japan Electric Power Information Center, Inc., *2010 Study Report on Indonesian Power Situation*, March 2011 (Japanese)

Western Indonesia with historically low electrification rates are expected to grow at a higher pace than Java-Bali region, and demand for Eastern Indonesia is projected to increase by an AAGR of 11.3% to 36.7 TWh in 2021, and Western Indonesia to 62.2 TWh in 2021 after growing at 10.5% AAGR. To fulfill the requirement as mentioned above, expansion or enhancement of all segments of power facilities related to generation, transmission, and distribution will become absolutely necessary. In particular, with regard to generation facilities the above RUPTL has proposed to build 57,250 MW by 2021, where PLN is to shoulder 30,119 MW or 52.7% of the total with IPPs assuming 27,131 MW and 47.3%.

Viewed from the angle of the type of power plants, the development plan up to 2021 suggests that the majority of the facilities to be built in the future will be of coal-fired designs (excluding coal gasification technology), with the total capacity of 37,697 MW accounting for 65.8% of the total newbuilds. On the other hand, gas-fired power plants (conventional steam-turbine generator) and combined cycle gas turbine power plants put together will take up 13.7% of the total at 6,616 MW. For renewable energy-based power, construction plans for geothermal power at 6,348 MW command the largest share of 11.1% of the total, followed by hydropower at 7.6% and 4,370 MW.

Concerning the project owners, both PLN and IPPs are planning to carry out their respective development chiefly with coal-fired power plants, aptly reflecting the national policy for effective utilization of indigenous coal (lignite) in displacing oil.

Notably, with regard to international power trade, although there is no precedent of actual transaction between Indonesia and any of the adjacent country, study is under way concerning an international grid connection with Singapore and Malaysia. Since Indonesia needs to maintain the contract volume of gas exports, supply of gas for domestic consumption tends to suffer shortages, against which effective utilization of coal with rich proven reserves is planned. Here, it is hoped that by optimizing power systems within the region, in other words, by exporting power from burning domestic coal, gas exports for neighboring countries could be reduced eventually leading to relax the domestic gas shortage,

2.5 Power Tariff / Subsidies

Power tariff charged by PLN that monopolizes the retail electricity is regulated by the approval of the House of Representatives (DPR) at the national assembly. Further, while a single electricity tariff had been applied throughout the nation in the past, after the enforcement of the new Electricity Law of 2009, provincial governments are allowed to determine the electricity price with the approval of the local council (DPRD), making it possible to set the electric charges in each region differently from the national electricity tariff (Regional Tariff).

The Indonesia Rupiah (IDR) experienced a sharp fall in the wake of the Asian currency

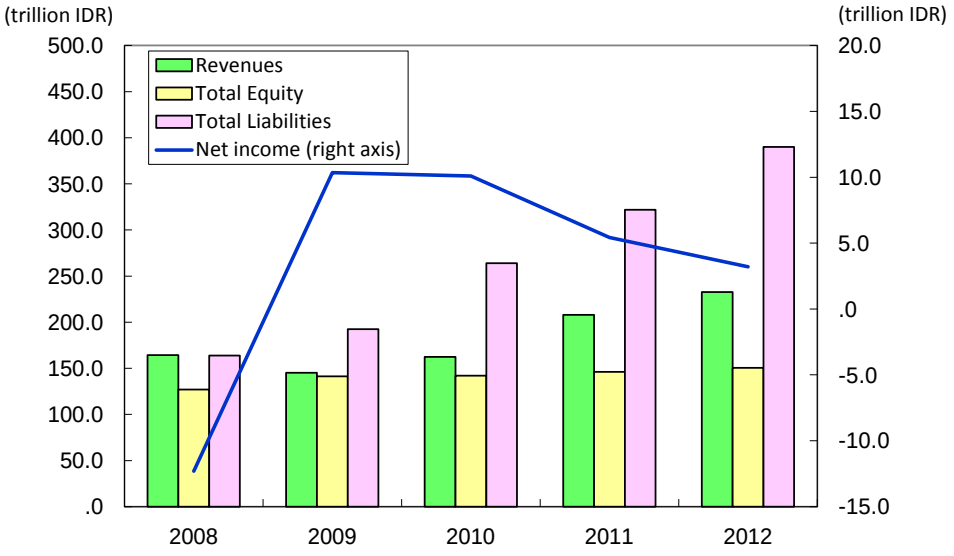
crisis in 1997. Since PLN used to settle fuel costs and electricity purchased from IPP operators in dollars, the situation caused the supply costs to exceed the income from retail electricity sales. By 2003, thanks to the step-by-step price adjustments to raise the electricity rate, the retail price in dollar terms improved almost to the level prior to the currency crisis. However, soaring fuel prices again brought a situation where the supply cost is higher than the retail price. In order to help PLN with the difficulty, subsidies of about IDR3 trillion were allocated in early 2002's, but the amount bulged to about IDR79 trillion in 2008 due to rising fuel costs. This was because the increase in retail electricity prices had not been permitted since July 2003 from political considerations such as elections. Thereafter, retail rate increase of about 10% in average was approved by the National Assembly in July 2010, for the first time in seven years. In addition, retail rate increases were approved and carried out every three months from January 2013 for the purpose of reducing subsidies to PLN. It is expected that this price hike would reduce government subsidies by approximately IDR15 trillion.

As discussed above, in Indonesia, the government regulates the retail electricity price and offers subsidies to compensate for the difference between the supply costs and sales proceeds. As the amount of such subsidies is becoming excessively high in recent years, even the electricity rate hikes are not sufficient enough to keep the financial health of power utilities.

2.6 Financial Data on Individual Power Enterprises/Cooperatives

The financial condition of PLN is discussed below:

Figure 5 : Financial condition of PLN



Source: PLN Financial Reports

For the gross income, due to the effect of increases in electricity retail prices in 2010, it has

increased to about IDR233 trillion in 2012 from about IDR145 trillion in 2009. Concerning its net income, however, it is not in a satisfactory situation, registering a net loss in 2008. While a positive net income was recorded in 2009 and onwards, the status of low income level still persists. As for the liabilities, they were about IDR164 trillion in 2008 but expanded by about 2.4 times to a level of about IDR390 trillion in 2012, indicating that the financial standing of PLN keeps on deteriorating.

According to the breakdown on revenues of PLN, about one-half was the subsidy from the government both in 2011 and 2012. Electricity prices are not yet at a reasonable level and, in order to improve the financial condition, it is essential that electricity price be maintained at the proper level that reflects the cost situation.

3. Other Noteworthy Issues

3.1 Environmental Regulations

a. Air Quality / Emission standards

Currently, regulations on air pollutants in Indonesia are provided based on the 1995 Ministry of Environment (MOE) Decree Concerning Emission Standards for Stationary Sources (No. Kep-13/MENLH/3/1995). The current emission standards set emission limits for Particulate Matter (PM), SO2, NOx, applying to new and existing coal-fired power plants. However, all existing power plants (those in operation or planning stage completed before 7 March 1995) must meet emission standards set for new power plants from 1 January 2000.

Table 2 : National emission standards for coal-fired power plants (Indonesia)

	Emission standards, mg/m^3 (effective from 2000)
Particulate Matter	150
SO_2	750
NOx (as NO_2)	850

Source: IEA Clean Coal Center Database

b. GHG

In 2011, the Government of Indonesia (GOI) announced non-binding commitment to reduce 26% below BAU level of emission in 2020 with domestic budget (in which the contribution of energy and transportation sector is expected to be able to reduce CO_2 emissions to 0.038 giga-ton CO_2e), and further reduced until 41% if there is international support (in which the contribution of energy and transportation sector is expected to be able to reduce CO_2 emissions to 0.018 giga-ton CO_2e). The GOI produced two new regulations reducing CO2 emissions, i.e. Presidential Regulation No. 61/2011 Regarding National Action

Plan for GHG Emission Reduction and No. 71/2011 Regarding National GHG Inventory System. One of the mitigation actions to reduce CO_2 emissions from energy and transportation sectors is to utilize renewable energies.

3.2 Renewable Energy

a. Renewable Energy Policy

As of 2011 year-end, the total installed generation capacity based on new and renewable energy except large-scale hydropower stood at 1,274.68 MW, accounting for 3.2% of the total generation capacity. The foregoing is made up with 1,209 MW Geothermal, 0.93 MW Wind, 5.93 MW Micro-Hydro, 57.66 MW Mini-Hydro, and 1.16 MW Solar[17] .

Currently the development of renewable energy is regulated by Presidential Decree No.5/2006 regarding the National Energy Policy. This decree mandates that the contribution of new and renewable energy in the 2025 national primary energy mix be targeted at 17%, consisting of 5% biofuel, 5% geothermal power, biomass, nuclear, hydro, and wind, and liquefied coal combined at 2%. The GOI will take measures to add the capacity of Micro-Hydro power plants to 2,846 MW by 2025, Biomass of 180 MW by 2020, wind power of 0.97 GW by 2025, solar of 0.87 GW by 2024, and nuclear power of 4.2 GW by 2024[18].

The GOI has also launched an "Energy Vision 25/25" to support the above programs. The vision has a target that by 2025 the energy utilization based on new and renewable energy will reach 25% of total national energy mix.

In 2009, the GOI announced a "Fast Track Program Phase II" for a total capacity of 10,000 MW to be newly added. While coal-fired thermal plants were given the priority in the Phase I program, Phase II focuses on constructing renewable energy-based power plants in the face of environmental requirements and the rise in coal prices. Based on Ministerial decree No.1/2012, the composition of the generation mix doe FTP11 will consist of 49% from geothermal, 30% from coal,17% from hydropower, 3% from gas, and 1% from gasified coal. Under this program, IPPs have opportunities to develop power generation as well as PLN.

To support the development of new and renewable energy, the GOI has issued several rules and regulations, consisting of Presidential Decree No.5/2006 on the National Energy Policy, Law No.30/2007 on Energy, Law No.15/1985 on electricity, Government Regulation No.10/1989 which is renewed by Government Regulation No. 03/2005 and No.26/2006

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[17] 2012 Handbook of Energy & Economic Statistics of Indonesia

[18] Ministry of Energy and Mineral Resources (MEMR), http://www.esdm.go.id/news-archives/general/49-general/1963-indonesias-renewable-energy-potential.html

regarding the supply and usage of electricity, Ministerial Regulation No.002/2006 on the commercialization of middle scale renewable energy power plants (< 10 MW), and Minister of Energy and Mineral Resources (MEMR) Decree No.1122k/30/MEM/2002 on the spread of small scale power plants (=< 1 MW). Currently the government is formulating a law on new and renewable energy which includes its supply and usage along with relevant incentives.[19]

MEMR Decree No.31/2009 requires PLN to procure all of the power generated from renewable energy sources other than geothermal power at certain specified prices. The prices are set at IDP656/kWh (connected to medium voltage line) and IDP1,004/kWh (low voltage line) as the basis to be multiplied with a regional incentive factor of between 1 ~ 1.5.

MEMR Decree No.32/2009 obligates PLN to procure the power generated by geothermal power plants at the prices determined at the time of geothermal mining tender, against which the mandatory ceiling price for bidding is set at US$9.7 cents/kWh.

MEMR Decree No.4/2012 requires PLN to procure all generated or excess power from medium and small scale power producers with renewable energy having up to 10 MW generation capacities. The procurement price for PLN is to be calculated based on costs, whereas special prices will be applied for the power based on biogas, biomass, landfill gas, or municipality wastes.

b. FIT, Fiscal incentives

The Indonesian government enacted the new Electricity Law in December 2009 (Law No.30/2009). Subsequent to the law, the Feed-In Tariff (FIT) mechanism was implemented based on the MEMR regulations. Under this mechanism, PLN is obliged to purchase renewable energy at a predetermined price. These FIT rates are diverse among provinces (Sumatra, Java-Bali, Sulawesi, etc.) ranging: US cents 11.5 – 18.5/kWh for geothermal, Rp 1004-1506 for hydropower, solar and wind power, Rp 850-1,398 for biomass, biogas and wastes. Establishment of the comprehensive FIT system is expected to promote utilization of renewable energies in Indonesia, though there are various issues to be fine tuned in the course of actual implementation.

Among others, MEMR Regulation No. 22/2012 obligates PLN to procure geothermal power based on the Feed-in Tariff (FIT) Mechanism. The Geothermal FIT is given as shown in the table below:

[19] Ministry of Energy and Resources (MEMR),
http://www.esdm.go.id/news-archives/general/49-general/1963-indonesias-renewable-energy-potential.html

Table 3 : Geothermal FIT (Indonesia)

No	Area	Price (cent US$/kWh)	
		High Voltage	Medium Voltage
1	Sumatera	10	11.5
2	JAMALI	11	12.5
3	Southern Sulawesi	12	13.5
4	Northern Sulawesi	13	14.5
5	West Nusa Tenggara, and East Nusa Tenggara	15	16.5
6	Maluku and Papua	17	18.5

Source: Geothermal Development in Indonesia, MEMR, 20 September 2012

In addition, fiscal incentives are offered for geothermal power generation as listed below (based on Government Regulation No. 62/2008 No. 1/2007; MR of MoF No. 177/PMK.011/2007; and MR of MoF No. 22/PMK.011/2011), which will constitute a comprehensive policy package together with FIT:

- 30% reduction of corporate income tax;
- 10% of added-value tax paid by the GOI;
- Custom duties exemption for geothermal developers;
- 25% per year depreciation for 8 years with double declining balance method; and
- Investment tax credit of 5% per year for 6 years.

3.3 Energy Efficiency and Conservation

According to the IEA's "Energy Balances of Non-OECD Countries – 2013 Edition", Indonesia's energy intensity defined as total primary energy supply per thousand 2005 US dollars of GDP (TPES/GDP) improved from 0.68 in 2000 to 0.52 in 2010. However, the level of energy efficiency of Indonesia in terms of TPES/GDP still leaves much to be desired when compared to, for example, 0.096 of Japan in 2012.

For Indonesia, its ample endowment of energy and resource reserves and the bounty system to suppress the end-user energy prices at low levels so far have been the major obstacles in promoting energy efficiency and conservation initiatives. Although Presidential Decrees on energy conservation matters have been issued several times in the past, their effect was limited both in terms of validity and scope. On the other hand, since the volatility of international oil prices and the decline in crude oil production of late are one of the major elements destabilizing Indonesia's public finance, energy conservation and development of alternative energy to replace oil are being increasingly recognized as an important issue of contemporary years.

As called for by the Energy Law, a National Energy Conservation Program (RIKEN) was

formulated in 1991 and updated in 1995 as required. In addition, to promote diffusion of energy efficiency and conservation concept, the Presidential Decree No.5/2006 was issued in which a goal of achieving the elasticity of energy consumption to GDP of less than one by 2025 was mandated.

For energy efficiency and conservation initiatives in Indonesia, MEMR Decrees lay down specific policy measures based the Presidential Decree. The MEMR Decrees that have been issued since 2010 are as listed below:

2010: MEMR Decree No.14/2010 Concerning Energy Manager Of Each Company To Manage Their Consumption;

2011: MEMR Decree 06/2011 Concerning Energy Efficient Labeling;

2012: MEMR Decree No.13/2012 Concerning Efficiency In Electricity Demand

Thailand

Key Indicators (2011)

1) GDP (at Current Prices)	Billion US Dollars	369.7
2) Population (as of 1 July)	Million person	67.6
3) Per capita GDP	US Dollars/person	5649
4) Total Primary Energy Supply(TPES)	Million tonnes oil equivalent (MTOE)	119.1
5) Energy Self-supply Ratio	-	57.7 %
6) Electricity Consumption	Tera- WH (TWH)	148.7
7) Power Generation Capacity	Million kW	31.5(2010)
8) CO_2 Emissions (energy origin)	Million tons CO2 equivalent (Mt-CO2)	248.5(2010)
9) Per capita Primary Energy Supply	TOE/person	1.763
10) Energy Intensity per GDP	TOE/Thousand USD	0.322
11) Per capita Electricity Consumption	kWh/person	2200
12) Electrification rate[2012]	-	99.8%20
13) Electricity Intensity per GDP	kWh/Thousand USD	402
14) Per capita CO_2 Emissions (energy origin)	Ton-CO2/person	3.692(2010)
15) Primary Energy Supply Composition	Coal	15.3%
	Oil	39.3%
	Natural Gas	25.8%
	Nuclear	0.0%
	Hydro	0.6%
	Geothermal	0.0%
	Other Renewables	18.3%
16) Energy Self-sufficiency	Total	57.7%
	Coal	33.9%
	Oil	38.6%
	Natural Gas	71.4%

Source 1) – 3): ADB Key Indicators 2012, 4)-6), 14), 15): IEA Energy Balances of Non-OECD Countries 2012, 7) APEC Energy Statistics 2010, 8) IEA CO_2 Emissions from Fuel Combustion 2012

20 Office of the Energy Regulation Commission,Thailand,"Energy Sector in Thailand", August 2013, presentation at the Dialogue on Energy Sector Reform, Manila, Philippine.

1. Current Status and Challenges in Energy Sector

1.1 Energy Policies

a. Overall Policy

On December 30, 2008, the then Prime Minister Abhisit announced a "Thailand's Energy Policy" during a policy speech and in January, 2009, the then Energy Minister Wannarat Channukul announced an "Energy Strategy" which laid down the following:

1. Enhance development of domestic energy resources to improve energy self-sufficiency

2. Introduce national alternative energy policies
   - Promote production and utilization of biofuels (bioethanol for E10, E20 and E85, and biodiesel)
   - Promote introduction of natural gas in transport, industry, and residential and commercial sectors
   - Promote introduction of renewable energies (e.g., wind power, solar power, hydropower, biomass, biogas, and energy from waste)
   - Promote research and development (R&D) relating to alternative energy, renewable energy, and other innovative technologies

3. Monitor and maintain appropriate and stable energy prices
   - Monitor to ensure fair and stable energy prices
   - Improve quality and safety of energy-related services
   - Encourage competition and investment in the energy business

4. Promote energy efficiency and conservation in the industrial, transportation, services and residential sectors
   - National energy development and energy conservation (energy savings target: 20%)
   - Provision of knowledge on energy conservation to people through energy conservation campaign
   - Formulation of preferential policies that encourage investment in energy conservation
   - R&D relating to energy conservation system and technology
   - Setting standards and regulations relating to energy conservation appliances and energy management

5. Promote energy procurement and consumption that implement environmental protection

b. Coal

The Thai government considers that they need to diversify power supply mix from the current natural gas dependent structure, which means increasing use of coal to mitigate rising import dependency of natural gas. However, after the air pollution caused by the Mae Moh coal power plant was discovered, local residents have strongly objected to construction of a new power plant from anxieties over the environmental impact of coal, calling for effective countermeasures.

c. Oil

The "Thailand's Energy Policy" announced in December, 2008 aims to promote domestic production of crude oil and condensate, develop related infrastructure system, encourage overseas resource exploration, and promote/strengthen development of energy related industries such as petrochemical complex.

The Government has strengthened efforts in exploring and developing hydrocarbon resources in order to secure stable supply of sufficient oil and gas to the domestic market. It plans to expand investment on domestic exploration and production (E&P) with a view to increase indigenous oil and gas supply, and also plans to develop oil storage systems and pipelines for reduction of energy transportation costs. The Government pays particular attention to exploring oil and gas resources in the deep water offshore western coast.

d. Natural Gas

The "Thailand's Energy Policy" aims to nicely manage the country's natural gas supply, which consists of domestic production in the Gulf of Thailand, piped gas import from Myanmar and emerging LNG import, in good balance with the domestic demand trend. To this end, the government closely monitors the progress of domestic natural gas fields under development to maintain the level of remaining reserves (on a "2P" basis) at least for 30 years. The "Thailand's Energy Policy" also aims to limit the share of natural gas-fired power generation to a maximum 70%, strengthen the relationship with gas-producing countries, and promote use of natural gas in the transportation as well as buildings and household sectors.

The Power Development Plan 2010 Revision 3 (PDP 2010 - Revision 3) approved in June 2012, which develops a power generation development plan by energy source, aims to bring the share of natural gas-based generation down to 54% in 2030.

e. Electric Power

The "Thailand's Energy Policy" proposes the following implementation methodologies in order to ensure energy supply and promote fuel diversification.

1. Encourage power purchase from small power producers (SPPs) and very small power producers (VSPPs).

2. Defer IPP projects that are not ready for connection to the grid.

3. Consider enhancing power purchase from neighboring countries.

4. Promote campaigns on fuel diversification.

The PDP2010 Revision 3 estimates that the total power generation capacity will reach 71 GW by 2030, which is about 2.2 times that in December 2011. It also aims to reduce the share of natural gas that accounts for 70% of the total power supply to 54% within the next 20 years, and significantly increase the share of alternative energies, such as solar energy, wind power, and others to 14% of the total.

f. Nuclear Energy

In February 2008, a Nuclear Power Program Development Office was established, affiliated with the Ministry of Energy, with an objective of studying the advantages of nuclear power generation. It has carried out tasks such as examination on candidate sites, research on nuclear power education and safety regulations, and other issues in order to define the potential of nuclear power generation.

Then, the PDP2010 approved in April 2010 disclosed a view that nuclear power shall become an important alternative energy source in consideration of increasing electricity demand, needs for enhanced energy security, and so on, and proposed construction of five 1,000 MW-class nuclear power plants commencing in 2020 through to 2028. However, in the wake of the Fukushima nuclear accident in March 2011, the timing of nuclear power introduction was changed to 2023 in the PDP2010 Revision 2、and the nuclear power generation capacity in 2030 reduced to 4,000 MW. In the PDP2010 Revision 3 announced in June 2012, nuclear power introduction was further deferred to 2026 and the projected capacity was halved to 2,000 MW.

1.2 Energy Supply and Demand

Energy consumption of Thailand has recorded strong increase of annual 4.6% during the first decade of the 21st century keeping pace with its robust economic growth of annual 3.9%. Electrification has almost completed during the period thanks to the particular efforts of the government and the power industry. Fossil fuel production, mainly oil and natural gas, has recorded steady increase during the period, and thus, energy self-sufficiency ratio has been kept at almost same level. However, as its natural resources are relatively limited, it may become increasingly difficult to maintain the present self-sufficiency ratio unless substantial new discoveries. Under the circumstance, securing stable import channels for fossil fuels as well as promoting energy efficiency and conservation and development of renewable energies are among the important energy policy issues.

Figure 1 : Total Primary Energy Supply

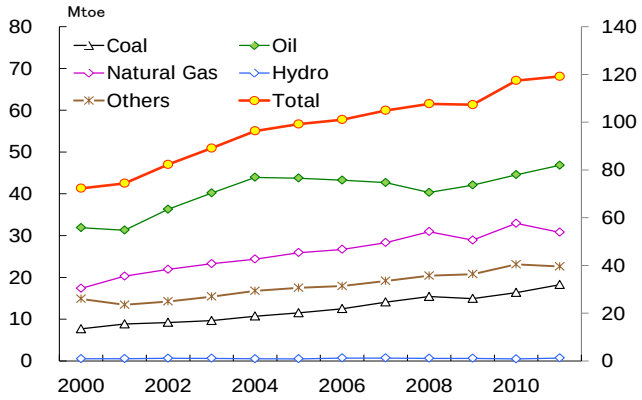
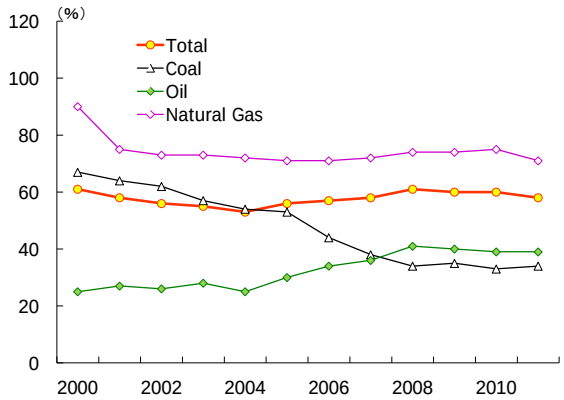


Figure2 : Self Sufficiency of Fossil Fuel

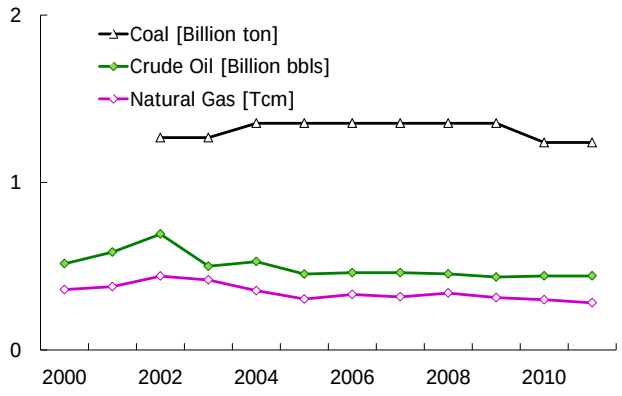


Source : IEA, Energy Balances 2012 edition.

1.3 Energy Resources

Domestic oil and gas reserves are located mainly in the gulf of Thailand. As exploration in its main corridor and the joint development zone with Malaysia is nearing maturity, the existing reserves may be depleted unless new discoveries via new exploration concepts/targets. Thailand now looks to hydrocarbon potential of the western deep water in the Indian Ocean. As lignite coal resources in the interior area has been exploited for quite sometime now, no new additions has been recorded in recent years. High quality coal is not found in significant quantity in Thailand.

Figure 3 : Proven Reserves Since 2000



Source :BP Statistical Review of World Energy, June 2012

2. Current Status and Challenges in Power Sector

2.1 Power Utility Systems

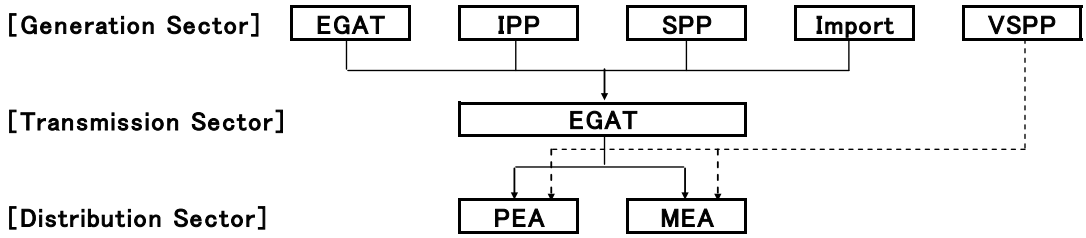
In Thailand, the electricity business had been monopolized by three public corporations. Specifically, the Electricity Generating Authority of Thailand (EGAT) took charge of power generation and transmission sectors, and the Metropolitan Electricity Authority (MEA) together with the Provincial Electricity Authority (PEA) handled the power distribution and retail sectors, whereas small-scale power plants managed by PEA and the Department of Alternative Energy Development and Efficiency (DEDE), affiliated with the Ministry of

Energy, supplied electricity in the off-grid areas such as isolated islands.

The electricity business was reformed in the 1990s. Competition was introduced into the power sector in 1992, and IPPs and SPPs (small power producers) were allowed to enter the electricity business. In 2002, a law relating to introduction of VSPPs (very small power producers) was enacted.

The term SPP refers to a small power producer that sells 10 to 90 MW electricity to EGAT, and was introduced in order to utilize energy through cogeneration, and promote power generation that utilizes by-products from local industries (e.g., agriculture) and renewable energy resources. The term VSPP refers to a very small power producer that sells 10 MW or less electricity to MEA or PEA as power distribution utilities. The system was initially targeted at power producers that own a renewable energy power plant having a generation capacity of 1 MW or less. The system has been extended to the current power generation scale since 2006, and also to include cogeneration.

Figure 4 : Thailand's Power Utility Systems



The Thai Government initially planned to implement a completely competitive market including the retail sector based on the introduction of competitive principles into the power generation sector, and set up an electricity pool market.[21] However, the Government decided in December 2003 at a Cabinet meeting to review electricity market liberalization in view of the power crises that occurred in California, U.S.A. in 2000 and 2001. The Government decided to establish a new power sector system in which the business accounting is completely separated while maintaining EGAT's key role in the power generation and transmission sectors, and set up an independent Electricity Regulatory Commission (ERC) in order to maintain fairness of competition in the power sector.

At present, EGAT supplies electricity generated by its facilities directly to large consumers, purchases electricity from IPPs and foreign countries as the single buyer, and wholesales the purchased electricity to the power distribution utilities (MEA and PEA). EGAT owns power transmission and transformation facilities, as well as end-user supply facilities, and takes charge of system operations.

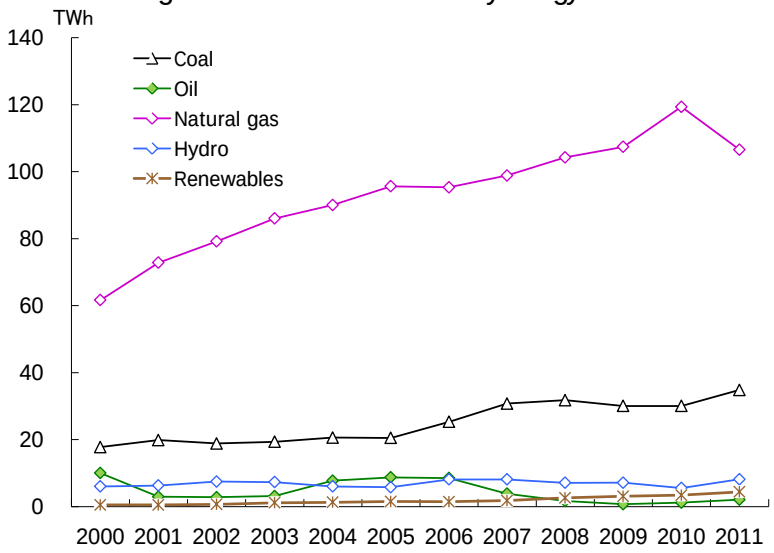
[21] The National Energy Policy Office, "Electricity Supply Industry Reform and Thailand Power Pool", November 2000

MEA is involved in the power distribution and retail business in the capital Bangkok and two neighboring Prefectures (Samutprakarn Prefecture and Nonthaburi Prefecture). PEA is involved in the power distribution business in four areas (73 Prefectures) outside the service area of MEA. The business area of PEA covers 99% of the country.

2.2 Power Supply and Demand

In Thailand, electricity consumption had steadily increased from 2000 to 2007 by 4 to 9% per year, but the growth rate of electricity consumption has declined since 2008, registering a negative growth in some years. The electricity consumption in 2011 was 148,700 GWh. In 2011, industrial electricity consumption accounted for 42%, commercial consumption 34.3%, and household consumption 22.1%. There has been no substantial change in the consumption structure during the decade up to 2011.[22]

Figure 5 : Thailand's Power Mix by Energy Source



TWh

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal	17.8	19.9	18.8	19.4	20.6	20.5	25.3	30.8	31.8	30.0	30.0	34.8
Oil	10.0	2.9	2.8	3.2	7.8	8.7	8.5	3.9	1.7	0.7	1.2	2.1
Natural gas	61.6	72.8	79.2	86.0	90.0	95.6	95.3	98.8	104.3	107.4	119.3	106.6
Hydro	6.0	6.3	7.5	7.3	6.0	5.8	8.1	8.1	7.1	7.1	5.5	8.2
Renewables	0.5	0.5	0.7	1.2	1.3	1.5	1.5	1.8	2.6	3.1	3.4	4.4
Total	96.0	102.4	109.0	117.0	125.7	132.2	138.7	143.4	147.4	148.4	159.5	156.0

Source : IEA, Energy Balances of Non-OECD Countries 2012

The maximum demand increased from 16,445 MW in 2001 by an average of 6.2% per year up to 2006. In recent years, however, the pace of electricity generation growth has slackened, and the maximum demand in 2011 was 23,388 MW.

The total amount of electricity generated by the power producers in 2011 was 154,886 GWh. In 2011, EGAT accounted for 47.4% (73,387 GWh) of the total amount of electricity

[22] DEDE, "Electric Power in Thailand 2011"

generated by the power producers, whereas IPPs and SPPs accounted for 52% (81,242 GWh) of the total , and PEA and DEDE that supply a small amount of electricity in remote islands, etc., accounted for 0.1% (257 GWh) of the total. EGAT generated almost all the electricity in Thailand up to 1994. Since IPPs and SPPs entered the power generation market along with liberalization, the share of EGAT has been below 50% since 2003.

In terms of power mix by energy source, the share of natural gas increased from 62.9% in 2000 to 71.0% in 2011. By contrast, the share of oil significantly decreased from 11.6% in 2000 to 1.7% in 2011.

2.3 Power Facilities

The total power generation capacity of the power utilities was 31,773 MW in 2011. The Government or State Electric Utilities including EGAT, PEA, and DEDE accounted for 51% of the total generation capacity, and the private power producers including IPPs, SPPs, and VSPPs accounted for 48.2% of the total.

In terms of technology-wise generation capacity, combined cycle gas turbine (CCGT) power generation accounted for 50.6% (16,091 MW), steam power generation (coal-fired and gas-fired combined) accounted for 25% (8,115 MW), hydropower generation accounted for 11% (3,500 MW), and cogeneration accounted for 9.2% (2,925 MW).

The power generation capacity of the government or state electric utilities increased from 15,877 MW in 2000 to 16,470 MW in 2011, while the power generation capacity of the private power producers more significantly increased from 6,717 MW in 2000 to 15,303 MW in 2011, i.e., by a factor of about 2.3.[23]

2.4 Power Development Plans

The EGAT takes charge of preparing power development plan in Thailand. A new plan called the "Summary of Thailand Power Development Plan 2010-2030" was published in April, 2010. Thereafter, the coal thermal power development plan was revised downward due to the opposition by local residents, and the introduction of nuclear power plants was postponed along with a reduction in scale in the wake of the Fukushima nuclear accident. As a result the Summary of Thailand Power Development Plan 2012-2030 (PDP2010: Revision 3) published in June 2012 is the latest power development plan of Thailand.

In consideration of needs in improving energy security and dealing with increasing fuel costs, the new plan aims to introduce nuclear power as a new power source, to diversify fuel mix, and to increase imports of electricity from neighboring countries,.

The PDP2010 Revision 3 estimates that the total power generation capacity (excluding

[23] DEDE, "Electric Power in Thailand 2011"

imported electricity) will increase from 30,246 MW in 2011 to 44,631 MW in 2020. It also estimates that the major energy sources will comprise: natural gas 61.5% (71.0% in 2011), coal 13.2% (13.1% in 2011), hydropower 9.2% (11.4% in 2011), and renewable energy 15.5% (3.5% in 2011), and aims to reduce dependence on natural gas by increasing renewable energy power generation. The plan estimates that the total output excluding imported electricity will be 62,056 MW in 2030, where the major energy sources will include natural gas (61.1%), coal (11.9%), hydropower (6.7%) , renewable energy (15.4%), and nuclear power (3.2%), thereby incorporating the plans to construct nuclear power plants.

The PDP2010 Revision 3 aims to enhance combined cycle gas turbine (CCGT) power generation that achieves high thermal efficiency instead of expanding the conventional-type gas-fired plants in order to avoid excessive dependence on natural gas, and EGAT and IPPs plan to construct new CCGTs or expand existing ones in various locations. Concerning the source of supply, natural gas is supplied from domestic gas fields and from Myanmar through pipelines, and additionally from the Map Ta Phut LNG terminal that started operation in September, 2011 in order to diversify natural gas sources.

There is no firm plan to construct or expand coal-fired power plants that burn domestically produced brown coal in Thailand due to the strong oppositions by local residents who worry about air pollution by the coal dust, while application of cleaner and more efficient IGCC system is under study. Accordingly, EGAT plans to construct a new power plant that utilizes imported coal as fuel.

The PDP2010 initially planned to start operation of the first nuclear power plant (1,000 MW) in 2020, and proposed to build five nuclear power plants for a total of 5,000 MW by 2028. However, the Government decided to postpone the nuclear power introduction as well as to reduce the plant size to build one unit (1,000 MW) in 2026, and another one (1,000 MW) in 2027, in consideration of the Fukushima nuclear accident.

Since Thailand is neither rich in fossil fuels such as oil and gas nor water resources, leading to high import dependence, the Government is actively trying to introduce renewable energy such as biomass and solar energy, which are abundantly available in the country. The Government plans to increase the renewable energy-based power generation so that their capacity shall exceed the coal-fired power generation capacity by 2020.

2.5 Power Tariff / Subsidies

The Metropolitan Electricity Authority (MEA) exclusively takes charge of the electricity retail business in Bangkok and two neighboring prefectures (Samutprakarn Prefecture and Nonthaburi Prefecture), and the Provincial Electricity Authority (PEA) exclusively takes charge of the electricity retail business in the remaining areas. The National Energy Policy Council (NEPC) approves their retail prices.

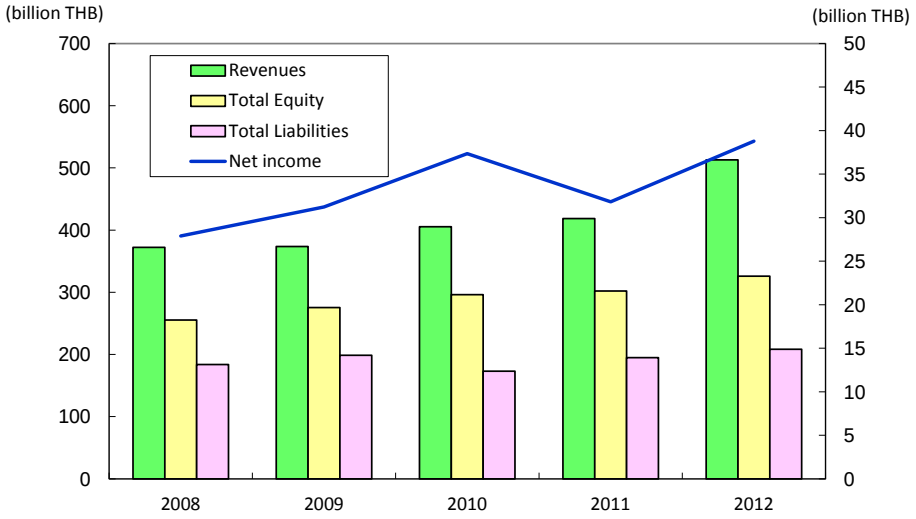
The retail prices are calculated by adding the fuel tariff (Ft) to the base tariff, and the unit prices are reviewed every two (2) years. The fuel tariff (Ft) reflects changes in fuel cost, power purchase cost from IPP and foreign countries, power sector support cost based on the national policy, and renewable energy promotion cost (called "Adder"), etc. in the electricity prices every four (4) months.

Thailand employs a system that exempts low income people from paying electricity charges. At present, users whose electricity consumption per month is 50 kWh or less are exempted from paying electricity charges. The exemption is not available when electricity consumption is over 50 kWh. The cost necessary for the exemption system is added to the retail prices through the fuel tariff (Ft). It is not known if the Government employs any other subsidy systems for power producers or consumers.

2.6 Financial Data on Individual Power Enterprises/Cooperatives

The financial situation of EGAT and MEA is shown below.

Figure 6 : Financial Condition of EGAT

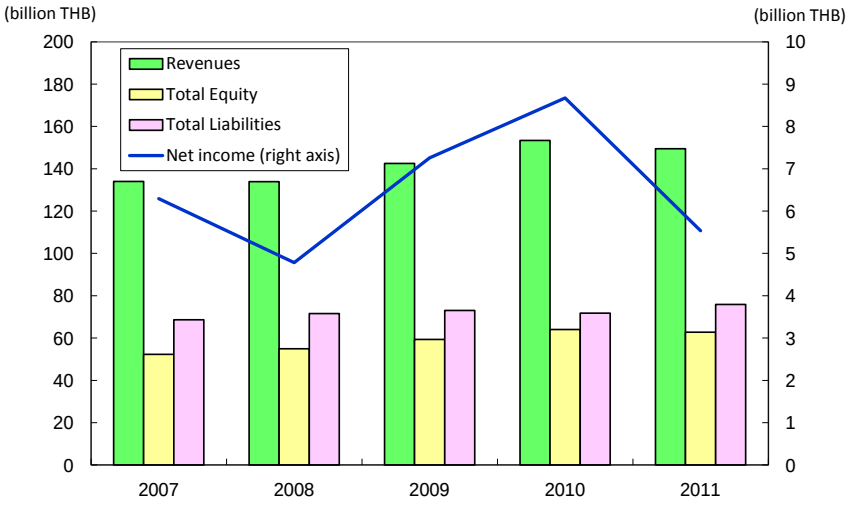


Source : EGAT Annual Report

EGAT maintains an excellent financial situation in which the equity significantly exceeds liabilities. Its revenue has increased from Baht 372 billion in 2008 to Baht 513 billion in 2012 by a factor of about 1.4. The net income has also increased from Baht 27.9 billion in 2008 to Baht 38.8 billion in 2012 by a factor of about 1.4. Its net income has steadily increased in proportion to increase in revenue, while very sound and steady business management is observed.

The MEA maintains an excellent financial situation although an increase or decrease in net income is observed.

Figure 7 : Financial Condition of MEA



Source: MEA Annual Report

3. Other Noteworthy Issues

3.1 Environmental Regulations

a. Air Quality/Emission standards

The Enhancement and Conservation of Environmental Quality Act of 1992 (B.E. 2535, as amended) is the principal instrument to address environmental issues in Thailand. It promotes natural resource conservation and environmental protection, and requires the preparation of long-term environmental policies and medium-term action plans. It grants the National Environment Board the power to issue and modify Environmental Quality Standards and set emissions standards.

Table 1 : National Emission Standards for Power Plants (Thailand)

New power plants

Pollutants	Plant size (MW)	Emission standards
SO_2 (ppm)	> 500	320
	300 - 500	450
	< 300	640
NOx (as NO_2) (ppm)		350
Particulate (mg/m^3)		120

Existing power plants

Fuel	Emission standards		
	SO_2 (ppm)	NOx as NO_2 (ppm)	Particulate (mg/m^3)
Coal	700	400	320
Lignite	60	200	60

Mae Moh Power Plants

	Emission standards		
	SO2 (ppm)	NOx as NO_2 (ppm)	Particulate (mg/m^3)
Units 1 - 3	1300	500	180
Units 4 - 7	320	500	180
Units 8 - 13	320	500	180

Source: IEA Clean Coal Center Database

b. GHG

Thailand has a strong policy of protecting the environment from the impact of energy production and consumption, in particular the impact of the transport sector. The government's environmental protection policy is to encourage energy procurement and consumption which attach importance to the environment with public participation. It does this by setting relevant standards and promoting Clean Development Mechanism (CDM) projects to reduce social and environmental impact as well as greenhouse gas emissions. The strategies with targets and actions to achieve the above policy are:

- Monitor the environmental impact of energy production, conversion and use. Set a target and develop a plan to boost the management of greenhouse gas (GHG) emission rates in the energy sector, to reduce Thailand's CO_2 emissions by at least 1 million tonnes per year.
- Promote the CDM in the energy sector to reduce greenhouse gas emissions. The objective is to enable Thailand to submit energy projects for certification under the CDM, at a total of 1 million tonnes of CO_2 per year, and enhance the economy's role

as a leading exporter of carbon credits in Asia.[24]

3.2 Renewable Energy

a. Renewable Energy Policy

The total installed RE generation capacity existing in Thailand, as of Q1/2013, comprises: 486MW Solar, 215MW Wind, 102MW Small hydropower, 1,989MW Biomass, 197MW Biogas, and 43MW MSW.

In 2011, the Government of Thailand announced a Renewable and Alternative Energy Development Plan (AEDP 2012–2021), in which a target of raising the ratio of renewable and alternative energy in the total energy consumption up to 25% by 2021 was pledged. The AEDP 2012–2021 set forth the following six strategies to achieve its goal:

1. Promoting the community to collaborate in projects to broaden producing and consuming renewable energy;
2. Adjusting the incentive measure on investment from private sector appropriated with the situation;
3. Amending the laws and regulations which do not benefit to renewable energy development;
4. Improving the infrastructure as system of transmission line, power distribution line, including a development towards Smart Grid System;
5. Public relations and building up comprehensive knowledge on RE for the people;
6. Promoting the research work as mechanism to develop the integrated renewable energy industry.

The latest capacity targets by type of RE source are as follows[25]:

Table 2 : Power Generating Capacity by Renewable Energies

Fuel	Generating Capacity
Biomass	4,800 MW
Biogas	3,600 MW
Solar	3,000 MW
Wind	1,800 MW
Hydro and waste	727 MW
Total	13,927 MW

[24] APEC ENERGY OVERVIEW 2012

[25] Bloomberg, "Thailand Plans to Boost Renewable Energy Output to 25% of Total", 17 July 2013

b. FIT (Adder), Fiscal incentives

In July 2007, the Thai government introduced a system called "Adder" to promote renewable energy generation by the private sector. Under the "Adder" system, the Electricity Authorities are required to procure power produced by RE at a predetermined premium added on top of the normal price of electricity.

The "Adder" premium will be applied to the power procured from VSPPs (i.e. Very Small Power Producers, producing up to 10 MW) and from SPPs (Small Power Producers, producing from 10 MW up to 90 MW).

The Thailand Board of Investment (BOI) offers a range of fiscal and non-tax incentives for investments. Tax-based incentives include exemption or reduction of import duties on machinery and raw materials, and corporate income tax exemptions and reductions. Non-tax incentives include permission to bring in foreign workers, own land, and take or remit foreign currency abroad. Additionally, foreign businesses are entitled to 100% ownership.[26]

Table 3 : "Adder" Rates

Fuel	Adder (Baht/kWh) VSPP	SPP	Adder-VSPP (USD Cents /kWh)**	Special adder * (Baht/kWh)	Supporting period (Year)
❑ Biomass - Installed capacity <= 1 MW - Installed capacity > 1 MW	0.50 0.30	Bidding	1.54 0.93	1.00 1.00	7 7
❑ Biogas (all categories of production sources) - Installed capacity <= 1 MW - Installed capacity > 1 MW	0.50 0.30	Bidding	1.54 0.93	1.00 1.00	7 7
❑ Waste (community waste, not hazardous industrial waste, and inorganic waste) - AD &b LFG - Thermal Process	2.50 3.50	2.50 3.50	7.72 10.81	1.00 1.00	7 7
❑ Wind power - Installed capacity <= 50 kW - Installed capacity > 50 kW	4.50 3.50	3.50	13.89 10.81	1.50 1.50	10 10
❑ Mini and micro hydropower - capacity 50-200 kW - capacity < 50 kW	0.80 1.50	-No-	2.47 4.63	1.00 1.00	7 7
❑ **Solar power**	**8.00/ 6.50**	**8.00/ 6.50**	**24.70**	**1.50**	**10**

Source: Thailand Solar Energy Overview, DEDE, March 2012

[26] Thailand Board of Investment, http://www.boi.go.th/index.php?page=opp_alternative_energy

c. THE NATION (July 13 2013)[27]

Energy Minister Pongsak Ruktapongpisal plans to submit to the Energy Policy and Planning Office on Tuesday (16 July) a proposal to promote electricity generation via solar panels installed on rooftops of houses, buildings, offices and factories.

For 2013-14, the ministry will propose a promotional electricity rate in the form of a feed tariff for 25 years for three groups of solar electricity producers. General residences will be entitled to support of Baht 6.69 /kWh; small and medium-sized enterprises (producing 10-250MW of electricity) will get Baht 6.55 /kWh; and medium-to-large factories (producing more than 250MW) will get Baht 6.16 /kWh.

Pongsak expects this project to result in at least 200MW of electricity generated by rooftop solar panels. The impact of this support on the fuel tariff (Ft) rate will be about Baht 0.50 /kWh. In addition, there will be tax breaks, after the Energy Ministry consults with the Finance Ministry.

3.3 Energy Efficiency and Conservation

According to the IEA's "Energy Balances of Non-OECD Countries – 2012 Edition", Thailand's energy intensity defined as total primary energy supply per thousand 2005 US dollars of GDP (TPES/GDP) suggests a challenge where the index deteriorated from 0.53 in 2000 to 0.56 in 2010.

In 1992, an Energy Conservation Promotion Act (B.E.2535) was enacted to promote the energy efficiency and conservation initiatives, especially for practice in buildings and factories. In its 2007 revision, the Act reinforced its scope not only in the area of technical approach relating to facilities and equipment, but also of response based on system management such as human resources, as well as expansion of the authority of the Department of Energy.

With the implementation of the Energy Conservation Promotion Act, an Energy Conservation Fund (ENCON Fund) has been established. The Fund mainly aims to provide support for energy-saving investments in designated factories and buildings, but, it is also used for human resource development or energy-related research and development projects.

In 2011, the Thai Government adopted the 20-year Energy Efficiency Development Plan (EEDP) 2011–30. This plan has a target to reduce energy intensity by 25% by 2030, compared with that of the base year, 2005. This equates to a reduction in final energy consumption of 20% in 2030, or about 30,000 kilotons of oil equivalent (ktoe), compared with

[27] http://www.nationmultimedia.com/business/Energy-minister-to-outline-plan-for-rooftop-solar--30210294.html

that in 2005. The economic sectors with priority for undertaking energy conservation are the transport sector (reduction: 13,400 ktoe in 2030) and the industry sector (11,300 ktoe). The EEDP aims to reduce energy elasticity (the percentage change in energy consumption to achieve a 1% change in national GDP) from an average of 0.98 in the past 20 years to 0.7 in the next 20 years[28].

[28] APEC Energy Overview 2012

Singapore

Key Indicators (2011)

1) GDP (at Current Prices)	Billion US Dollars	259.8
2) Population (as of 1 July)	Million person	5.2
3) Per capita GDP	US Dollars/person	50128
4) Total Primary Energy Supply(TPES)	Million tonnes oil equivalent (MTOE)	33.4
5) Energy Self-supply Ratio	-	2.8%
6) Electricity Consumption	Tera- WH (TWH)	41.7
7) Power Generation Capacity	Million kW	10.6(2010)
8) CO_2 Emissions (energy origin)	Million tons CO2 equivalent (Mt-CO2)	62.9(2010)
9) Per capita Primary Energy Supply	TOE/person	6.452
10) Energy Intensity per GDP	TOE/Thousand USD	0.129
11) Per capita Electricity Consumption	kWh/person	8049
12) Electrification rate[2009]	-	100%
13) Electricity Intensity per GDP	kWh/Thousand USD	161
14) Per capita CO_2 Emissions (energy origin)	Ton-CO2/person	12.390(2010)
15) Primary Energy Supply Composition	Coal	0.0%
	Oil	72.3%
	Natural Gas	24.1%
	Nuclear	0.0%
	Hydro	0.0%
	Geothermal	0.0%
	Other Renewables	2.8%
16) Energy Self-sufficiency	Total	2.8%
	Coal	0.0%
	Oil	0.0%
	Natural Gas	0.0%

Source 1) – 3): ADB Key Indicators 2012, 4)-6), 14), 15): IEA Energy Balances of Non-OECD Countries 2012, 7) APEC Energy Statistics 2010, 8) IEA CO_2 Emissions from Fuel Combustion 2012

1. Current Status and Challenges in Energy Sector

1.1 Energy Policies

a. Overall Policy

Important policy issues for Singapore include enhancement of the competitiveness of its energy market, diversification of primary energy sources, decentralization of supply sources, and improvement in energy efficiency.

In November, 2007, the Ministry of Trade and Industry, the Energy Market Authority, the Economic Development Board, the Ministry of the Environment and Water Resources, among others, announced a national energy policy report entitled "Energy for Growth". The main points of the strategy are shown below. The strategy aims at strengthening its position as Asia's largest oil hub, enhancing the energy trading range to LNG, biofuels, and CO_2 emission rights, and strengthening clean and renewable energy including solar energy, bioenergy, and fuel cells.

1. Promote competitive markets
2. Diversify energy supplies
3. Improve energy efficiency
4. Invest in energy R&D
5. Step up international cooperation
6. Develop whole-of-government approach

b. Coal

No specific coal policy is found.

c. Oil

The Government has carried out its policy to raise industries through free markets and free trades as a world-class oil hub/refining center while minimizing the Government's interference. The domestic retail prices of gasoline and diesel were completely liberalized in December, 1989.

Since Singapore lacks domestic energy resources, the Government has launched on upstream business in foreign countries through the Singapore Petroleum Company (SPC), such as Indonesia (e.g., 40% interest in Sampang and 100% interest in Mahakam Hilir), Vietnam (45% interest in Block 101-100/4 and 20% interest in Blocks 102 and 106), China (8.91% interest in Bohai Bay Block 04/36, 7.82% interest in Bohai Bay Block 05/36, and 100% interest in South China Sea Block 26/18), and Australia (35% interest in Block T/47P).

As measures to curb oil demand, the Government has increased the purchasing cost of cars in order to reduce the number of cars, and introduced an Electric Road Pricing (ERP) in

order to suppress utilization of cars.

d. Natural Gas

Singapore has little in any domestic energy resources, and depends on imports for almost the entire primary energy supply. Since Singapore is heavily dependent on oil, the Government has been introducing natural gas mainly in the power sector from the viewpoint of ensuring stable supply through diversification of supply sources.

In this connection, Singapore has imported natural gas from Malaysia through the Peninsular Gas Utilization (PGU) pipeline since 1992, and natural gas from West Natuna in Indonesia through a subsea pipeline since January, 2001. In addition, in May of this year, Singapore's first LNG terminal has just begun operation. The terminal is located in Meranti Seafront in southwest of Jurong island which is designed for a throughput capacity of 3.5 million tons/year and equipped with two LNG tanks of 188,000 m^3 each as well as a jetty capable of berthing large LNG tankers (120,000 to 265,000 m^3).

In addition, Singapore Petroleum Company (SPC) has also launched on upstream business overseas such as in Indonesia (KAKAPPSC, Oyong gas field).

With regard to the market structure, starting from September 15, 2008, the Singapore gas market was liberalized to introduce the principle of market mechanism into gas importing and marketing business. As a result, the fully competitive importing and marketing business was separated from the monopoly gas transport business, and natural gas importers were assured with a free access to the onshore gas pipeline network based on the Gas Network Code (GNC).

e. Electric Power

The electricity market was progressively liberalized during a period from 1990 to 2001 in the similar manner as the gas market. The Singapore Electricity Pool was adapted to introduce the market mechanism into power generation sector namely Tuas Power, Senoko Power, PowerSeraya (power companies founded in 1995), ENV (waste incinerator/power generator), and IPPs. Whole generated electricity was transmitted and distributed through monopolistic company PowerGrid. Before liberalization, retail market was monopolized by national company PowerSupply, but in 1998, large consumers of 5 MW or more became available to choose their supplier. After that, liberalized market was expanded in a phased manner (currently, monthly average consumption of 20MWh or more is eligible), and all the three national power generation companies were privatized in 2008.

f. Nuclear Energy

Singapore had some reservation about introduction of a nuclear power plant from the viewpoint of safety. However, the Economic Strategies Committee (an advisory committee composed of high-ranking government officials and private professionals) discussed an

economic growth strategy up to 2020 and submitted a report recommending a study on construction of a nuclear power plant to Prime Minister Lee Hsien Loong. Prime Minister Lee said that Singapore "cannot afford to dismiss the nuclear energy option" during the international energy conference in November, 2010, and stated that "a nuclear plant could be built in Singapore" if "advanced technologies on new, smaller and safer nuclear reactors with more fuel-efficient designs that reduce the amount of waste produced" could be developed.

According to reports after the Fukushima Daiichi nuclear disaster, Prime Minister Lee said that it would take considerable time to make any decision on nuclear energy, and the Government considers it as a subject of a long-term plan, but admitted that preliminary feasibility studies were conducted on the ocean floor (located between Cenang island and Semakau island at a distance of 20 km from the Singapore's main island and a distance of 10 km from Jurong island) as a candidate site.

1.2 Energy Supply and Demand

Energy consumption of Singapore has recorded relatively high increase during the first decade of the 21st century reflecting its steady economic development. Being a geographically small country, Singapore fully depends its energy supply on import, except for a small amount of renewables being developed in recent years. Oil is the predominant energy source. Singapore is the oil processing hub of East Asia and exports significant amount of processed oil products to neighboring countries. It also has a huge petrochemical industry. These make its industry relatively energy intensive. Piped natural gas is imported from Malaysia and Indonesia and used for power generation. To increase use of this cleaner fuel, Singapore launched its first LNG import terminal in May 2013.

Figure 1 : Total Primary Energy Supply

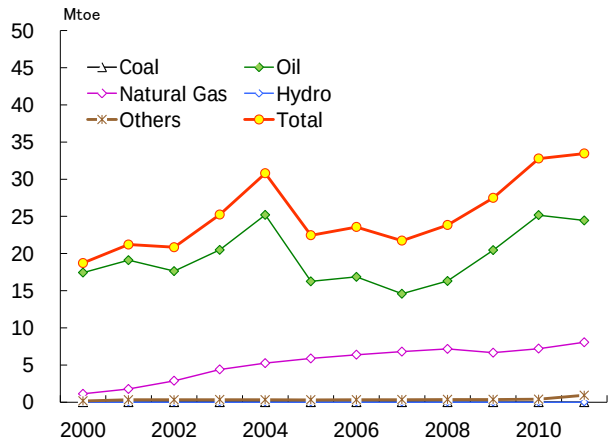
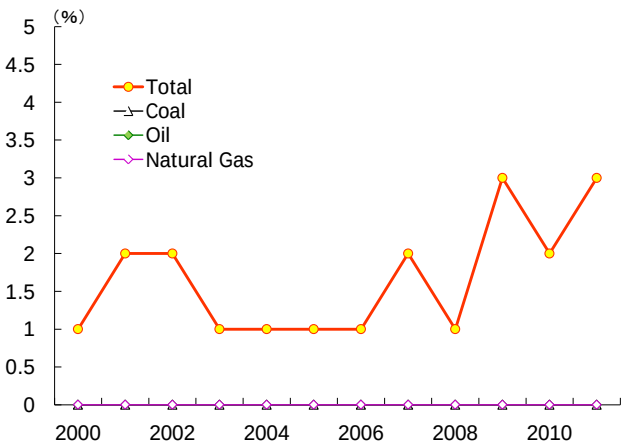


Figure 2 : Self Sufficiency of Fossil Fuel



Source: IEA, Energy Balances 2012 Edition.

1.3 Energy Resources (changes in proved reserves since 2000)

Being a geographically tiny island country, Singapore has few domestic energy resources. Primary energy is not produced in Singapore except for some biomass or waste, and Singapore depends solely on imports for primary energy supply.

2. Current Status and Challenges in Power Sector

2.1 Power Utility Systems

The liberalization of electricity market has been established in Singapore, and competitive fields such as power generation and retail, and non-competitive fields such as power transmission and distribution are separated as to ownership.

Figure 3 : Singapore's Power Utility Systems

Source : Energy Market Authority (EMA)

The wholesale electricity market in Singapore has been managed by the Energy Market Company (EMC) (i.e., an affiliated company of the Energy Market Authority (EMA), which is an agency that regulates electricity and gas industries), through the National Electricity Market of Singapore (NEMS) since January, 2003. Power producers sell electricity to the electricity wholesale market by the unit of 30 minutes, and electricity trading through the market is settled through the EMC. Note that fourteen enterprises including Senoko Energy, YTL PowerSeraya, and Tuas Power Generation have obtained authorization as power producers that participate in the NEMS as of July, 2013.

In the power transmission and distribution sector, SP PowerAssets has obtained authorization as a power transmission and distribution operator (Transmission Licensee), and SP PowerGrid, which is affiliated with SP PowerAssets and performs power

transmission and distribution business, has obtained authorization as a representative operator (Transmission Agent Licensee).

Retailers procure electricity from the electricity market, and compete for eligible customers. Eight retailers have been authorized as of July, 2013. Eligible customers for the retail sector have been extended to customers whose average monthly consumption is 10,000 kWh since December, 2003. It is estimated that the number of eligible customers is about 10,000, representing about 75% of the total power consumption in Singapore. The remaining non-eligible customers (about 25%) purchase electricity from SP Services by paying the regulated prices. Note that SP Services plays a role as a Market Support Services Licensee (MSSL) in addition to supplying electricity to non-eligible customers, and provides a supplier switch, meter reading, etc.

In the area of complete liberalization of the retail sector, the EMA has examined the required infrastructure cost and cost benefit after liberalization for example by the implementation of a trial project on preparation of environment for liberalization called Electricity Vending System (EVS)[29] from 2006 to 2010, etc. At present, a specific conclusion has not been made as to whether or not to implement complete liberalization of the retail sector as well as its timing.[30]

2.2 Power Supply and Demand

The total generation capacity operating in Singapore stood at 9,951 MW at the end of 2011. The maximum electricity demand in 2011 was 6,570 MW. Since Singapore is situated right under the equator, and the temperature is almost constant throughout the year, the peak electricity demand is almost identical regardless of the season, and an off-peak period is absent. Accordingly, a high ratio of reserve power is set taking account of a decrease in generation capacity due to scheduled maintenance and so forth.

The amount of electricity produced in 2011 was 45,999 GWh, and the amount of electricity sold in 2011 was 41,787 GWh. The annual electricity sales growth rate from 2007 to 2011 was 2.8%. By usage in 2011, electricity was sold for domestic (household) (17.1%), manufacturing (39.2%), and others (43.6%). In comparison with 2001, the amount of electricity sold for domestic and manufacturing purposes decreased, while that for other purposes increased.[31]

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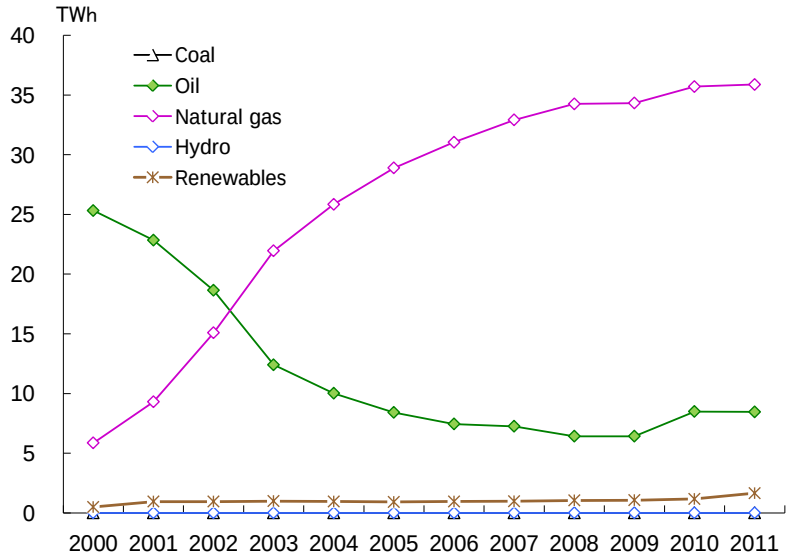
[29] EVS is an innovative concept of integrating the state-of-the-art smart metering technologies and the existing electronic payment (e-payment) infrastructure and will enable electricity consumers to purchase any amount of electricity at competitive prices, from any electricity retailer of their choice.

[30] Japan Electric Power Information Center

[31] Department of Statistics Singapore, "Yearbook of Statistics Singapore, 2012"

Figure 4: Singapore's Power Mix by Energy Source



TWh

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil	25.3	22.8	18.6	12.4	10.0	8.4	7.4	7.3	6.4	6.4	8.5	8.5
Natural gas	5.9	9.3	15.1	21.9	25.8	28.9	31.0	32.9	34.2	34.3	35.7	35.9
Hydro	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewables	0.5	0.9	0.9	1.0	1.0	0.9	1.0	1.0	1.0	1.1	1.2	1.7
Total	31.7	33.1	34.7	35.3	36.8	38.2	39.4	41.1	41.7	41.8	45.4	46.0

Source：IEA, Energy Balances of Non-OECD Countries 2012

2.3 Power Facilities

All of the generation facilities in Singapore are thermal power plants, with the total generation capacity of 9,951 MW at the end of 2011. The power plants included combined cycle gas turbine (CCGT) power plants (62.0%), steam plants (31.6%), open cycle gas turbine power plants (2.9%), and incineration and other power plants (3.5%).[32] In recent years, the ratio of CCGT power plants has increased since the power companies have pursued the fuel economy along with the Government's energy efficiency policy and electricity market liberalization. In terms of fuel mix for the power plants at the end of 2011, natural gas (78.0%), oil (18.4%), and other fuels (e.g., waste) (18%) were used. The share of natural gas has significantly increased during the decade up to 2011, whereas the share of natural gas in 2000 was 18.5%.

In Singapore, the average annual interruption duration and the average annual interruption frequency per customer have tended to decrease. The average annual interruption duration and the average annual interruption frequency in 2011 were as small as 0.23 minutes and 0.01, respectively. Singapore thus maintains a top-level service reliability in the world.

[32] EMA, "Annual Report 2011-2012"

2.4 Power Development Plans

According to "Statement of Opportunities for the Singapore Energy Industry 2011" published by the EMA, Singapore's total generation capacity in 2020 is estimated to be about 14,000 MW. In recent years, a continuing shift in power generation fuel from diesel to natural gas has been observed, and the power development will progress with a focus on combined cycle gas power generation using natural gas transported from Malaysia or Indonesia through pipelines, as well as LNG of which import has just started in 2013.

The EMA has recognized the necessity of avoiding excessive dependence on natural gas from the viewpoint of energy security, and has advanced efforts to promote electricity imports in addition to expansion of domestic power plants taking account of the limitations in terms of land (i.e., small land area and a high population density). In this regard, drafting of a "Regulatory Framework for Electricity Imports" has been under way since February, 2011. It is considered that promotion of electricity imports in Singapore will diversify the energy mix, and provide economic benefit to the electricity market through further competitive electricity sales from the viewpoint of both the power generation fuel mix and expanded supply options. In addition, it is also expected that trade, cooperation, etc. between the neighboring countries will be relatively improved along with the electricity imports. The consultation paper regarding electricity imports disclosed in December, 2011 is summarized as follows.[33]

- Imports of up to 600 MW per source country are envisioned;
- The EMA will conduct and award the tender if possible in 2013.
- The importer will start selling electricity to Singapore from 2017 or 2018.
- The EMA will require each tenderer to bid with contract-for-differences ("CfD") prices. A possible design for the CfD is such that it will effectively pay the importer at the CfD Strike Price or the prevailing Pool Price, whichever is lower.
- The EMA will grant to each selected tenderer an electricity import license to authorize it to import 600 MW of electricity for a period up to 20 years.

The consultation paper was posted until March 30, 2012 for comments and feedback from interested firms. At present, preparation for the electricity import tender is under way.

[33] Ministry of Economy, Trade and Industry, "Study on Optimization of ASEAN grid Initiated by Electricity Export from Batam Island, the Republic of Indonesia: final report", February, 2012

2.5 Power Tariff / Subsidies

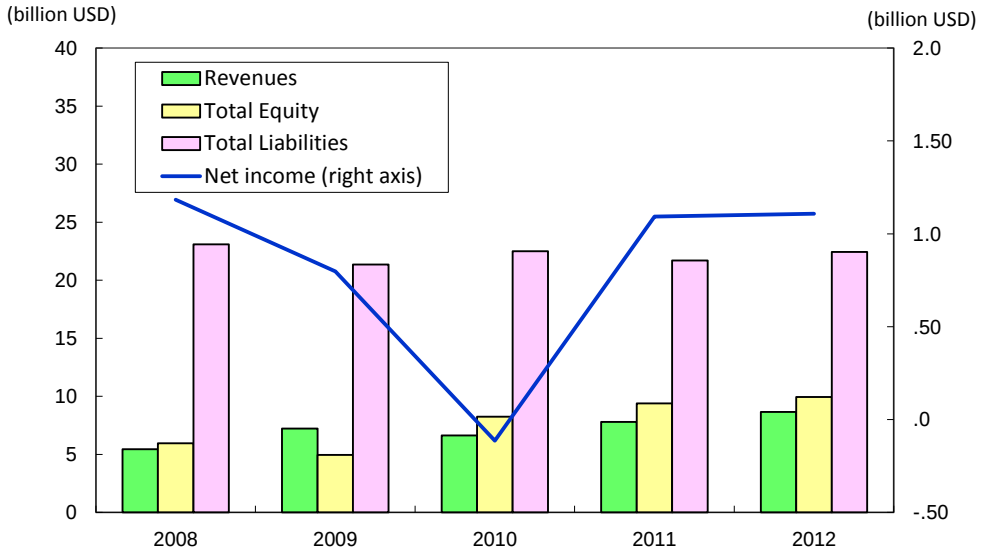
The electricity price for eligible customers have been determined based on the market mechanism, and is not regulated by the Government. On the other hand, customers subjected to regulated prices receive electricity from SP Service that is a subsidiary of Singapore Power, and the Energy Market Authority of Singapore (EMA) has the right to permit and approve the retail price. It is allowed to revise the tariff by reflecting changes in fuel cost, capital cost, and general expenses into the regulatory price once in a quarter. It is also possible to adjust excess and deficiency in the collected fees.

No information is available as to whether any subsidy is provided to power service providers and/or consumers in Singapore.

2.6 Financial Data on Individual Power Enterprises/Cooperatives:

The financial situation of Singapore Power is shown below.

Figure 5 : Financial Condition of Singapore Power



Source: Singapore Power Annual Report

Although Singapore Power has successfully increased its sales, its net income recorded a loss in 2010. The total liabilities were about four times the equity, and are larger compared with those of electricity providers in other countries. Since Singapore Power also owns and operates power transmission and distribution facilities, it is understood that Singapore Power is needed to keep such bigger amount of liabilities as compared with those of electricity providers in other countries that engage only in electricity retail business or electricity distribution/retail business. The equity increased from 5.9 billion USD in 2008 to 9.9 billion USD in 2012, and the financial situation has been steadily improved.

3. Other Noteworthy Issues:

3.1 Environmental Regulations

a. Air Quality / Emission standards

The air quality standards of Singapore are laid down in the Environmental Protection and Management (Air Impurities) Regulations (effective from 1 Jan 2001, as revised in 2002 and 2008), which replaces the Clean Air (Standards) Regulations that had been in force since 1978. The emissions of sulphur dioxide into the air from fuel combustion are controlled by limiting the sulphur content in fuels used by industries to not more than 1% by weight, relatively looser than the regulation in developed countries. Industries sited near urban areas are required to use fuel with lower sulphur content.

Table 1 : Standards for air pollutants emissions from stationary sources (Singapore)

Pollutant	Plant type	Emission limit, mg/m^3
Particulate matter	Any trade, industry, process, fuel burning equipment or industrial plant (except for any cold blast foundry cupolas)	100*
SO_2	Any trade, industry or process (non-combustion sources)	500
NOx (as NO_2)	Any trade, industry, process or fuel burning equipment	700

Source: IEA Clean Coal Center Database

b. GHG

With its narrow land, Singapore has limited access to alternative, low-emission energy sources such as wind, hydro, biomass, geothermal or nuclear power, marking it as an alternative-energy disadvantaged city-state. However, as a responsible global citizen Singapore must still play a part in addressing climate change by reducing emissions. Hence, in 2009, Singapore pledged in the context of the United Nations Framework Convention on Climate Change (UNFCCC) negotiations to reduce emissions by 16% from 2020 business-as-usual (BAU) levels in the event of a legally binding global agreement under which all countries will implement their commitments.[34]

[34] APEC Energy Overview 2012

3.2 Renewable Energy

a. Renewable Energy Policy

Singapore's modern, electricity-generating incineration plants make use of renewable waste-to-energy, annually consuming 2.7 million tonnes of waste disposed (biomass and wastes), which could generate about 200 MW of green energy in four incineration plants.

The government's main focus on renewable energy is solar power. Singapore has established R&D and test bedding initiatives to help companies and researchers advance the development of solar technologies. Singapore's test bedding efforts seek to improve understanding of the best practices for optimizing the performance of solar PV systems in tropical, urbanized environments.[35]

b. FIT, Fiscal incentives

Singapore is yet to introduce a Feed-in-Tariff (FIT) system for electric power generated by the renewable energy. Likewise, fiscal incentives for renewable energy projects are absent.

3.3 Energy Efficiency and Conservation

According to the IEA's "Energy Balances of Non-OECD Countries – 2012 Edition", Singapore's energy intensity defined as total primary energy supply per thousand 2005 US dollars of GDP (TPES/GDP) in the late 2000s once improved from 0.19 registered in 2000, but went back to the same level in 2010.

The Energy Efficiency Programme Office (E2PO), a multi-agency committee, promotes and facilitates the adoption of energy efficiency in Singapore towards the following four strategic goals:

- Stimulate demand for energy efficiency;
- Develop human and institutional capabilities;
- Promote emerging energy-efficient technologies and innovation;
- Profile and promote energy efficiency internationally;

The energy efficiency efforts are targeted at various sectors, such as power generation, industry, transport, buildings and households.[36]

The Sustainable Development Blueprint published in 2009 set numerical targets of reducing the amount of energy consumption per GDP by 20% in 2020 and by 35% in 2030, compared to the 2005 level respectively.

With effect from June 2012, an Energy Conservation Act was enforced with the following

[35] APEC Energy Overview 2012

[36] APEC Energy Overview 2012

objectives:

- To help Singapore achieve the target of a 35% improvement in energy intensity by 2030, from 2005 levels;
- To improve the energy performance of companies and thereby making them more competitive in the global economy;
- To complement existing schemes and capability building programs which provide support for companies investing in energy efficiency;
- To ensure a coordinated approach to standards setting for energy efficiency across all sectors.

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Vietnam

Key Indicators (2011)

1) GDP (at Current Prices)	Billion US Dollars	123.7
2) Population (as of 1 July)	Million person	87.8
3) Per capita GDP	US Dollars/person	1408
4) Total Primary Energy Supply(TPES)	Million tonnes oil equivalent (MTOE)	61.2
5) Energy Self-supply Ratio	-	108.8%
6) Electricity Consumption	Tera- WH (TWH)	90.9
7) Power Generation Capacity	Million kW	17.5(2010)
8) CO_2 Emissions (energy origin)	Million tons CO_2 equivalent (Mt-CO_2)	130.5(2010)
9) Per capita Primary Energy Supply	TOE/person	0.697
10) Energy Intensity per GDP	TOE/Thousand USD	0.495
11) Per capita Electricity Consumption	kWh/person	1035
12) Electrification rate[2012]	-	98%37
13) Electricity Intensity per GDP	kWh/Thousand USD	735
14) Per capita CO_2 Emissions (energy origin)	Ton-CO_2/person	1.501(2010)
15) Primary Energy Supply Composition	Coal	25.4%
	Oil	33.5%
	Natural Gas	12.2%
	Nuclear	0.0%
	Hydro	4.2%
	Geothermal	0.0%
	Other Renewables	24.0%
16) Energy Self-sufficiency	Total	108.8%
	Coal	160.4%
	Oil	82.7%
	Natural Gas	100.0%

Source 1) – 3): ADB Key Indicators 2012, 4)-6), 14), 15): IEA Energy Balances of Non-OECD Countries 2012, 7) APEC Energy Statistics 2010, 8) IEA CO_2 Emissions from Fuel Combustion 2012

37 Ministry of Industry and Trade, Vietnam, "Country Brief of Vietnam", September 2013, presentation at the Dialogue on Energy Sector Reform, Manila, Philippine.

1. Current Status and Challenges in Energy Sector

1.1 Energy Policies

a Overall Policy

The National Energy Development Strategy of Vietnam for the period up to 2020 with outlook to 2050 (hereinafter referred to as "National Energy Development Strategy") that was approved in December 2007 includes the following policies:

1. Energy development shall be integrated with the socio-economic development strategy of the country. Ensuring energy development with high growth rate, sustainability, harmony with diversification of energy resources and energy conservation technologies are the central tasks in pursuing national industrialization and modernization.
2. National energy development shall be in line with the contemporary current of international energy integration, efficient use of domestic natural resources in combination with reasonable exploitation and use of foreign natural resources, establishing national energy security in open conditions, implementing efficient interconnection with the energy systems of the region and the world, maintaining national security and development of an independent, autonomous economy.
3. Development shall be undertaken step-by-step to develop the energy market, and diversify ownerships and business forms, directed at satisfying the energy demand of consumers. Subsidies, monopoly, and other inefficient institution shall be abrogated.
4. Energy system shall be developed in a rational and harmonious manner among electricity, oil, gas, coal, and renewable energy, with particular attention to clean energy development, and priority to renewable energy promotion. There also shall be rational arrangement of energy systems among territories and regions; balancing exploration, exploitation, processing, and development in harmony with processing and services systems.
5. The success of intellectual economy will be applied in order to increase the efficiency and benefits of energy business. Investment in energy conservation will be encouraged, reducing energy loss rates.
6. Energy development shall be integrated with ecological environmental protection, ensuring sustainable energy development.

The National Energy Development Strategy set forth the following specific numerical targets.

- Ensure an energy supply of 100 to 110 Mtoe in 2020, and 110 to 120 Mtoe in 2025.
- Ensure an electricity supply reliability of 99.7% in 2010, and provide a power transmission system that meets the N-1 criterion (i.e., a design criterion whereby loss of one transmission line does not cause any supply failure).
- Increase the crude oil refining capacity to 25 to 30 million tons/year by 2020.

- Ensure a strategic petroleum reserve of 60 days by 2020, and 90 days by 2025.
- Achieve a share of renewable energy in total primary energy consumption of 5% by 2025, and 11% by 2050.

b. Coal

Vietnam National Coal-Mineral Industries Group (VINACOMIN) and Vietnam Electricity (EVN) are planning to construct coal-fired power plants, which require a greater amount of coal significantly exceeding the increase in coal production. Thus, coal demand will overtake coal production in the future, and Vietnam may become a net coal importer. Therefore, the Government plans to increase the coal export tax to reduce the export of coal to China that accounts for 77% of the total coal export (in 2010), so as to secure a sufficient amount of coal for the domestic market. At the same time, it plans to increase import of coal from Indonesia and Australia in order to accommodate the increasing demand in the southern provinces.

c. Oil

The major mission of the oil and gas policies is to ensure sufficient supply to accommodate the rapidly increasing domestic demand. The Government adopts the following policies in order to pursue this mission:

1. The Government shall soften conditions and regulations for upstream exploration and production in order to promote investment and production increase. Petrovietnam shall proactively open negotiations with overseas investors on new contracts.
2. Petrovietnam shall proceed with purchase of overseas oil and gas assets in order to its revenue and increase equity production.
3. The Government shall build up strategic oil reserves in order to improve the ability to deal with oil supply disruption.
4. The Government shall promote production and consumption of biofuels.

Petrovietnam's five-year plan approved by the Government in August, 2011 aims to increase the crude oil refining capacity to 16 to 17 million tons/year by 2015, completing the second refinery at Nghi Song.

d. Natural Gas

The Gas Master Plan approved in May, 2011 illustrates the development strategy up to 2025, which aims to achieve the following goals:

1. Gas production: 14 bcm/year in 2015, and 15 to 19 bcm/year in the period from 2016 to 2025
2. Gas consumption: 17 to 21 bcm/year in 2015, and 22 to 29 bcm/year in the period from 2016 to 2025

3. LNG terminal capacity: 3 to 5 bcm/year in 2015, and 7 to 10 bcm/year in the period from 2016 to 2025
4. Gas pipeline: 1,163 km or more offshore pipelines, 849 km or more onshore pipelines, and 835 km or more gathering pipelines. The required investment amount is USD 5.3 to 5.4 billion in the period from 2010 to 2015, and USD 3.6 to 7.0 billion in the period from 2016 to 2025.

e. Electric Power

The Power Development Plan 7 (PDP7) drawn up in July, 2011 aims at ensuring national energy security by way of:

1. efficiently utilizing domestic energy resources;
2. importing a part of primary energy sources required to generate sufficient electricity; and
3. supplying sufficient higher quality electricity at a reasonable price for achieving economic and social development.

The National Energy Development Strategy projects that a power generation capacity 6.9 times that of 2010 will be required in 2030. In view of securing stable supply, it also aims to diversify energy sources promoting introduction of nuclear energy, enhancing utilization of renewable energy, and reducing dependence on hydropower generation that would be affected by drought.

f. Nuclear Energy

The Atomic Energy Law that was approved in June, 2008 regulates utilization of nuclear energy and transportation and import/export of radioactive substances, and encourages domestic and overseas organizations and individuals to invest in nuclear power technologies in areas of medical treatment, agriculture, environmental protection, and power generation.

The Master Plan announced in July, 2011 plans to build eight nuclear plants with 1,000 MW generating capacity consecutively in the first and second sites in Ninh Thuan Province from 2020 to 2027, and add two more nuclear plants of 1,350 MW in the central province by 2029.

1.2 Energy Supply and Demand

Energy consumption of Vietnam has more than doubled during the 1st decade of the 21st century reflecting its robust economic growth. Among others, electricity demand increased almost four times. This strong trend in energy demand is continuing, or even accelerating in 2012. To accommodate the increasing demand, fossil fuel consumption has been increasing rapidly. Vietnam launched its first oil refinery at Dun Quat, located at the central province facing to the east coast, in 2009, and is constructing second one in Nghi Song, south of Hanoi. Vietnam has been exporting crude oil while importing petroleum products.

Given the present trend, the country may become a net oil importer unless significant discoveries. Vietnam is presently using natural gas from the offshore fields mainly for power generation. In view of its cleaner nature, Vietnam is considering LNG import, while construction of gas supply infrastructure is a prerequisite of wider gasification. Vietnam is presently exporting high quality anthracite; however, its surplus for export is being nibbled away by increasing domestic consumption. Coal import may increase in the resource thirsty southern provinces. All in all, securing energy supply to accommodate the increasing demand is the urgent policy objective.

Figure 1 : Total Primary Energy Supply

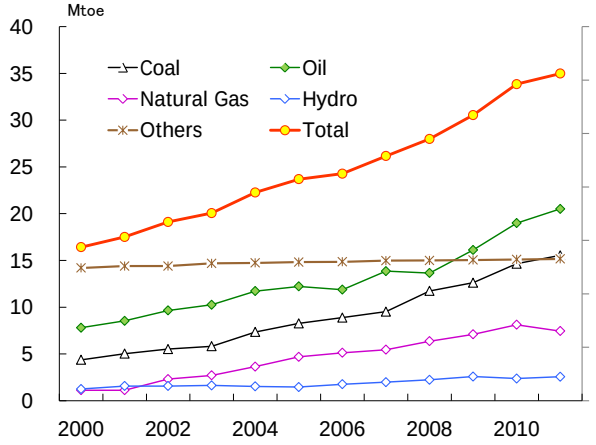
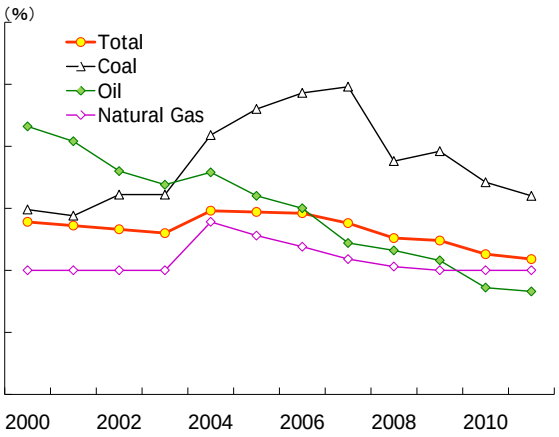


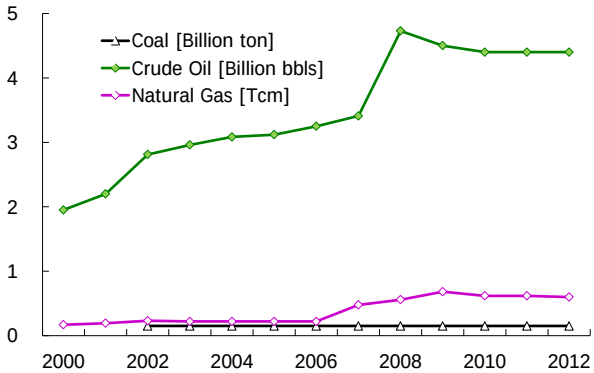
Figure 2 : Self Sufficiency of Fossil Fuel



Source: IEA, Energy Balances 2012, edition.

1.3 Energy Resources

Figure 3 : Proven Reserves Since 2000



Source :BP Statistical Review of World Energy,

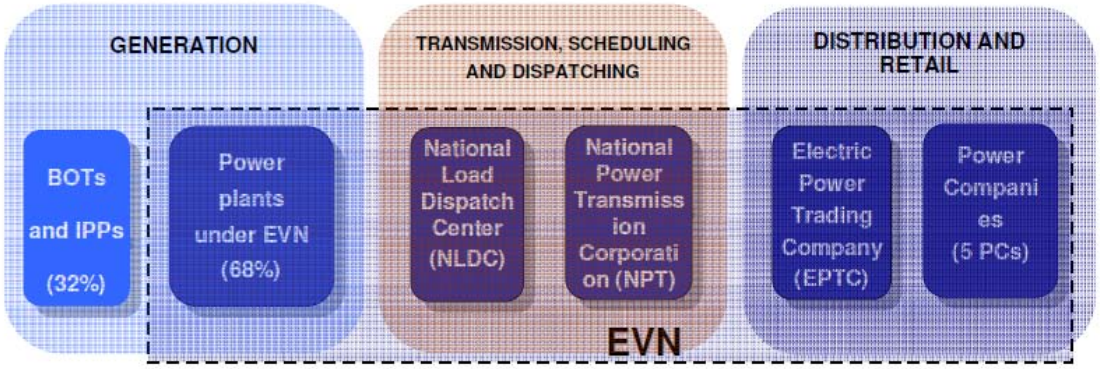
Vietnam is endowed with coal, oil and natural gas resources, though they are not very significant. Extensive exploration activities on oil and natural gas are being carried out in offshore blocks, which are expected to bring new reserves. As some of natural gas reservoirs in northern territories contain high CO_2, sophisticated technologies will be needed to develop them commercially. Developing the coal seams underneath the shallow river bed of the Hon river delta will add coal production significantly, once appropriate technologies for safe production is developed.

2. Current Status and Challenges in Power Sector

2.1 Power Utility Systems

EVN is currently responsible for electricity supply in Vietnam as a vertically integrated power utility. EVN was established in 1995 as a government-run electric power group in accordance with the government's electric power policy to integrate the northern, central, and southern power sectors, and to own and manage the major power plants, load dispatch centers, transmission companies, power distribution companies, and other related functions. Subsidiaries include EVN-run companies which are entirely owned by EVN and for which the budget is determined by EVN, financially-independent companies which are entirely owned by EVN, but are operated on a stand-alone basis, and joint stock companies (JSC) that are partially owned by EVN. [38]

Figure 4 : Power Utility Systems in Vietnam



Source : ERAV (Electricity Regulatory Authority of Vietnam

In 2011, the EVN group accounted for 68% (EVN-run companies and financially-independent companies: 51%, JSC: 17%) of the total power plant capacity, and IPP and BOT[39] accounted for the remaining 32%. In recent years, however, the number of private-capital power plants has increased.

The National Power Transmission Corporation (NPT) (financially-independent company) is involved in maintenance, operation, and management of 220 to 500 kV transmission facilities across the country, and is also involved in construction investment (e.g., power transmission facility expansion program and enhancement program).

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[38] "Electric Power Situation in Vietnam", Japan Electric Power Information Center, May 2012

[39] "BOT" is an abbreviation for build-operate-transfer (i.e., a system in which a private company (100% foreign capital in Vietnam) constructs a power plant, operates the power plant for a certain period, and transfers the power plant to a local entity).

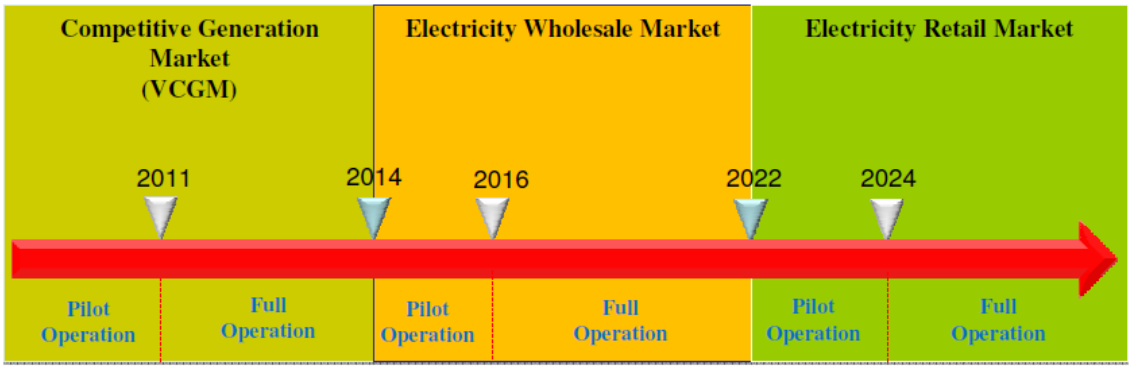
The National Load Dispatch Center (NLDC) (EVN-run company) is involved in operation of power supply systems in cooperation with the regional load dispatch centers located in the northern part, the central part, and the southern part of Vietnam.

The Electric Power Trading Company (EPTC) (EVN-run company) is involved in negotiations about EVN's electricity trading (e.g., power purchase agreement (PPA)).

For electricity distribution, the Northern Power Corporation, the Southern Power Corporation, the Central Power Corporation, the Ho Chi Minh City Power Corporation, and the Hanoi City Power Corporation (all financially-independent companies) are established on a regional basis to supply electricity to consumers in each region and commune suppliers. These corporations take charge of operation and maintenance of power distribution lines (110 kV or less), business tasks (e.g., fee collection), rural electrification, etc. Commune suppliers are the small-sized power distributers that mainly target end consumers in remote areas.

In Vietnam, the Electricity Law was enforced in July, 2005, and the Government announced policies to develop a competitive power generation market, wholesale market, and retail market in the power sector in a stepwise manner. In January, 2006, a power market reform roadmap was decided by the prime minister in order to implement the above policies. The plans and an outline of the roadmap are summarized below.

Figure 5 : Power Market Reform Roadmap (Timeline)



Source : ERAV (Electricity Regulatory Authority of Vietnam

Table 1 : Power Market Reform Roadmap (Outline)

Stages	Objectives	Notes
2005-2008	Introduce competitive power generation market	EVN power stations are made into independent power generation companies; and transmission and distribution business also to financially-independent companies.
2009-2014		IPPs (30MW or above) are allowed to sell to the wholesale entity (EVN) at PPA prices or at spot prices (tender) at the market.
2015-2016	Introduce wholesale power market	A plurality of wholesale entities created which are allowed to sell power to distribution business (EVN affiliates) at a free price within a regulated range.
2017-2022		EVN-affiliated distribution business to be made into independent distribution entities (state-run or joint ventures); the independent entity is allowed then to close a direct purchase contract with a generating entity. Wholesalers need to supply electricity to distribution entities or bulk users at more competitive prices.
2022-2024	Introduce competitive retail market	End-users are able to choose distribution service provider (trial introduction); Distribution entities are allowed to sell electricity to users at a free price within a regulated range. Retail marketers are required to procure power from wholesalers at a more competitive price and sell it to end-users at more advantageous prices.
2024-		Users across the nation are entitled to choose distribution service providers; institutions or individuals with proper license are entitled to procure electricity from power generation entities or the market.

Note: Despite the above, power market reform did not progress smoothly, and it was only in July 2011 that the initial stage of introducing competitive generation market was put on a trial operation.

Source: JETRO, 2011, 2011 Vietnam Electric Power Situation Survey

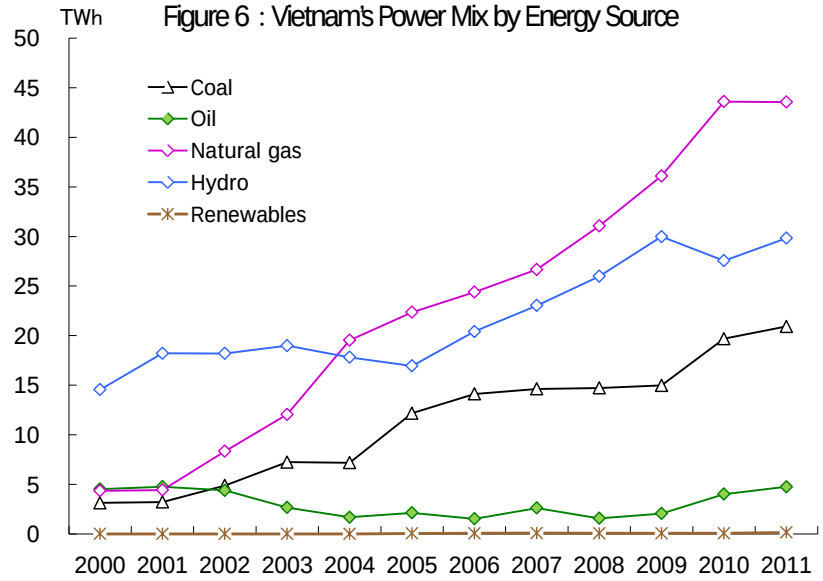
2.2 Power Supply and Demand

Electricity demand in Vietnam has strongly increased from 22,904 GWh in 2000 to 94,277 GWh in 2011 by a factor of 4.1 on a power production basis. The average annual growth rate during this period reached 13.7%.

The above rapid increase in demand was mainly covered by coal-fired power generation and natural gas-fired power generation (including combined cycle power generation). Both coal-fired and natural gas-fired power generation steadily increased during the 10-year period from 2000. The share of coal-fired power generation in the total power generation mix increased from 12% to 31%, and the share of natural gas-fired power generation substantially increased from 16% to 46%.

In contrast, hydropower generation that accounted for 55% of the total power generation in 2000 gradually decreased its share following construction of the Phu My gas-fired power plant, and other thermal plants, down to 29% in 2010. Vietnam is basically rich in water resources, and electricity can be provided at low cost by utilizing hydropower when there is abundant water by heavy rainfalls during the rainy season. However, since it is necessary to avoid a power shortage during the dry season while hydropower development potential is limited, hydropower dependence has been reducing in recent years moving to main use of coal- and gas-fired power generation.

Figure 6 : Vietnam's Power Mix by Energy Source



TWh

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal	3.1	3.2	4.9	7.2	7.2	12.2	14.1	14.6	14.7	15.0	19.7	20.9
Oil	4.5	4.8	4.4	2.7	1.7	2.1	1.5	2.6	1.6	2.1	4.0	4.7
Natural gas	4.4	4.4	8.3	12.0	19.5	22.4	24.4	26.7	31.1	36.1	43.6	43.5
Hydro	14.6	18.2	18.2	19.0	17.8	16.9	20.4	23.0	26.0	30.0	27.6	29.8
Renewables	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total	26.6	30.6	35.8	40.9	46.2	53.7	60.5	67.0	73.4	83.2	94.9	99.2

Source : IEA, Energy Balances of Non-OECD Countries 2012

2.3 Power Facilities

The total installed generation capacity at the end of 2010 was 18,494 MW. EVN and its subsidiaries own 74% (13,676 MW) of the total capacity, while the IPPs such as Petrovietnam and Vinacomin own the rest of 26% (4,818 MW). The generation capacity of the EVN group, at 5,783 MW in 2000, has increased 2.4 times by 2010 at an annual growth rate of 9.0%. The generation capacity of the IPPs has recorded a more significant increase from 547 MW in 2000 reaching 8.8 times during the same period growing at an annual rate of 24.3%.

As of 2010, of the total national generation capacity, power plants owned by the EVN group comprised hydropower (41%), gas turbines (17%), coal (12%), oil (3%), and diesel (1%), whereas 26% was unspecified types owned by IPPs. Notably, the EVN group mainly runs hydropower plants.

As solar power and wind power are being developed as renewable energy power sources, these plants are small-sized, and only used for rural electrification or electrification in isolated mountainous areas, etc. [40]

2.4 Power Development Plans

The latest power development plan in Vietnam is "Vietnam's Power Development Master Plan VII (PDP7)" released in July, 2011. The PDP7 sets out the following four development visions. [41]

1) Achieve well-balanced power production over the northern, central, and southern parts of the country. Reduce power transmission losses by supplying stable electricity on a regional basis, and efficiently operate hydropower plants sharing the role of reserve power with other sources and considering seasonal availability changes.
2) Reduce power transmission losses in the nationwide power grid by rational allotment of local power companies across the country, ensuring stable and thorough power supply in local provinces and economic efficiency of power-related projects, so as to eventually contributing to the development of the national and regional economy.
3) Improve the technology level at the existing power plants in operation, and, in developing new power sources, adapt modern technologies that satisfy environmental criteria.
4) Diversify power development investment in line with the policies to improve competitiveness and economic efficiency.

According to the PDP7, the Government plans to increase the generation capacity in Vietnam to about 75,000 MW by 2020. The PDP7 estimates that power plants will consist of; hydropower plants (23.1%), pumped-storage hydropower (2.4%), coal-fired power plants (48.0%), gas-fired power plants (16.5%, of which LNG-fired power plants: 2.6%), renewable energy (5.6%), nuclear power plants (1.3%), and imports (3.1%). The PDP7 projects that the total output in 2030 will be about 146.8 GW, and power plants will consist of; hydropower (11.8%), pumped-storage hydropower (3.9%), coal-fired power plants (51.6%), gas-fired power plants (11.8%, of which LNG-fired: 4.1%), renewable energy (9.4%), nuclear power plants (6.6%), and imports (4.9%).

As evident in the above discussion, the Government intends to preferentially and promptly develop renewable energy power plants (e.g., wind power, solar power, and biomass power), to increase renewable energy power generation stepwise.

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[40] Japan Electric Power Information Center, "2011 Vietnam Electric Power Situation Report", March 2012

[41] JETRO, "National Power Development Plan for the 2011-2020 period with the Vision to 2030", July 21, 2011

The Government also plans to develop nuclear power plants in order to ensure stable power supply in the future taking account of depletion of domestic energy resources. The Government plans to operate the first nuclear power plant in Vietnam in 2020, and increase the nuclear capacity to 10,700 MW and the output to 10.5 billion kWh (i.e., 10.1% of the total power production) by 2030.

The Government plans to preferentially develop hydropower plants that simultaneously aim to support flood prevention and irrigation as an integrated project. It also aims to improve power grid operation efficiency conducting studies on suitable pumped-storage power generation.

Meanwhile, the Government plans to develop thermal power plants at an appropriate share considering locations, generation method and capability of fuel supply. It also plans to ensure LNG supply and develop LNG-fired power plants, in order to diversify fuel sources for power generation. The total capacity of the planned LNG-fired power plants will be around 2,000 MW in 2020 and 6,000 MW in 2030. The Government intends to fully utilize domestic coal in northern coal-fired power plants, and also considers that it is necessary to study introduction of coal-fired power plants that utilize imported coal from 2015 onwards.

On the matter of international grid connection, the Government shall enhance cooperation with neighboring countries (e.g., Laos, Cambodia, and China) that are endowed with abundant hydropower potential, with a view to promote efficient regional power export/import that will enhance mutual interest, and eventually reinforce import from them building a stable power transmission network. Projected electricity imports are 2,200 MW in 2020, and 7,000 MW in 2030.

2.5 Power Tariff / Subsidies

Electricity rates in Vietnam are among the lowest in the world, and the supply cost has continuously exceeded the retail price. This situation is considered to induce worsening business conditions for Vietnam Electricity (EVN), and barriers for entry of IPPs and foreign investors. To address such a situation, the electricity tariff system is being reformulated, aiming at correction of retail electricity price to a reasonable and transparent one.

A prime minister's Decree (No. 21/2009/QD-TTg) was issued in 2009 aiming to reformulate the electricity tariff system that requires addressing the following issues:

- A uniform electricity retail tariff throughout the country
- An electricity retail tariff for low-income households
- Reduction in cross-subsidies between industrial/commercial electricity tariff and residential electricity tariff
- Introduction of a licensing system on electricity retail business

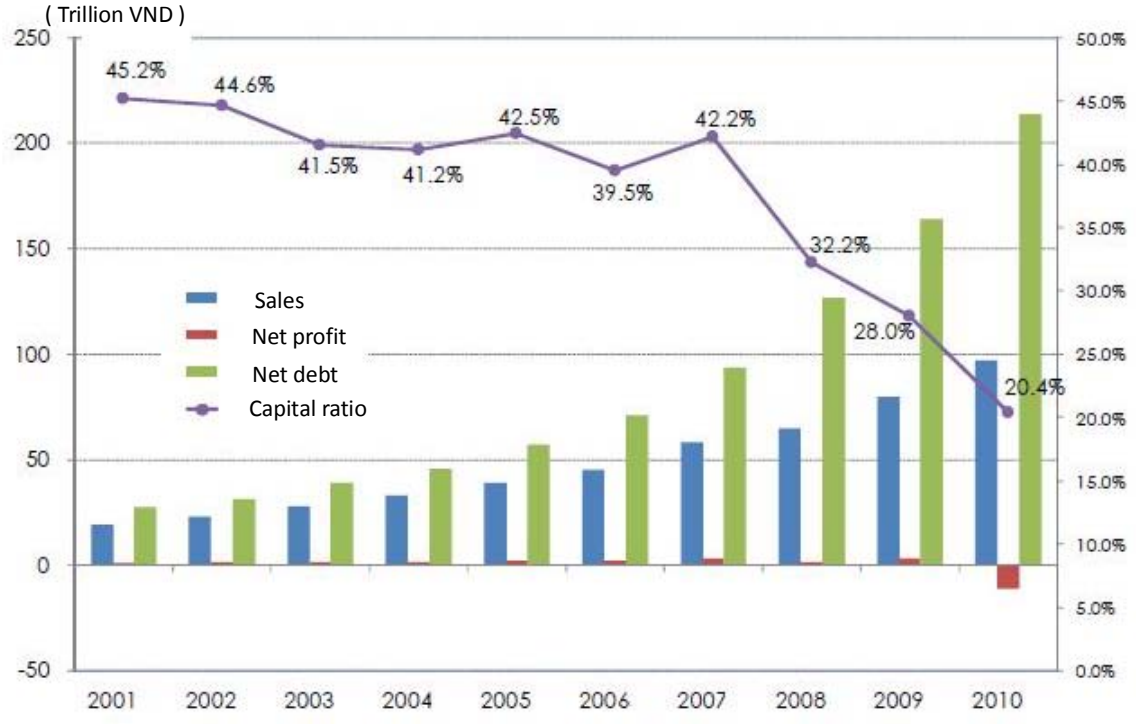
- Introduction of an electricity rate adjustment system based on market mechanism

In Vietnam, a six-step progressive charging system is employed for the electricity retail price so that heavier users are required to pay a relatively high electricity tariff depending on electricity consumption. In particular, a cross-subsidy system is in force that the cost to compensate the subsidies for low-income households is added on to the price for the users whose electricity consumption is 100 kWh or more, while EVN pays subsidies of VND 30,000/month to low-income consumers whose monthly electricity consumption is 50 kWh or less.

2.6 Financial Data on Individual Power Enterprises/Cooperatives:

The financial status of EVN is as follows. The sales amount of EVN has increased from about VND 19 trillion in 2001 to about VND 97 trillion in 2010 or by a factor of about 5 reflecting increased electricity sales. On the other hand, the net debt has rapidly increased from about VND 28 trillion in 2001 to about VND 214 trillion in 2010, and hence the capital adequacy ratio has continuously deteriorated. In 2010, EVN suffered a net loss, causing its debts to increase due to a reduced operation of hydropower resulting from water shortage, and increasing thermal power fuel cost and electricity imports.

Figure 7 : EVN's Business Performance



Source: Japan Electric Power Information Center (Modified)

3. Other Noteworthy Issues

3.1 Environmental Regulations

a. Air Quality / Emission standards

Emission limit values for air pollutants from thermal power plants and other industrial processes are laid down in "Emission standards for thermal power industry (TCVN 7440:2005, in force from 20 Jul 2005)" and "Air quality – Industrial emission standards – Inorganic substances and dusts (TCVN 5939:2005, effective from 28 Jul 2006)", respectively, as shown in the table below.

Table 2 : National emission standards for thermal power industry (Vietnam)

	Pollutant			
	Dust	SO_2	NOx	
Emission limit value (mg/m^3)	200	500	600 (with coal VM content > 10%)	1000 (with coal VM content # 10%)

Source: IEA Clean Coal Center Database

b. GHG

The Government of Vietnam issues a "National Target Programme to Respond to Climate Change" (NTP-RCC) to assess climate change impact on sectors and regions over specific periods, and to develop feasible action plans to effectively respond to climate changes. In December 2008, the Prime Minister of Vietnam approved a budget of VND1,965 billion for the National Targeting Programme for Protection from Climate Change (PMVN 2008b). At the same time, a National Steering Committee was established, with the Prime Minister as its chair. This program aims to achieve two general objectives: to evaluate the potential impacts of climate change in each sector and region at different time intervals; and to identify effective responses which are based on the close, reasonable and harmonious coordination of economic, social development and environmental protection goals. In addition, every five years the Vietnamese Government issues "National Target Programme to Respond to Climate Change" (NTP-RCC) to assess climate change impact on sectors and regions over specific periods, and to develop feasible action plans to effectively respond to climate change in the short and long term to ensure the sustainable development of Vietnam.[42]

[42] APEC Energy Overview 2012

3.2 Renewable Energy

a. Renewable Energy Policy

The National Energy Development Strategy (PMVN 2007a) sets out a target for the share of renewable energies in the total energy consumption at 5% by 2020, and11% by 2050.

Another target is to increase the share of renewables in total electricity production to 6% by 2030. To reach the targets set for increasing the share of renewable energy sources in power generation, the government of Vietnam, since 2008, has been developing policy to support renewable energy use. The government documents in this area include the Decision by the Minister of Industry and Trade on "Regulation on avoided cost electricity tariff and power purchase agreement" (MOIT, 2008), and the Decision by the Prime Minister on "Mechanism for supporting wind power development" (PMVN, 2011b).[43]

In Vietnam, while policy measures to promote wind power have been established, those for other types of renewable energy have yet to be prepared, presenting a challenge to be addressed.

b. FIT, Fiscal incentives

In June 2011, the Prime Minister issued the Decision No. 37/2011/QD-TTg (Decision 37) on "Mechanism for supporting wind power development." With this Decision, a Feed-in Tariff (FIT) policy for wind power generation has been introduced.

Under this mandate, the power monopoly, Vietnam Electricity (EVN) must purchase all power output generated by wind power at the fixed price of VND1,614/kWh (equivalent to US$7.8 cents/kWh). At the same time EVN will also receive a subsidy of VND 207 /kWh (US$1.0 cent/kWh) from the Government via Vietnam Environment Protection Fund. The FIT for wind power in Vietnam, even including the above-mentioned subsidy, is at a much lower level compared to US$18 cents/kWh in Thailand, or US$23 cents/kWh in the Philippines.

To facilitate the wind power development, several fiscal incentives have been introduced as follows:

- Corporate income tax incentive rate: 10% for a period of 15 years to newly-established enterprises investing in power plant projects.
- Possibility of 10% tax rate being extended up to 30 years: if the projects are classified as large scale projects, using high or new technology or specifically necessary investment.
- Exemption of import duties: for equipment and machinery imported and classified as fixed assets of the RE projects.

[43] APEC Energy Overview 2012

- Special encouraged projects: exemption/reduction of land use fee/rental (depending also on the location of the projects)
- Duration of Power Purchase Agreement: 20 years.

3.3 Energy Efficiency and Conservation

According to the IEA's "Energy Balances of Non-OECD Countries – 2012 Edition", Vietnam's energy intensity defined as total primary energy supply per thousand 2005 US dollars of GDP (TPES/GDP) suggests a challenge where the index deteriorated from 0.78 in 2000 to 0.80 in 2010.

On 18 June 2010, the National Assembly of Vietnam passed the Law on Energy Saving and Efficiency. According to the Law, high energy consuming groups as its target including intensive energy consumers from industrial establishments, public facilities, and transportation establishment shall follow the strict requirements on energy efficiency and management. Compulsory procedures include conduct of energy audit, formulation of annual energy consumption plan, application of specific energy saving measures, regular reporting on energy consumption record to authorities, and assignment of energy management officers to be responsible for constructing and helping the management carry out the executing plans. For the remaining group, the Law encourages the production and utilization of energy efficiency equipment and materials, and the participation in lowering electricity use during peak hours. The Law also provides general guidelines on energy performance standards and energy labeling, as well as measures to promote energy saving and efficiency through incentives and science/technology development.[44]

In October 2012, a National Targeted Program on Energy Efficiency and Conservation Phase 2012 – 2015 was approved by the Government with main objectives as enumerated below[45]:

- Achieve savings from 5 - 8% of the total energy consumption of the country in the period 2012 – 2015.
- Extensive use of high-performance equipment, replacing low-performance equipment, proceed to remove obsolete equipment and technology.
  - ✧ Steel: Reduce the average energy consumption for the production of one (1) ton of steel components from 179 kgoe in 2011 to 160 kgoe in 2015;
  - ✧ Cement industry: Reduce the average energy consumption for the production of one (1) ton of cement from 97 kgoe in 2011 to 87 kgoe in 2015;

[44] Energy Efficiency in Vietnam, AFD HANOI, No.2 June 2012

[45] Decision on Approval of National Targeted Program on Energy Efficiency and conservation Phase 2012 – 2015, VNEEP

- ✧ Textile and apparel industry: Reduce the average energy consumption for the production of one (1) ton of fiber in 2011 was 773 kgoe to 695 kgoe in 2015.

- Implementation of mandatory management in compliance with Vietnamese Construction Standards "Energy efficiency construction buildings" from 2012, for 100% of new or renovated buildings within the scope of the Standards.
- Development of transportation system to meet the transport demand with increasingly high quality, save fuel and reduce environmental pollution.

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Annex-II

ENERGY SECTOR REFORM DIALOGUE

29 August – 04 September 2013
Manila, Philippines

NOTES OF DIALOGUE[1]

1. INTRODUCTION

The Energy Sector Reform Dialogue is a component of the Technical Assistance being provided to the Department of Energy (DOE) by the Japanese Government through the Japan International Cooperation Agency (JICA) in formulating a vision for energy sector reform and the necessary policies that will establish an effective market design and management in reference to the appropriate role and the extent of participation of the government. The technical assistance which is being executed by the Institute of Energy Economics, Japan (IEEJ) is responding to the request of the DOE by conducting the study for Energy Sector Reform in the Philippines. The study includes the holding of policy dialogues between officials of the Philippines and with Japanese government.

This report summarizes the presentations and discussion during the Energy Sector Reform Dialogue between Philippines and other ASEAN countries (Indonesia, Thailand and Vietnam) held on 29 August to 04 September 2013 in Dusit Hotel, Makati City.

1.1 Objectives of the Dialogue

The Energy Sector Reform Dialogue between Philippines and other ASEAN countries is aimed at extracting inputs through sharing of information, experiences and plans for the formulation of a vision and policies for the Philippines energy sector reform to respond to the challenges in the electric power industry.

1.2 Messages from Senior Officials and Advisors

1.2.1 Keynote Address of DOE Secretary

In his keynote address during the opening of the Energy Sector Reform Dialogue, Hon. Carlos Jericho L. Petilla, Secretary of the Department of Energy of the Republic of the Philippines thanked the Japanese government through JICA for generously heeding to his request to provide the Philippine government a Technical Assistance for the Energy Sector Reform in the Philippines which include the hosting dialogues between Philippines and the neighboring countries in Southeast Asia. He declared that the objective of the DOE for the Energy Sector Reform Dialogue is to share problems and practices and collaborate in solving the problems and challenges of the energy sector.

[1] Prepared by Prof. Rowaldo del Mundo, JICA Study Team Member of IEEJ who provided the summary of each session and synthesis during the closing of the Energy Sector Reform Dialogue

1.2.2 Messages from Japanese Officials and Advisors

During the opening session of the high level dialogue with senior officials from Indonesia, Mr. Takahiro Sasaki, Chief Representative of Philippine Office of JICA gave his message to the officials of countries represented and participants in the dialogue for energy sector reforms. He mentioned that JICA is hosting bilateral dialogue between Philippines and Southeast Asian countries to contribute to the development of dynamic and vibrant SEA. He expressed his hope that the dialogue will contribute to policy making for the energy sector (in general) and in power industry (in particular) so that the energy sector will function efficiently to meet the demand of growing economies. Mr. Sasaki particularly wished that the dialogue will help the Philippine government in its pursuit of reforms in the energy sector to provide solution to the challenges that it is facing.

The high level dialogue with senior officials of Thailand was opened by Mr. Omura Yoshifumi, Director for Philippines of JICA. He reiterated the message from Japanese government given earlier by Mr. Takahiro Sasaki. He also thanked the Thai delegation and wished for fruitful discussions.

Mr. Eigo Azukizawa, Senior Representative JICA Philippine Office, expressed the commitment of Japanese government to contribute to the development of Philippines and Southeast Asia by hosting dialogues to help in policy making and pursuing reforms in the energy sector in order for it to function effectively in providing reliable, adequate and affordable supply.

Mr. Hisashi Hoshi, JICA Study Team Leader of IEEJ, expressed in his opening remarks his hope that the dialogue will be responsive to the different situations and challenges of the countries in Southeast Asia. Highlighted in his message was the different approaches of the countries in power sector reforms where Indonesia and Thailand pursued a “controlled market” while Philippines and Vietnam has liberalized the market towards competition to achieve their objectives. The dialogue is meant to learn from each other experiences. During the closing of the dialogue, Mr. Hisashi Hoshi thanked everybody for the fruitful dialogue. He noted that electricity industry is a dynamic industry sector and there is a need to keep looking for changes to respond to the challenges and achieve the objectives of the sector such as reducing power rates and ensuring security of power supply.

Mr. Kensuke Kanekiyo, JICA Study Team Member of IEEJ who served as Co-Chair and Moderator of the dialogues declared the objective of the dialogue to aid in policy making for the energy sector of the Philippine DOE and the participating SEA countries. He encouraged the participants to raise issues and concerns during open forum which come after the presentations.

During the closing session of the series of dialogue, Ms. Muto Megumi, Deputy Director General for SEA and Pacific Department of JICA gave the closing remarks in behalf of Japanese government hosting the dialogue. She emphasized the importance of the dialogue in solving the challenges of countries in meeting the objectives of the energy sector. She suggested the need for considering the inputs from the dialogue for the planned ASEAN regional integration.

1.2.3 Messages from Officials of Philippine Department of Energy

Department of Energy Undersecretary Ramon Allan V.Oca welcomed the participants of the dialogue and expressed his expectation for a fruitful cooperation in all high level and technical level sessions of the dialogue in his opening remarks.

DOE Undersecretary Loreta G. Ayson of DOE thanked the senior officials from participating Southeast Asian countries in her closing remarks. She appreciated the active participation and exchanges among the participants. She said that the DOE is looking forward to more exchanges with other ASEAN countries to help each other in solving problems in the energy sector.

Mr. Jesus Tamang, Philippine DOE Planning and Policy Bureau Director extended his gratitude to the senior officials from Indonesia, Thailand and Vietnam for the active exchanges during the dialogue and is looking forward to close collaboration. During the technical session with Vietnam, DOE Assistant Director Carmencita Bariso also welcomed all participants of the dialogue and expressed her expectation for a fruitful cooperation.

2. PRESENTATION OF PHILIPPINE DEPARTMENT OF ENERGY

2.1 Focus of Presentation

During the dialogue with Indonesia, DOE Secretary Carlos Jericho L. Petilla presented and discussed the Philippine energy sector reforms. The presentation focused on the power sector as it is the main concern of DOE having challenges in reform implementation and results. The following are discussed by Secretary Petilla:

a. Structure of the Philippine power industry before and after the enactment of the Electric Power Industry Reform Act of 2001
b. Rationale and objectives of reform
c. Role of government in the reform implementation
d. Status of reform implementation

In the succeeding high level sessions, Ms. Irma Exconde, Assistant Director of the Electric Power Industry Management Bureau (EIMB) presented the Philppines power sector reforms.

2.2 Pre-EPIRA Power Sector Structure

2.2.1 .NPC Monopoly in Generation and Transmission

The Philippine power industry prior to the enactment of EPIRA has the National Power Corporation as monopoly power generation and transmission company. It owns a portfolio of power plants and contracted Independent Power Producers (IPPs) to meet the growing demand of electricity when it is not able to build due to financial resource limitations.

The facilities of the DUs are connected to NPCs transmission system. Large industries and bulk users are also directly connected to the transmission system of NPC.

2.2.2 Monopoly Distribution Utilities

Private investor-owned distribution utilities in key cities and consumer-owned electric cooperatives (mostly in rural areas) are monopoly companies with exclusive franchise in a given geographical area to provide monopoly distribution and retail services. Some DUs are supplied by their own IPPs in addition to the NPC.

2.2.2 Regulated Tariffs

NPC has regulated wholesale tariffs for bulk generation and transmission of electricity. The distribution utilities have also regulated distribution and supply tariff for retail customers.

2.3 Power Sector Reform Law

The Philippine Congress enacted into law the Electric Power Industry Reform Act (EPIRA) on 08 June 2001 which became effective on 26 June 2001. The EPIRA law mandates the over-all restructuring of the Philippine electricity sector and calls for the privatization of National Power Corporation.

2.4 Rationale and Objectives of Power Sector Reforms

2.4.1 Rationale for Reform

The following are the rationale for reform:

a. Sustain investments in the power sector through greater private sector participation to meet the growing electricity demand
b. Enhance transparency in electricity rates and charges
c. Improve efficiencies by widening the ownership base in the power sector
d. Provide customers with the power of choice

2.4.2 EPIRA Objectives

The following are the objectives of the EPIRA Law:

a. Competition
b. Transparency
    i. Institutional (generation, transmission, distribution and supply)
    ii. Electricity rates (reasonable prices)
c. Private sector investment
    iii. Generation
    iv. Transmission (through concession)
    v. Distribution
    vi. Supply
d. Strong and independent regulatory body
    vii. Promote competition
    viii. Consumer protection

2.5 Industry Structure and Reforms

2.5.1 Industry Structure

Functional and business unbundling with

a. Competitive generation
b. Regulated transmission
c. Regulated distribution
d. Competitive retail supply

End-users as classified as:

a. Contestable (start with 1 MW or larger) customers
b. Captive customers

2.5.2 Reform Activities

The following are the major reform activities:

a. Establishment of Wholesale Electricity Spot Market (WESM)
b. Privatization of NPC Generating Assets
c. Opening up of high voltage transmission lines for easy access of distributors and large customers
d. Opening up of distribution lines for contestable customers
e. Unbundling of electricity rates and services for greater transparency and accountability

2.6 Role of Government

2.6.1 Key Government Agencies

The Department of Energy is the policy making agency and has overall supervision of the power industry.

The Energy Regulatory Commission (ERC) is an independent, quasi-judicial body that regulates the technical performance and prices of regulated utilities. It is mandated to promote competition, ensure customer choice, and penalize abuse of market.

The National Electrification Administration (NEA) prepares the Electric Cooperatives in a competitive market. It also reviews and upgrades regulatory policies to enhance viability of ECs.

2.6.2 Key Industry Participants

The Power Sector Assets and Liabilities Corporation manages the assets and debts of NPC pending privatization. It assumed the NPC debts and IPP contracts. It also manages the NPC privatization process and administers the Universal Charge for Missionary Electrification (UCME).

The Philippine Electricity Market Corporation is the Market Operator of the WESM responsible for energy dispatch scheduling and pricing. The NPC, NPC-IPPs, IPPs, and IPP Administrators trade the generation output of the power plants hourly in a gross-pool market.

The National Power Corporation (NPC) continues to generate and sell electricity from undisposed generating assets and IPP contracts of PSALM. It also performs “Missionary Electrification” in small islands.

The National Transmission Company (Transco) is the Grid Owner and the National Grid Corporation of the Philippines (NGCP) as O&M Concessionaire provides transmission services, metering services. It is also the System Operator with implement the energy/reserve dispatch.

Private Distribution Utilities (PDUs) and Electric Cooperatives are the distribution utilities providing distribution services to retail customers.

Some large industrial and commercial customers are directly connected to the grid operated by NPGCP.

2.6.3 Role of DOE

The following are the role of DOE under the Restructured Environment:

a. Supervise the restructuring of the electricity industry
b. Oversee the WESM
c. Develop and update annually the Philippine Energy Plan
d. Prepare and update annually a Power Development Program
e. Encourage and promote development of indigenous and renewable energy resources, and rural electrification
f. Facilitate and encourage reforms in the structure and operations of distribution utilities for greater efficiency and lower costs
g. Public information and education

The DOE Secretary seats on the Board of the following government-owned and controlled corporation as:

a. Chairman, Philippine Electricity Market (PEM) Board of the WESM
b. Chairman, National Electrification Administration (NEA) Board
c. Vice Chairman, PSALM Board
d. Vice Chairman, National Power (NP) Board of NPC
e. Vice Chairman, Transco Board

2.7 Status of Reform Implementation

2.7.1 Unbundling of Rates

As mandated by EPIRA, the NPC rates was unbundled in 26 March 2002 while the unbundling of DUs rates were competed in June 2003.

2.7.2 Removal of Cross Subsidies

Inter-grid (Luzon, Visayas and Mindanao Grids) cross subsidies were removed in September 2002. Intra-grid and inter-class (of customers) cross-subsidies were removed in October 2005.

The government practically has zero subsidy. NPC and Transco in national budget is only US$350M/yr. Government subsidies only for the CAPEX to extend distribution lines for rural electrification.

2.7.3 Establishment of WESM

WESM have been functioning for almost 7 years. Luzon commercial operation on 26 June 2006 while Integration of Visayas Grid in 26 December 2010. PEMC will soon start the operation of the Interim Mindanao Electricity Market.

WESM which is being fine tuned through the audits that are being conducted and review of the market rules.

2.7.4 Privatization

EPIRA requires at the privatization of at least 70% of NPC generation assets and the transfer to IPP Administrators of at least 70% of NPC IPP Contracts before retail competition is declared by ERC. The SPALM has so far achieved 79.56% privatization of NPC power plants and 76.85% of NPC IPP contracts.

Privatization of Transco is through an O&M concession. The NGCP was granted franchise by Congress after it won the bid for the O&M concessionaire of Transco.

2.7.5 Open Access and Retail Competition

Having complied with all the pre-requisites, the ERC declared open access in distribution to start retail competition on 26 December 2012.

The commercial operation of retail electricity market for customers with at least 1MW demand has been started but with only 2 months experience. About 200 out of 900 contestable customers have registered at PEMC to participate in the competitive market.

2.8 Challenges in Power Sector Reforms

2.8.1 Control of Power Generation Capacity

Government cannot control when private sector will invest in new generating capacity. DOE is strengthening demand forecasting to be more convincing for the private sector to respond to the requirements as forecasted.

2.8.2 Price of Electricity

People complain about high prices of electricity. Government cannot control the deregulated prices in generation and supply sector. The DOE is making more transparent information about electricity prices to manage complaints and make people understand.

2.8.3 Power supply contracting of large customers

There are concerns expressed by some customers that the available capacity is deficient to warrant an effective competition. DOE is waiting for actions of large customers in power supply contracting.

3. HIGH LEVEL SESSIONS

3.1 Dialogue with Senior Officials of Indonesia

3.1.1 The Indonesian Delegation

The following Senior Officials of the Ministry of Energy and Mineral Resources (MEMR) constituted the delegation from Indonesia:

a. Mr. Pamudji Slamet, Head of Law, Directorate General of Electricity
b. Mr. Afrizal, Deputy Director, Management and Supervision of Electricity Business, Directorate General of Electricity
c. Ms. Mira Suryastuti Nirbito, Deputy Director, Electricity Information and Government Capital Investment, Directorate General of Electricity

In addition to the senior officials from MEMR, the Indonesian delegation is joined by Mr. Tomosaburo Yano, Advisor for the Director General for Electricity, Indonesia Office, JICA.

3.1.2 Presentation of Indonesian Delegation

The following were presented by Indonesian delegation:

a. Overview of the energy sector

Data on energy indicators, trend in power and energy consumption, energy resources, energy mix and installed capacity and infrastructure in generation and transmission. Electrification at 76.5% appears to be a low accomplishment due archipelagic nature of the country.

b. Role of government in power sector

- Electricity law No. 30/2009 (new law) is the legal framework. The electricity law in 2002 which seeks to liberalize the power sector similar to Philippines was revoked in 2003 even before it was implemented. Market liberalization is now limited at the level of IPP selection. Government can control IPPs at the procurement stage through bidding process. Government still gives guarantee in the PPA.

- Authority of government in issuing licenses and setting the tariff. Whoever gives the license also sets the tariff (national and local)

b. Policy Measures and Regulations for Electricity Market Reform

- Government Regulation No. 14/2012 sets the framework for centralized planning of power sector and private sector participation to ensure security of power supply. IPPs are selected through a competitive bidding process. PPA and selling price are reviewed and regulated by government.

- Uniform tariff set by Parliament and local authorities. Different tariff only in different area depending on resource used in the area. Tariff has subsidies from government. In 2011, the average electricity price was Rp1.251/kWh. About Rp93.18 Trillion of subsidy was provided. By government.

- Ministerial Regulation 17/2012 was issued to set a ceiling price for renewable energy (but higher than the tariff from traditional fuel) to increase the share of RE. Another Ministerial Regulation (No. 22/2012) provides the Feed-In Tariff for RE.

c. Challenges

- How to reduce the subsidies but still control the prices to be affordable to consumers

3.1.3 Open Forum of Indonesian Delegation with Senior Officials of Philippine DOE

The following are the questions and comments raised for clarifications and additional information during the Open Forum:

a. Clarification from DOE Officials on some information presented by Indonesian delegation

- How many years is the economic development plan of Indonesia and the Electricity Development Plan? Both 20 years.
- Who recommends the fuel mix? RUKN (National Energy Policy Office to National Energy Council to Parliament)
- Who is driving the objective of reducing subsidy? The national government. The plan is to reduce the subsidy in the long term.
- How is the subsidy implemented? Through the utility company. Note that the fuel of the power sector is already at market prices. It is the transport fuel that is heavily subsidized.
- Is there a discount in power rates for Special Economic Zones? No. In fact, the rates in economic zones are generally higher than the normal price. However, there are areas in Indonesia whose supply is predominantly hydro where the prices are lower.
- Is the 76% electrification ratio in 2012 measured at household level? Yes. The 2014 target of 80% was already exceeded in 2013. The plan is to electrify 98% of the households by 2017.
- Indonesia was pursuing electricity sector reform towards a restructured power industry with competitive sectors almost at the same time as the Philippines but Indonesia revoked the law so the current structure is still the regulated monopoly.
- Do you think the Indonesian government made the right decision in holding off the restructuring plan? Yes. The Indonesian government believes that electricity is link to economic growth and at this point government must maintain control of the industry particularly the price of electricity.
- What are the practices of Indonesia policy and law making and tariff setting at local (government) level? In general, whoever grants the license will set the tariff based on the cost of energy/electricity in the area.

b. Questions from Indonesian delegation for the Philippine DOE Officials

- How did you reduce and manage the subsidies? The Philippine government decided to remove all subsidies and cross-subsidies. The government implements universal levy for all consumers for the subsidy of a sector (e.g., missionary electrification in small islands). Utility companies also implements lifeline discounts for poor customers (low volume users) which come from the contribution of all other customers.

3.1.4 Issues for Discussion in Technical Session - Indonesia

The following topics and issues were requested to be discussed during the Technical Session of the dialogue with Indonesia:

a. How to induce timely investment in generation
b. How to reduce price of electricity
c. How to reduce subsidies in tariff

3.2 Dialogue with Senior Officials of Thailand

3.2.1 The Thai Delegation

The following Senior Officials of the Office of the Energy Regulatory Commission (ERC) and Electricity Generating Authority of Thailand (EGAT) constituted the delegation from Thailand:

a. Ms. Narumon Intharak, Director, Electricity & Natural Gas Regulation, ERC
b. Mr.Tongkum Piyateravong, Director, Energy Environmental Engineering, ERC
c. Mr. Nimit Sujiratanavimol, Engineer, Alternative Power Energy Resource, System Planning Division, EGAT

3.2.2 Presentation of Thai Delegation

The following presentations were shared by the Thai delegation:

a. Energy Industry Management

Reform started in 2007 through Energy Industry Act. Policy making and regulation was separated. ERC as regulator under Ministry of Energy was established. A single buyer power market was established. Bidding rounds for IPPs resulted in additional generating capacity. Gas industry is a monopoly with supply coming from Thai Gulf and some imports from Myanmar.

b. Energy Policy

The policy statement of the Council of Ministers (23 August 2011) are the following:

- Promote and enhance energy industry to generate national income. Investment in energy infrastructure will be increased to make Thailand the hub of regional energy business.
- Reinforce energy security through the exploration and development of energy sources, both domestic and abroad. Energy sources and types will also be diversified.
- Regulate energy prices to ensure fairness and to reflect actual costs.
- Support the production, use, research and development of renewable and alternative energy sources, with target of replacing at least 25% of fossil fuels within 10 years.
- Promote energy conservation through reduction of energy intensity by 25% within 20 years. Consumer awareness of economical and efficient use of energy will be raised.

c. Energy Pricing

- Thailand has formal tariff setting process for electricity and gas.
- Electricity rate is uniform tariff but cost reflective and is implemented through Financial Transfer Mechanism across utilities to achieve the two objectives.
- Measures to manage impact of rising prices include cross subsidies among customer categories. Residential customers consuming less than 50 kWh/month are fully (100%) subsidized by other customers. About 3-4 Billion Baht/year are contributed by other customers.
- Power Development Fund imposed to industry players managed by ERC is used to channel tariff subsidies.

d. Promotion of Energy Efficiency and Renewable Energy

- RE development is incentivized through tariff adder and feed in tariff which produced good response from players (SPP and VSPPs). More than 10,000 MW was achieved in installed capacity.
- Smart Grid under consideration to support intermittent and decentralized generation.

3.2.3 Open Forum of Thai Delegation with Senior Officials of Philippine DOE

The following are the questions and comments raised for clarifications and additional information during the Open Forum:

a. Clarification from DOE Officials on some information presented by Thai delegation:

- The natural gas price link to crude oil is a policy in Thailand.

- Why almost natural gas in 1st IPP Bidding Round of Thailand? It is result of tender where EGAT did not specify the fuel. In 2nd bidding round, 50% gas and 50% coal was specified. The 3rd round will be 100% gas.

- There is 7% VAT in power rates

- Is there a policy to limit coal power? No. In fact, Thailand is promoting coal. However, acceptability in the society is a challenge. Thai government is trying to educate the people.

- What is the mechanics for demand response to reduce electrical use in a certain period? This is not finalized and announced yet.

- What is the mechanics for Power Development Fund? Retail company collects from consumers while ERC collects from licensees.

b. Questions from Thai delegates include:

- Is the price objective in the Philippine electricity market achieved? The DOE responded that in the beginning results of the market is lower than the average "contract price" but lately the prices are higher as demand has increased and supply is tighter now. The DOE still collecting data t determine the results of the prices in retail contestable market. The DOE also clarified that the WESM has a price cap of Php 62/kWh. The trading interval is likewise being reviewed to implement 5-minute dispatching to solve intra-hour dispatch problems.

- Is there a plan for Philippine nuclear power plant? The turbine of the Bataan Nuclear Power Plant (BNPP) which was never operated has been sold already. There is problem in social acceptance for nuclear power in the Philippines. The government however, still consider nuclear as an option but it is the last among the options.

c. Questions from Japanese delegates:

- Who takes care of the price volatility of gas in Thailand? Price is adjusted according to market price movements.

- How did Thailand achieve lower tariff in generation? Through competitive IPP bidding process.

3.2.4 Issues for Discussion in Technical Session - Thailand

The following topics and issues were requested to be discussed during the Technical Session of the dialogue with Thailand:

a. Price in electricity market
b. Philippine DOE would like to know the Oil Fund, taxation and subsidy mechanism of Thailand
c. Pricing biofuels

3.3 Dialogue with Senior Officials of Vietnam

3.3.1 The Vietnamese Delegation

The following Senior Officials of the Ministry of Industry and Trade (MOIT) constituted the delegation from Vietnam:

a. Mr. Thang The Hung, Deputy Director, Planning Department, General Directorate of Energy
b. Mr. Hoang Tung, Expert, Planning Department, General Directorate of Energy
c. Mr. Ngho Minh Hoan, Officer, Personnel and Organization Department

3.3.2 Presentation of Vietnamese Delegation

The following presentations were shared by the Vietnamese delegation:

a. Overview of Energy Sector

Highlighted was the high GDP growth rate of Vietnam from 2006-2012 [5 – 7%] and the corresponding trend in energy [9.4%]. Electricity peak demand during the period grew at

12.2%. The electric power industry is governed by the Ministry of Industry and Trade (MOIT) with the General Directorate of Energy (GDE) in charge of planning and policy making while the Electricity Regulatory Authority of Vietnam (ERAV) regulates the power industry.

b. Vietnam has restructured its power industry from vertically integrated model with EVN as a monopoly company for generation, transmission and distribution into a structure that will allow competition in generation. Currently the companies in the Vietnam Competitive Generation Market are the EVN generators (some owned and some equitized), BOT generators, and IPPs. EVN still dominate the market

c. Vietnam's Master Plan reflects the countries strategy for reliable and affordable power by pursuing more coal in the energy mix (48% by 2030) and by introducing nuclear energy to meet the growing demand (14.1-16% for the period 2011-2015; 11% for the period 2016-2020; and 7.8-8.8% for the period 2021-2030).

d. Tariff
   - The Prime Minister is responsible for the approval of electricity retail tariff with MOIT setting the prices along supply chain. Contract prices are based on negotiation between parties but subject to the limitations set out by authorities.
   - Generation prices are based on:
     i. Annual approval by State Authority for SMHPs
     ii. Contracts (PPA) for BOT power plants, imports and ancillary services
     iii. CfD and spot market price for other plants
   - Transmission and distribution prices are based on allowed revenue set annually.

e. Renewable Energy promotion through avoided cost mechanism for small hydro power plants and co-gen facilities. Avoided cost is defined as the production costs of the most expensive generator in the national grid. Wind power development is also supported by a guaranteed price and fiscal incentives. Energy efficiency is promoted through a law which specifies the measures to meet efficiency targets and the obligations of organizations, households and individuals.

3.3.2 Open Forum of Vietnamese Delegation with Senior Officials of Philippine DOE

The following are the questions and comments raised for clarifications and additional information during the Open Forum:

a. High growth rate of Vietnam
   - Vietnam clarified that historical growth rate of economy and electricity demand are high and was used as basis of the Master Plan prepared in 2010 with high expected growth rate

b. Electricity Tariff
   - Vietnam tariff for residential consumers is US$0.07/kWh while Philippines (MERALCO) is about US$0.25
   - Vietnam believes that there is no subsidy in their tariff although it is very low. Contributory to the low rates are the following:

i. Hydro power with a 40% share is cheap.
ii. Many power plants practically has no more fixed costs to recover
iii. Vietnam is endowed with very rich resources (coal and gas) and they are cheap since the prices do not follow international market. Local coal and gas prices are controlled by government.
iv. Coming from socialist regime of government, the old accounting system do not have depreciation costs since the power infrastructure were constructed using government budget. (The modern accounting system has investment and depreciation)
v. A very efficient CCGT was accomplished in Phumi Gas Turbine plant (>60% efficiency) through economy of scale and baseload operation

- Vietnam electricity price will eventually follow international market as new power plants comes in and domestic fuel supply shrink. But this will be very slow as government will have to manage the impact to consumers.
- There was a suggestion to assist Philippine ERC in benchmarking to achieve least-cost prices in the Philippines

c. Over-capacity and Shortage
   - Philippines shared its experience when the country had over-capacity and shortage. Both resulted in high electricity price
   - Philippines is challenged with its reliance on private sector to secure supply. DOE Secretary of DOE is interested in developing effective strategy given the Philippine industry structure and market situation
   - Philippines will address security though better forecasting and by shortening the administrative process in developing and constructing power plants
   - Private generation company in the Philippines are worried about over-capacity
   - There is a need to define “oversupply” and “shortage”

d. Power Development and Energy Mix
   - Philippines asked about the social/public acceptability given that the energy mix in the master plan of Vietnam indicates that it will pursue more coal and will introduce nuclear. Vietnam does not expect problem in social acceptance provided the power plant will comply with environmental regulations.
   - How does Vietnam manage the power system with the seasonal variation of water for hydro plant? Large hydro plants (80MW – 1000 MW) in Vietnam are reservoir type. Run of river hydro are small plants (10-30MW).

e. Electrification
   - How does Vietnam balance the cost of electrification particularly in off-grid since Vietnam achieved 98% electrification ratio? Vietnam clarified that the off-grid areas in Vietnam is minimal and subsidy is not significant compared to overall budget of the utility. EVN has constructed lines practically for the villages

f. Industry structure and power market
   - Philippines requested for more description of the power market
   - There was a question why generation capacity in the Philippines is not coming while the price is high.

- What is the strategy of Vietnam in regulating PPA? After negotiation of parties, government will review and approve contract prices
- Why Petro Vietnam joined the power industry as power generator (with gas and coal)? Is this a business decision of Petro Vietnam or a coordinated decision of the government based on integrated policy and strategy?
    i. Vietnam gas is "associated gas" from crude oil Petro Vietnam needs to create an assured market from its gas supply.
    ii. EVN negotiated with PVN for the PPA

3.3.3 Issues for Discussion in Technical Session - Vietnam

The following topics and issues were requested to be discussed during the Technical Session of the dialogue with Vietnam:

a. Government strategy to secure power supply
b. Price of Electricity vis-à-vis balancing retail tariff and government budget to subsidize the power utility
c. Design of competitive electricity market of Vietnam

4. TECHNICAL SESSIONS

4.1 Technical Level Discussions with Senior Officials of Indonesia

4.4.1 Presentation of Indonesian Delegation

The Senior Officials from MEMR repeated its presentation during the technical level session as requested by the Co-Chair (Moderator) Mr. Kensuke Kanekiyo because the participants of the dialogue from Philippine DOE are not the same during the high level session. (See Section 3.1.2 for the summary of presentation of Indonesian delegation)

4.4.2 Open Forum with DOE Officials and Staff with Indonesian Delegation

Clarifications requested by DOE in presentation of Indonesian delegation in management of authority (national, province and municipality government): What is the delineation if there is conflict? For state-owned companies and private companies across provinces, it is the national government who has the authority. The province government has authority over private companies with business across cities. Private companies within the city are subject to the authority of the regency/municipality government.

The exchanges between Philippines and Indonesia are summarized in the following issues:

a. Geothermal energy development

Indonesia inquired on policies of Philippines that it succeeded in increasing its geothermal share. Indonesia has minimal response from power developers even FIT is already in place. Philippines responded that the country had no choice in 1970s (world oil crisis) but to look for option to reduce its dependence from oil. The original law was Presidential Decree 1442 but it was recently replaced by the RE Law in 2008. Philippines offered help to Indonesia in

geothermal development to benefit from experiences and expertise that has been developed over the years.

b. Development of other energy resources.

Both countries have problem in advancing nuclear energy due to social acceptability. Both countries still consider nuclear as an option but it is last priority. There are also a lot of opposition in coal power plant. Indonesia wants to pursue more coal and handle opposition through clean coal technology (i.e., supercritical technology for very large coal plant). From economic point of view the subcritical coal technology for smaller plants (100 – 300 MW) will be an option with environmental consequences. Philippines requested for information on handling bottom ash in coal power plant. IEEJ promised to send booklet about clean coal technology from NEDO that has information on these issues.

c. Subsidy in electricity tariff

Economists in Indonesia are divided on the issue of subsidy. Some says it is better to provide subsidy while some seeks to reduce and remove subsidies. While there is big subsidy in electricity tariff in Indonesia, nothing for the fuel but the utility companies get subsidy for their operations. Big subsidies are prevailing in the transport sector. Government wants to reduce subsidies. Philippines has no subsidy at all. Philippines also requested contact persons to get more information on Oil Fund mechanism.

d. Electric utility operations

Indonesian strategy for system loss reduction and collection efficiency improvement includes the use of prepaid meters. Law is enforced on theft with penalties as much as 3 times the bill of stolen electricity. Thefts are apprehended with support from police while large customers are litigated. Indonesia has achieved single digit system loss (9.27%).

e. Energy (power development) planning

Indonesia used economic growth, population and industrial plans in forecasting demand. Weather factors are not considered for medium and long term forecasts.

4.2 Technical Level Discussions with Senior Officials of Thailand

4.2.1 Presentation of Thai Delegation

The Senior Officials from Thailand ERC repeated its presentation during the technical level session as requested by the Co-Chair (Moderator) Mr. Kensuke Kanekiyo because the participants of the dialogue from Philippine DOE are not the same during the high level session. (See Section 3.2.2 for the summary of presentation of Thai delegation)

4.2.2 Open Forum with DOE Officials and Staff with Thai Delegation

The exchanges between Philippines and Thailand are summarized in the following issues:

a. Interconnection of Power System and Regional Electricity Market

- Thailand has interconnection with other countries (Lao PDR, Cambodia, Myanmar, Malaysia and China) mainly to import energy (electricity) to take advantage of abundant resources in neighboring countries
- No problem with technical issues such as voltage. Even the Malaysian interconnection with different frequency was managed though direct current (DC) link.
- So far all cross-border interconnections of Thailand are based on bilateral contracts. There is a plan to establish sub-regional market in Greater Mekong Sub-region (GMS). Thailand look forward to participate but there is no definite plan and timeline yet.
- The "One ASEAN Economy" may accelerate the development of the regional market.

b. Energy Efficiency

- Philippines asked Thailand to elaborate on salient features of Thailand's Energy Efficiency Plan and how the plan was effectively implemented. What are the indicators?
- Thailand is conducting surveys on energy efficiency of appliances and uses of electricity.

c. Electrification

- Thailand achieved a very high level of electrification (99.8%). Practically Thailand accomplished 100% but because there are always new households, the 0.2% was estimated to account for the lag.
- MEA and PEA are very focused in planning and implementing the connection of residential customers.
- There is long term plan for the expansion of distribution system to rural areas. When the plan is approved, the investment to implement the plan is included in the tariff.
- Aside from being land-locked which is easier to electrify compared to Philippines which is an archipelago, Thailand has free electricity for very small residential consumers.

d. Renewable Energy

- Price Adder and FIT promotes RE and so far good response from players
- Subsidy for RE does not come from government but from consumers as universal levy

e. Natural Gas

- Quality control of natural gas is at all points from source to end-users. Different quality standards for different users (power plant, industrial, etc.)
- Although natural gas regulation in Thailand is open, PTT controls the industry as a monopoly. EGAT is studying LNG imports. ERC is planning to develop third party access code since the transport facilities are owned by PTT.
- Priority use of Gas is for electricity (not for residential and small users)

f. Thailand Tuktuk fuel is being replaced with LPG (not CNG). Philippines jeepney fuel is replaced with CNG and by electric vehicles mainly to manage the impact of spikes in petroleum prices.

g. Nuclear Energy

- Thailand plan to develop nuclear energy in far end of the horizon (2030).
- Philippines consider nuclear only as an option but will be the last priority among available options
- Both countries have problem in social acceptability of nuclear power plant

h. Subsidies, Cross-subsidies and Host Community Benefits

- Free electivity to residential customers with consumption of up to 50 kWh/month
- Thailand ERC sets the criteria for the host community benefits (e.g., 3 km radius from the location of power plant). A committee from the community proposes to ERC how the PDF will be used.

i. Liberalization and Investment Policies

- EGAT will remain in control for at least 50% of the power mix
- Electricity market liberalization was stopped in 2003 due to opposition from consumer protection groups.
- EGAT remains a government agency/entity and has not been corporatized
- Thailand plan power mix with coal but private sector investment response has favored natural gas due to social acceptability problem of coal plants.
- The type of the power plant is specified in the bidding documents for IPP procurement

j. Downstream Oil Industry

- Philippines inquired on how Thailand is managing the substandard LPG Tanks.
- Philippines also asked how much successful is the private sector participation in downstream oil
- Oil fund collected from petroleum consumers was used to stabilize petroleum prices before the deregulation. It is still in place but only to subsidize LPG prices.

k. Energy Planning

- New Energy Plan is prepared in Thailand whenever there is new Prime Minister to respond to new policy statements of the new government.
- Power Development Plan is updated only when there are new situations or conditions that warrant the review of the plan.

4.3 Technical Level Discussions with Senior Officials of Vietnam

4.3.1 Presentation of Vietnamese Delegation

In addition to the overview of energy situation in Vietnam and the role of government in power sector that was presented in the high level session, the Vietnamese delegation presented details on the electricity market reform starting from the initial reforms (drivers, framework and key elements of reform), the progress and accomplishments, and the future plans. (See Section 3.3.2 for the

summary of presentation of Vietnamese delegation on Overview of the Energy Situation and Role of Government on Power Sector)

a. Power Industry Reform Roadmap

- The Electricity Law of Vietnam provides the roadmap for the electricity market reform in 3 phases (Phase 1 – competitive generation market, Phase 2 – competitive wholesale power market, and Phase 3 – competitive retail power market. Each phase will be implemented in 2 steps: partial pilot and full operation.
- The main drivers for the reform are the (a) the lack of efficient pricing, (b) lack of investment, and (c) need for cost recovery to maintain viability of power sector.

b. The Key elements of the electricity market reform in Vietnam are:

- Unbundling of EVN (ring fencing of business activities and defining tariffs for each function)
- Privatization of power entities thorough equitization. However, the government will continue to control the 3 multipurpose hydro power projects representing 30% of the country's installed capacity (as of 2004).
- Development of Power Market based on principles of transparency, choice, and sustainable electricity system (safe, stable and efficient supply).

c. Role of Government in Power Sector (Electricity Pricing)

- The Prime Minister is responsible for the approval of retail tariff. MOIT for approval for the transfer prices along the supply chain (transmission and distribution prices and other fees). Contract prices based on negotiation between parties but subject to the limitations set out by authorities.
- Generation cost of multipurpose hydro approved annually by State Authority; Generation cost from BOT plants and for ancillary services through PPAs; From other plants: purchase costs under CfDs and spot market
- Transmission cost set annually according to Allowed Transmission revenue
- Distribution cost set for 3-5 years by Performance Based Regulation according to Allowed Distribution Revenues

d. Achievements of the reform process

- Developed regulatory framework (licensing; technical regulation: grid code, distribution code & metering code; economic/market regulation: market rules; tariffs and contractual regulation: market-based adjustment of retail tariffs, methodologies for generation pricing, and approvals of PPAs)
- Establishment of 3 Gencos (June 2012), separate transmission company, and 5 distribution companies; Note that EVN is still major generator with more than 50% of total capacity

- Full operation of Vietnam Competitive Generation Market (July 2012): combination of spot market which is gross cost-based pool and termed PPAs between Gencos and Single Buyer in form of Contract for Difference (CfDs) with high initial coverage (90-95%)
- Tariff adjustment on market-based mechanism (quarterly due to changes in fuel costs and exchange rates)

e. Immediate Implementation Plan

- Establishment and operation of the National System & Market Operator (2013)

f. Future Plan (Roadmap)

- Establishment of competitive wholesale market (2015-2022) where distribution utilities are free to choose any generation company for power supply; and competitive retail market (2022 onwards) where consumer will also have choice of power supplier.

g. Challenges

- Huge volume of capital need for investment in generation (USD110,332 Billion from 2011-2030) and transmission network (USD156,303 Billion from 2011-2030).

4.3.2 Open Forum with DOE Officials and Staff with Vietnamese Delegation

The exchanges between Philippines and Vietnam are summarized in the following issues:

a. Privatization/Equitization in Vietnam

- How much can be shared to foreign companies? Depends on type of power plant. Government controls (and will own) the strategic multipurpose large hydro plant. Private companies may invest either though the stock market or by directly through Management Board of the power plant.

b. Energy/Power Development Planning

- Who provides guidelines to parties in preparing and reviewing energy plans? Philippines DOE prepares the generation plan but the transmission development plan is prepared by NGCP (O&M Concessionaire) which is reviewed by Transco (Owner) then referred to DOE. Distribution Development Plans are prepared by the distribution utilities. DOE organize and leads the public consultation. The Power Development Plan is approved by DOE and incorporated in Energy Plan which is submitted to the President.
- Forecast of DOE is based on observed and programmed demand. Information from Department of Trade and Industry (DTI) on what kind of industries are developing. DOE is now making inventories of buildings with their own power generation.
- Vietnam's Master Plan is focused on Gas, Coal and Electricity. Gas and Coal are inputs to electricity generation

c. Private Sector Response to Energy Plan and Security of Supply

- How do we ensure that the private sector will respond in a timely manner based on the energy/power development plan? Can the private sector response be made predictable? How to convert the "Plan" to "Plant"? What is the mechanism to ensure security of supply?
- Philippine DOE announce the plan to investors. The process of how the demand is estimated or forecasted is discussed. DOE also provide assistance to investors for administrative/permitting requirements. The local government is also engaged to understand energy needs and resources. The Philippine has "host community benefits" program.
- From (Japanese participant): From point of view of investors, (1) there is no government guarantee (policy that private sector understands); (2) Investors are relying on PPAs with electric cooperatives. Gencos are exercising market power to get the profit that they want. Also in talking about private sector, it is important to include the "banks" in private sector. They have specific concerns in lending IPPs. In Philippine case, development of small RE projects may have enough capital from banks (local banks can lend for 300 MW or smaller) but for large power plants (e.g., 1000 MW), international lenders must come in.
- The key question then is "How to set-up a guarantee system without the government guaranteeing private investment?"
- Who has the mandate to secure power supply? In Philippines, the DUs must secure power supply for their customers.

d. Rationalization of Small Electric Cooperatives

- Can small ECs be merged? Difficult because of culture where it is even possible to divide but not combine due to 'public' election process for the Board of Director.
- The Mindanao electric cooperatives have aggregated their demand and signed a contract for a 300MW demand trough a competitive process.
- How does DOE see the ECs 10 years after retail competition. The DOE is monitoring the technical and financial performance of the ECs.

e. Philippine WESM

- Why DOE is overseeing WESM? Should this be the role of ERC in Philippines? The WESM is still in transition. There is no Independent Market Operator yet. The ERC also oversees the market fees and monitor prices and anti-competitive behavior.

f. Role of government in awarding power plant (IPP Selection)

- What is the role of GDE in the selection of IPPS? Large scale power plants have already investors (identified) in Master Plan. Small-scale power plants selected by provincial government. Most IPPs in Vietnam are in small power plants. In general competitive process is encouraged but Petro Vietnam have always the right to submit unsolicited proposal.

- PH DOE secretary wants PNOC to come in when there are no takers of RE power development preferably 40% ECs, 40% private and 20% PNOC.

f. Communication strategy for power plant construction

- Vietnam has provincial planning and consultation

g. Electricity and Fuel pricing in Vietnam

- Government set gas, coal and electricity prices. Gas and Petroleum is state monopoly. Gas tariff is based on PPA approved by government.

5. Synthesis

This section provides the synthesis of the dialogue by Prof. Rowaldo del Mundo, JICA Study Team member of IEEJ during the closing of the 4-day activity at Audio Visual Room of the DOE.

5.1 Shared Concerns and Perspectives

The following are the shared concerns and perspectives of the four countries (Philippines, Indonesia, Thailand and Vietnam):

1. Adequacy of supply to meet the growing demand of developing economies
2. Electricity prices that must be affordable to consumers and support industrial and commercial activities of the economy
3. Lack of government financial resources. Hence, the reliance to private sector for capital investment in energy sector
4. Electrification is important tool for social development
5. Renewable energy and energy efficiency must be pursued for sustainable development of the energy sector

5.2 Electricity Market Reforms

1. Indonesia and Thailand remained in controlled/regulated market. Security of supply and affordability of electricity prices through competitive selection of IPPs and regulatory approval of contracts (PPAs). Thailand has well defined policy and process for the single buyer market.
2. Philippines and Vietnam liberalized the generation sector and creating competition in power supply

5.3 Strategies to Control Prices.

1. Except the Philippines, subsidy is used to control the prices. Indonesia for example has very high level of subsidy and the country is looking for ways to manage the impact of reducing subsidy. Looking at the figures reported, however, it appears that even Indonesia remove all subsidies the electricity price is still very much lower than the Philippines.

2. Vietnam has “hidden” subsidy through the non-recognition of costs incurred in the past by government in building the infrastructure (from accounting point of view)

5.4 Strategies for Sustainable Development and Environment.

1. All the four countries have policies and programs that promote renewable energy and energy efficiency.
2. The programs provides fiscal incentives and provide some forms of guarantees in prices (e.g., Feed in Tariff for RE)

5.5 Conclusion

1. The four countries have similar and different conditions, experiences, strategies, and results in their respective pursuit of energy reforms.
2. Each country must continue to seek effective reforms to address the changing situations.
3. It is very important to clarify the role of government to control the desired results of reforms through policy making, planning, regulation, and supervision of the market
4. There is wisdom in sharing experiences (both good and bad) to learn from each other to solve problems and to build on each other strength. So the dialogue at high level and middle level (technical) of government bureaucracy must be continued.

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Annex-III

JICA ENERGY SECTOR DIALOGUE IN JAPAN
15 – 18 October 2013
Tokyo, Japan

Day 1: Meeting with JBIC[1]
Notes of Meeting

1. Participants of Meeting

- JBIC Power and Water Finance Department of Infrastructure Finance Group
  Mr. Masaaki Yamada, Director General
  Mr. Nao Kawakami, Division Director
  Mr. Kazunori Ogawa, Division Director
  Mr. Koji Ishino, Division Deputy Director

- DOE Delegation
  Hon. Carlos Jericho L Petilla, Secretary
  Ms. Loreta Ayson, Undersecretary
  Ms. Zenaida Monsada, Director for Oil and Gas Bureau
  Mr. Mario Marasigan, Director of RE Bureau
  Ms. Carmencita Bariso, Assistant Director of Energy Policy and Planning Bureau
  Ms. Lisa Go, Chief of Investment Promotion Office
  Ms. Victoria Capito, Chief of PFRD Energy Policy and Planning Bureau
  Ms. Mabel, Assistant to Secretary

- IEEJ
  Prof. Rowaldo del Mundo

2. Discussion from DOE by Secretary Petilla

- Investment Opportunities in the Philippine Power Industry are classified as committed and indicative projects. The committed projects are those with documents submitted to DOE including financing. Some of the indicative projects may remain indicative (i.e., will not become committed) as some of them have financing problems.
- Ms. Lisa Go will provide list of investment opportunities that may interest lenders like JBIC
- There is a lot of interest in renewable energy. The DOE will soon be launching Rooftop Solar power in schools. The initial target is 300 MW private schools in Metro Manila.

[1] Note: meeting was very short as the Philippine delegation arrival at JBIC Office was very late. The parties just exchanged short/abbreviated information during the meeting]

Ultimately it will be 1,000 MW for the whole country. Business model is being finalized by DOE. The rationale why private schools in Metro Manila are:

- Schools are horizontal structures (1 to 4 floors buildings). Hence, a lot of space for solar panels
- Private schools owns the properties (lot and building) and are business oriented who can respond if the economics make sense for them
- Price of electricity in Metro Manila is a more expensive compared to the provinces
- At $3Million/MWp of solar, the cost of electricity will be competitive against the grid (about Php8-10/kWh) as it will avoid the transmission and distribution costs

3. Discussion from JBIC

- JBIC have been participating in financing some energy projects in the Philippines such as Pagbilao thermal power plant and San Roque hydro power plant
- JBIC is very active in financing and supporting renewable energy and energy efficiency projects
- JBIC has 3 financing programs which include the following:
    - Green Facility which is considered as Clean Energy Support. This is focus on RE like hydro, PV, and geothermal projects.
    - Financing for Investment Projects. This is direct financing support to investors. For example, Marubeni putting their equity and JBIC will finance the rest of investment requirements.
    - EPC and export loans for contractors and suppliers

JICA ENERGY SECTOR DIALOGUE IN JAPAN
15 – 18 October 2013
Tokyo, Japan

Day 2: Investment Symposium for Energy Sector in the Philippines
Notes of Symposium

Note: This is partial notes including only the presentation of Sec. Petilla and Q&A

4. Opening Remarks

- Mr. Hisashi Hoshi, Board Member of IEEJ gave his welcome and opening remarks[2]

- Usec. Loreta Ayson gave the opening remarks on behalf of the Philippine DOE Delegation. The highlights of the message are:

    - The August 29 – September 4, 2013 Dialogue with counterparts of Philippine DOE in neighboring countries in Southeast Asia (Indonesia, Thailand and Vietnam) provided helpful exchanges which underscore the challenges and concerns of the policy makers and regulators of the energy sector particularly in privatization (and private sector participation) and developing exit strategies in government subsidies
    - The Philippines has restructured the power industry 12 years ago which reformed the electricity market into a competitive market. Modest gains have been achieved but with challenges
    - The PPP program in the Philippines is an investor-friendly framework which may interest the Japanese government and companies. DOE hopes that Japan will be take interest in Philippine energy sector as investment destination
    - DOE looks forward to the report of the JICA-IEEJ Study team on the Policy dialogues and symposium to enhance the policies in the energy sector of the Philippines and attract investments

5. Presentation DOE Secretary Carlos Jericho Petilla

- Investment opportunities in the Philippine energy sector are in power, oil & gas, coal, natural gas, e-vehicles, and renewable energy. DOE has also investor's support program.

- Situation and Opportunities in Power industry
    - People complain when there is no (or lack of) power. Later will complain on the high price of power. Philippines has high price of electricity but during the recent AMEM meeting, the Energy Ministers of other countries including Indonesia has told him

[2] The message of Mr. Hoshi was in Japanese and was not captured due to the wrong channel of the earphone interpretation

that they want to copy the Philippine model on how government can remove subsidies in electricity prices
- Forecasting demand has become more challenging due to changes in economic growth vis-à-vis the 3-5 year time lag of project implementation.
- Philippine power grid is divided into 3 major power grids. These are the Luzon, Visayas and Mindanao Grids. Total dependable capacity in the Philippines is 17,000 MW.
- The Luzon Grid has 767.4 MW "committed" projects mainly coal and diesel power plants and 10,152.5 MW "indicative" projects. The investors must to submit papers to DOE before the Secretary transfer them to list of committed projects. The DOE also give its commitment to investors committed project.
- Visayas Grid with 2,000 MW demand has 429 MW committed projects
- Mindanao has power deficiency but will have enough power in 2015. There are 2,530 MW indicative projects. Petro-Brunie is interested to put up LNG facilities for peaking. Mindanao which is a separate grid (from Luzon and Visayas Grid) launched the Interim Mindanao Electricity Market (IMEM) last September 26, 2013 and is expected to start commercial operation on November 26, 2013
- The National Power Corporation is not allowed by law to build more power plants. The government thrust is to privatize all generation assets of NPC. So far about 80% of the assets are already disposed.
- The Philippine competitive power market is 7 years old. The Doe will introduce a co-optimized reserve market by March 26, 2014.

- Situation and Opportunities in Oil and Gas
  - There are 26 service contracts in upstream oil and gas
  - DOE is conducting in first quarter of 2014 the fifth Philippine Energy Contracting Round (PECR 5) to award more oil and gas service contracts
  - The Philippine National Oil Company will catalyze to provide comfort to investors but preferably with limited participation like 10% equity in JVs.

- Situation and Opportunities in Coal
  - There are several potential coal mines in the Phhilippines and the DOE is currently reviewing and cancelling service contracts because those who have been awarded did not move. The DOE will award the service contracts to investors who will move fast.

- Situation and Opportunities in Natural Gas
  - Malampaya gas field will ran out of gas in 14 years and no due drilling is happening because of the Philippine-China dispute in West Philippine Sea (South China Sea). The Philippines must prepare to import LNG to secure supply to more than 2,000 MW of NG power plants. LNG terminals are necessary.
  - DOE is preparing a NG master plan. The master plan will provide policy and regulatory direction for investments in NG including when and where to put up the facilities.

- Opportunities for e-vehicles
  - There are 523 existing e-trikes. The Philippines has bidded for 3,000 units for year 1 (2014) of the e-vehicle program. There are 4 bidders to design, develop and manufacture the Philippine e-trikes. Two of the 4 bidders are Japanese companies.
  - Year 2 to 5 will be additional 15,000 to 30,000 units of e-trikes annually.
  - After e-trikes (3-wheels), the e-cars (4-wheels) will follow

- Situation and Opportunities in RE
  - It takes 2 years to award RE service contracts. DOE will trim down the process to 45 days.
  - RE being indigenous will require 60/40 PH/Foreign ratio in equity
  - Solar and Wind FIT program is oversubscribed even the policy is first come first serve where investor must develop first before FIT eligibility certificate is issued

- DOE's Investor Support
  - There are 166 permits necessary for foreign investors from development to operation of power plants. The DOE could not do away with many of the administrative requirements
  - DOE will assign a staff to work with investors to obtain the permits from other government agencies and local governments.

6. Q&A for DOE Secretary Petilla's Presentation

- What is the expression of DOE's commitment to "committed" projects?
  - When DOE puts the project in the list of "committed projects" is a statement to other investors that they are "crowded out" already.
  - The DOE commits to help in obtaining permits, in importation, getting tax incentives, etc. to ensure that the project will be implemented

- Unlike in 1990's the IPPs can own 100% of the power company, the new law has make the requirement 60/40 capital ratio
  - The policy has not changed. In the case of the IPP program, the power plant projects are BOT which will eventually be turned-over to NPC
  - NPC is not allowed anymore to sign PPA

- How efficiency in the sector and market be improved? How will efficiency improvement reduce the electricity price? How much is the expected reduction?
  - For the power generation we expect the technology will introduce price reduction. For example, the highest price from a coal power plant is Php6.88/kWh which is from long-term contract signed long time ago. Now the cheapest from coal plant is from the latest plant of GNPower recently commissioned which is only Php4/kWh.

- The DOE has also a transparency program (www.kuryente.com) to enhance competition. “No information – No competition”.
- DOE expects Php1-2/kWh reduction

- For the Reserve Market, who will bear the cost? Will price not go up again? What is the discussion within the government on how this will be paid?
  - There will be no government subsidy. PH cannot afford to have a situation like Indonesia that 23% of the national budget is subsidy.
  - The DOE Secretary believes that subsidy across board is anti-poor because it gives more subsidy to the rich who consumes more

- The EPIRA experience showed that strong capacity for regulation is very important in achieving the desired outcome of policies. What do we expect from the master plan for LNG which will have policy and regulatory statements?
  - Policy and regulatory should work together in a small market (say less than 25,000 MW)
  - Regulation should support to transform the industry towards market driven. We cannot have immediate “free market”.
  - LNG master plan will provide direction where to put the facilities consistent to national objectives.

- Regarding Nuclear power, the PH cancelled the only nuclear plant while countries in SEA are introducing nuclear power in their countries.
  - The BNPP have been completed (not cancelled) but never operated.
  - The DOE policy is to give nuclear a level playing field. It will be treated in the same manner as other sources of power like coal. It will be discussed a lot in public and people will decide.
  - If the in MEARLCO, the price is of electricity to consumers is Php11.50/kWh and an addition of nuclear will not reduce greatly the price, the consumers may not favor it.
  - The PH is also watching Japan regarding its steps in view of the recent nuclear plant incident in Fukishima.

- The private sector will face risk in PPP. Any guarantee for the private sector?
  - PPP in Power generation is market-driven. The 20 year contracts of distribution utility companies who are monopoly and franchised will provide the guarantee and not the government.
  - Investors should study the risks of contracting with 130 DUs all over the country.
  - The DOE is now shaping-up Electric Cooperatives that are considered by GENCOs as risky

- Why Diesel and not solar?
  - PH DOE is not encouraging diesel. We would like to accelerate the LNG for peaking.
  - There is a roof solar power in schools for 1,600 MW capacity and will start in 2014 for the first 300 MW. DOE is finalizing the business model.

- In off-grid, there will still be a need for frequency regulating or load following power plant and will most likely be provided by diesel plants.

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Annex IV

Energy Sector Reform in the Philippines

Policy Paper

In view of the Policy Dialogue on Energy Sector Reform

With Indonesia, Thailand and Vietnam

Held in August and September 2013

September 20, 2013

Japan International Cooperation Agency

The Institute of Energy Economics, Japan

Executive summary

Implications (Lessons Learned and Potential Issues)

This policy paper summarizes the characteristics of power sector policies in comparison to other major ASEAN countries in consideration of the policy dialogues between Philippines and VIP countries.

The primary purpose was to explore the differences on the role of the government in electric power sector among countries and to share the experiences to find potential improvement for the power sector of the Republic of the Philippines (ROP). The primary finding is that the role of government in ROP is limited compared to other countries.

It should be applauded that Philippines has successfully implemented the liberalization and privatization, while some other countries, notably Indonesia and Thailand have slowed down the process. The actual outcome of the implementation depends on the policy environment of individual country and the design of the way to control the market. Philippines is now trying to minimize her control over the market, while other invited countries of Indonesia, Thailand, Vietnam are controlling through direct control of power companies.

The policy dialogues between ROP and other countries highlighted the differences. The comparison through dialogues showed that the shrink in the role of the government at current stage of the design and policy is not flawless. The issues pointed out to be improved are national plan, financing and affordable access to electricity.

- National plan

ROP and all invited countries have national plan for future. All invited countries have governmental function to lead the power development in the future through power companies. Although, ROP also has power development plan, the implementation is indirect and cannot force in the market. Therefore, the limitation of current ROP policy and measure becomes clear in the role of national plan, especially for the cases of energy access for poor, future energy (fuel) mix.

- Financing

The role of government in financing is very important in energy sector from the point of energy security, social welfare, and economic development. The role of the government is to promote the investment in consideration of the public benefit. The problems are pointed out for the case of long term and large scale needs such as large scale coal power plant of more than 1GW of clean/advanced plants to supply in the future. It is indeed cheaper in long term. Because the size of the needs of financing could exceeds the availability in private sector-local banks, the current liberalized market would be difficult to secure economic and clean power development in the future.

- Affordable access

  - Energy, especially electric power is very important for social welfare and standards of life. There are two aspects. One is electrification for rural development and energy access for poor. Except Philippines, the issue of electrification is a matter of social development and direct support from the government lead the improvement of the electrification even in a lower tariff level in Thailand and Vietnam. As for Indonesia, the level of electrification of the Philippines is similar. It is understood the difficulty of electrification for island countries like Indonesia and Philippines. Indonesia uses public money (subsidies) for electrification, which makes easier for plan compared to Philippines approach.

  - The second aspect is the general price level of electric power.

    <u>Liberalized market does not guarantee efficiency: There are still some needs of improvement in the way to control the power sector market.</u>

    All invited countries succeeded to supply electric power with lower level of tariff. Including subsidies, the price levels are estimated below that of the Philippines. It is notable that even the similar archipelago of Indonesia could supply electric power with lower rate including subsidies.

These findings should not be interpreted to discount the importance of the liberalization in the Philippines. The policy environment in the ROP is competitive and this could contribute to energy savings among end users and electric power appliances. Also it succeeded in reduce the spending of the government. Nevertheless, the policy dialogue showed an implication that there are experiences to learn from other countries as will be briefed below.

Policy implication from Indonesia

1.1 Feature of energy policy in Indonesia

1) Electric Power Market Structure

Electric power industry in Indonesia is under the supervision of the central and local governments, and the national power company (Persahaan Listrik Negara, hereinafter referred to as "PLN") is assigned to conduct electricity business representing the national policy. Local state companies, private companies and cooperatives are also able to enter the electricity market. Particularly, the government is promoting investment from the private sector allowing participation as IPPs in the power generation sector and PPUs (Private Power Utility) in the power delivery sector. However, in a real sense, the national power company PLN is mandated to play a leading role as an executing body of the national electricity policy.

2) Stable Supply of Electricity, Sound Power Source Development

Stable electricity supply is an important national policy, and the Ministry of Energy and Mineral Resources (MEMR) sets out the policy plan called RUKN (Electricity Supply Business Plan) to be approved by the House of Representatives. Based on this RUKN, the national company PLN sets up its own business plan called RUPTL. It develops investment plans for the new power stations and transmission & distribution network based on the demand outlook for the next 10 years, as well as targets for cost reduction, energy efficiency improvement and other important policy objectives. By this way, the national policy of Indonesia is directly executed in the market through PLN, although its achievement is sometimes another matter.

Fuel mix of power generation is an important policy target. This is because economics would not always meet with policies for enhancing energy security or mitigating environmental burden, may not support rural electrification or introduction of renewable energies. Indonesia aims to reduce oil dependence by way of increasing use of coal and natural gas as fuel for power generation; this policy is stipulated in the RUKN set out by the central government. Other important national policies are also incorporated in the RUPTL of the PLN, such as rural electrification mobilizing the national budget and priorities given to indigenous geothermal and hydro among various renewable energy sources.

New power stations are constructed in two major streams; one is development by PLN and the other development by private investors, or so called IPPs. PLN's development plan is of course in line with the national fuel mix policy. Later also follows the national fuel mix policy, since each IPP tender is prepared by PLN for certain designated type of fuel resources following the national policy. In this way, the fuel mix policy of Indonesia is controlled and implemented in the electricity market via PLN.

In conduct of IPP businesses, PLN provides IPPs with long term power purchase agreements (PPA). Thus, IPP investors are able to secure future cost recovery and profit, which is an essential condition for an investment decision on a high cost power plant. With PPAs providing confidence for IPP investors, Indonesia is promoting investment from the private sector.

3) Affordable, Lower Electricity Rate

With a view to lower electricity rates, Indonesia is promoting use of domestic lignite and geothermal resources in development of new power generation plants. Although Indonesia is rich in lignite, its high moisture content has hindered its use. However, its use is beneficial in lowering the power generation cost because of the lower prices compared with high quality coals. Also, being a volcanic country, Indonesia is endowed with rich geothermal resources yet to be tapped. The government is promoting development of geothermal power stations which are expected as stable and relatively low cost power sources. These policies are incorporated in the program known as Fast Track Program 1 (2006-2009, 10GW, Coal-fired) and 2 (2010-2014, 10GW, Geo, Coal-fires, etc), and PLN functions as the policy implementation body.

In Indonesia, IPPs account for about 20% of the total power supply. PLN contracts long term PPAs with IPPs, but purchases electricity through a bidding process. Thus, PLN secures competitive prices for its electricity procurement.

In Indonesia, same electricity tariff had been applied nationwide. Upon enforcement of Law No.30/2009, it has become possible to set different electricity rates in respect of regional specific conditions such as electricity supply cost and income level. In Indonesia, electricity tariff has traditionally been set at below cost level to protect lower income people. Resultantly, insufficient cost recovery has brought huge debt piling up as a burden for PLN. In order to improve the situation, the central

government aims to raise electricity tariff in a phased plan.

4) Rural Electrification

Indonesia's electrification ratio was 76.5% in 2012. RUKN set up in 2008 aims a target to achieve 90% in 2020. Rural electrification is decided to be implemented by the national budget, and, according to the Medium Term Development Plan of MEMR, the General Electricity Office (DJK) of MEMR and PLN are implementing electricity development building generating sources and transmission/delivery network. While provincial state, private companies or cooperatives are allowed to participate in the electricity business, PLN is designated as the responsible body with mandate for rural electrification.

1.2 Implication for Philippine

The feature of the Indonesian electric industry, in comparison with the Philippines, is that the national company PLN has an extensive authority throughout the electricity supply chain from power generation, transmission/delivery network through to rural electrification. While both countries set out the national electric policy, their apparent difference is the existence of the executing entity that directly implements the government policies.

For example, in case of developing a new power station, after establishing some policy, the Philippine government is in a position just to wait for a decision of investors. Or, the Philippine government may only be able to set up new regulations for indirect intervention with regard to fuel selection or a thermal efficiency target of a new power station. On the other hand, in Indonesia, the government can directly control the startup date, fuel type and thermal efficiency of a new power station via PLN as a tool for policy-implementation. That is to say, probability of policy execution is apparently higher in Indonesia than Philippine.

From a view point of securing private sector investment, Indonesia provides support for IPP investors by providing purchase guarantees for the amount and price of the electricity to be generated. In contrast, there is no mechanism in the Philippines mitigating the risk associated with IPP projects. For the eyes of investors, therefore, Indonesia may look much less risky as a country for an IPP project.

2. Policy implication from Thailand

2.1 Feature of energy policy in Thailand

1) Electric Power Market Structure

Electric power market in Thailand is under the supervision of the Ministry of Energy and the independent regulator ERC (Energy Regulatory Commission). The transmission sector is monopolized by national company EGAT (Electricity Generating Authority of Thailand). The distribution and retail sector is monopolized by the two national companies MEA (Metropolitan Electricity Authority) for metropolitan area and PEA (Provincial Electricity Authority) for the other areas. Although the power generation sector was dominated by EGAT in the past, now the private IPPs have increased to surpass the share of EGAT (IPP: 55% vs. EGAT:45% as of June 2013).

2) Stable Supply of Electricity, Sound Power Source Development

In principle, the Ministry of Energy is responsible for preparation of the Power Development Plan, while the national company EGAT is deeply involved in its preparatory work. The latest document, "Power Development Plan 2010 revision 3," illustrates development plans for new power station and transmission network expansion. Thailand's power sector is featured with its high dependency on natural gas. In view of the extremely high gas dependence and insufficient domestic resources, the government plans to diversify fuel sources to use coal, renewable energy and nuclear; such policy is incorporated in the latest power development plan.

There are two major streams to construct new power stations; one is direct development made by EGAT, and the other is power plant construction by private investors so called IPPs. The former is of course in line with the national fuel mix policy, while the later also follows the national fuel mix policy, as IPP tenders are offered by EGAT for certain type of fuel conditioned after the national policy. In this way, the fuel mix policy of Thailand is structured in the market through EGAT.

IPP projects are implemented based on the long term power purchase agreement (PPA) signed between EGAT and IPP investors, which provides basis for the cost recovery and future profit. This is the same mechanism as observed in the case of Indonesia.

3) Affordable, Lower Electricity Rate

In Thailand, IPPs account for more than half of the total electricity supply. As EGAT procures electricity from IPPs under the long term PPAs, electricity prices are decided at competitive prices through bidding process. Thus, EGAT is able to secure electricity at competitive prices.

In order to control the generation cost at low, Thailand has promoted use of domestically available natural gas and lignite. However, facing limited availability of the domestic natural gas resources and strong opposition from residents against coal-fired power plant, Thailand may have to increase use of imported fuels. Thus, fuel cost, comprising a significant part of power generating cost, should be exposed to international energy price fluctuations in future.

Electricity rate is regulated by ERC with a cost-base principle. Since EGAT, MEA and PEA are not exposed to competitive pressures, strict monitoring and price review by ERC are needed to control the electricity tariff at a reasonable rate.

Cross subsidy among customers are provided for the low income families. A part of the electricity tariff collected from richer consumers such as large industries is transferred to tiny residential consumers whose consumption is less than 50kWh monthly.

4) Rural Electrification

Electrification ratio is 99.8% as reported in August 2013, while the remaining tiny portion represents new requirements at land development sites. For financing rural electrification activities, cross subsidy among national entities is provided. Certain amount of money is transferred from EGAT and MEA to the Power Development Fund, and then PEA uses the fund for rural electrification.

2.2 Implication for the Philippine

The feature of the Thai electric industry, in comparison with the Philippines, is that the national company EGAT, MPA and PEA are given an extensive authority throughout the electricity supply chain from power generation, transmission/delivery network through to rural electrification. While both countries set out the national electric policy, their apparent difference is the existence of the executing entities that directly implement the government policies. Thus, probability of policy execution is higher in Thailand than in the Philippines.

From a view point of securing private sector investment, likewise with Indonesia, Thailand provides support for IPP investors by providing purchase guarantees for the amount and price of the electricity to be generated. For the eyes of investors, therefore, Indonesia may look much less risky as a country for an IPP project.

3. Policy implication from Vietnam

3.1 Feature of energy policy in Vietnam

1) Electric Power Market Structure

Electric power market in Vietnam is under the supervision of General Directorate of Energy and independent regulator Electricity Regulatory Authority of Vietnam (ERAV), both are under the Ministry of Industry and Trade (MOIT). The transmission & distribution sectors are monopolized by national company EVN. However in the generation sector, private investments through BOT (Built, Operate and Transfer) and IPP are gradually increasing their share because of declining investment capability of EVN. Vietnam is currently under the process of electricity market reform through unbundling of EVN, creation of wholesale market and liberalization of the retail market as experienced in Philippine; parts of generating plants and delivery activities of EVN are being capitalized and these shares are sold but not exceeding the majority limit.

2) Stable Supply of Electricity, Sound Power Source Development

Power development plan is set up by MOIT. The latest document, Power Development Plan 7, illustrates development plans for new power station and transmission network expansion. To meet a sharply growing electricity demand, the government plans to maximize the use of domestically available resources in both demand centers in north and south of the country, in particular coal.

There are three major streams to construct new power stations; one is direct development made by EVN, and the others are power plant construction by private investors through IPPs and BOTs solicited by EVN. The former is of course in line with the national fuel mix policy, while the later also follow the national fuel mix policy, as IPP and BOT tenders are offered by EVN for certain type of fuel conditioned after the national policy set out by MOIT. In this way, the fuel mix policy of Vietnam is structured in the market through EVN.

However, a large amount of debt is piling up at EVN arising from under recovery of cost for a long period (EVN has been accruing deficit as the balance of increasing cost while retail tariff were kept low), posing concerns on their future investment ability. This may also threaten even payment of EVN for the electricity purchased from BOTs and IPPs. Therefore, the government is expecting greatly on national companies such as Petrovietnem (charge of oil & gas) and Vinacomin (charge of coal) who have capabilities and fuels for power generation to participate in new power station development, in addition to promotion of IPPs and BOPs.

Long term power purchase agreement (PPA) between EVN and BOT/IPP investor functions as a measure for securing investment from the private sector. This is the same mechanism observed in Indonesia and Thailand. In future, however, the government plans to reform the electricity market and establish Vietnam Competitive Generation Market (VCGM) to trade electricity through the wholesale market.

3) Affordable, Lower Electricity Rate

In order to lower the electricity cost, Vietnam is promoting use of cheap fuel, in particular domestic coal. The government plans to increase the share of coal in the power generation mix up to more than half by 2030 from about 20% at present. This policy target will be implemented either through investment by EVN or private sector investment controlled by EVN.

In Vietnam, IPPs account for about 20% of the total electricity supply. As EVN procures electricity from IPPs under the long term PPAs, electricity prices are decided at competitive prices through bidding process. Thus, EVN is able to secure electricity at competitive prices. Nevertheless, the present electricity tariff lower than the cost is harming investment capability of EVN, while Vietnam needs substantial development of the electricity sector in the course of economic development. Thus, it is desirable to raise it to a reasonable level as soon as possible.

4) Rural Electrification

Electrification ratio was 98% in 2012. Power Development Plan 7 sets a target to achieve 100% by 2020. In Vietnam, "Commune," a unit of local society, has played a major role in rural electrification. However, so developed distribution networks sometime show technical inadequacy, EVN is taking over these businesses to rehabilitate the network.

3.2 Implication for the Philippine

The feature of the Vietnamese electric industry, in comparison with the Philippines, is that the national company EVN is given an extensive authority throughout the electricity supply chain from power generation, transmission/delivery network through to rural electrification. While both countries set out the national electric policy, their apparent difference is the existence of the executing entities that directly implement the government policies. Likewise with Indonesia and Thailand, probability of policy execution is higher in Vietnam than in the Philippines.

At present, electricity market reform is in progress in Vietnam, as the Philippines has experienced, unbundling EVN and creating wholesale market and liberalizing retail business step by step. Thus the market situation may change in future. It is a common policy objective to realize stable electricity supply at affordable price while securing sufficient investment for development.

4. Potential for policy improvement in the Philippines

4.1 Strengthening government intervention for power plant development

A large amount of capital is required to build a new power station. Since its payout period is longer, investors need to have a firm prospect on the sale and price level of their electricity generated throughout the project period before finalizing their investment decision. In Indonesia, Thailand and Vietnam, long term PPAs are functioning to provide this required assurance. However in the Philippines where electricity market has been liberalized in a form to virtually prohibit activities of the national power company, it is not possible to adopt this method. In the Philippines, therefore, it is necessary to create a mechanism to "mitigate the uncertainty relating to the sale and price level of the electricity to be generated by private sector investment to a reasonable extent."

As NPC is banned to develop new generating plants under the EPIRA law, it is necessary for securing stable supply and selecting favorable fuel mix to create an entity that will carry the responsibility to implement policy objectives with sufficient mandate, budget and capability.

Philippines may learn from precedents in already liberalized markets. For

example, "Vesting Contract[1]"applied in Singapore give us an effective idea to provide guarantees on the future electricity selling price. Under the system, a condition will be applied to certain part of the electricity sold at the wholesale market that either the price the Administration deems as the long term marginal cost or the wholesale market price, whichever is higher, shall be applied. If the wholesale price is lower than the long term marginal cost, the balance of them shall be paid to the electricity operator. Thus, this system works to lock-in the future selling price for the generated electricity. Vesting Contract in Singapore is reviewed annually. If we add some coefficient(s) in the formula such as to reflect changes in Price Index or fuel cost, we will be able to install an automatic adjustment mechanism toward the target price that works for a longer period, and shall work as price guarantee for IPP investors.

"Capacity Mechanism" or "Capacity payment" which is being considered in Europe may give another idea. This is to pay additional fee for the standby power plants to promote investment for this kind of power plants. As the operation rate of standby power plant is naturally very low, no one would invest on such low profitable plant unless certain external support or obligatory rules.

Another possible suggestion is to deem the gas-fired power generations as a clean energy source and let them applicable for a formula similar to Feed-In Tariff (FIT) or Renewable Portfolio Standard (RPS). Under the current market condition, it is anticipated that a relatively small-sized, less efficient coal-fired power plant may become most competitive in the Philippines, and thus this idea contributing to power source diversification and responding to environmental concerns may be worth considering. This is an idea to set a rule for distribution utilities to purchase certain part of electricity from gas-fired thermal generators that qualifies certain standard relating to fuel efficiency and GHG emissions. Applying such rule, it will be possible to contain the electricity purchase price conducting peer review on the cost, while it is also able to avoid upsurge of unnecessary capacity setting some ceiling on such purchase year by year.

Another idea may be learnt from Vietnam where other sector national companies are expected to make some contribution. Promoting the gasification of the electricity sector in the Philippines, other national entity such as PNOC may be able to construct

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[1] Vesting Contract: Certain portion of generated electricity should sold at lower price of target price or wholesale market price. Target price is calculated by regulator with consideration to long term marginal cost of gas-fired power plant in Singapore.

the LNG import terminal and gas pipelines to mitigate the burden of the power sector in the initial investment.

All of the above measures require additional fund. In view of their purposes to broadly secure electricity supply, it will be appropriate to collect the fund on top of the electricity tariff widely and thinly from all final consumers as a surcharge.

4.2 Lower Electricity Rate

The fundamental rule for reducing prices in a liberalized market is to enhance competition. Market liberalization aims to realize efficient business development and operation through competition, while it is always controversial how to enhance the competition properly.

First of all, on the supply side of the wholesale market, power generators are guarded by the long term PPA contacted with former NPC and not exposed to competition. IPPs contracted with distributors are also excluded from competition. Thus, only a limited amount of electricity could be supplied to WESM, while completion sufficient for reduction of electricity price as a whole would not come up. In order to solve this situation, it may be considered to obligate the suppliers to sell the whole electricity at WESM. However, as it would not be realistic to assume enforcing break-up of the existing contracts between NPC/IPP and distributors, it may take long time to realize the above mentioned market situation.

At the same time, it is important to increase new entrants to the power generation sector. Its first step will be to create good investment environment as already discussed in Section 4.1. From the experiences in Europe or the USA, introduction of "Marketer" or middlemen of electricity trading to the electricity market would be an option. However, in view of the market size and difficulty of interconnection with neighboring countries, it would be possible in the Philippines that we would not be able to secure a sufficient number of Marketers to see the market functions well.

As a regulatory measure, "Vesting Contract" of Singapore discussed in Section 4.1 gives us a good suggestion. This scheme is to lock-in the price for certain portion of the generated electricity making it possible to avoid sale of electricity at the wholesale market at extremely high or low cost compared to the long term marginal cost.

Secondary, on the demand side of the wholesale market, policy measures enhancing retail competition are already installed in the Philippines through partial

liberalization of the retail market and participation of Retail Electricity Supplies (RES). For a time being, the Philippine government may be required to monitor the market closely and remove barriers for competition, if any.

In future, Philippines may consider expanding the coverage of deregulation. Then, it is necessary to carefully examine the possibility of new entrant to the market and consumers' behavior expected there. On the large consumers, who themselves are cost sensitive and may act positively, and they are attractive customers for Retail Electricity Supplier (RES), active competition can be expected. On the other hand, on small consumers like household, many of them are not cost sensitive and are not attractive customers for RES, there is a risk that sufficient competition would not come up even if market is deregulated.

It should be noted here that, as the market becomes more competitive, it becomes more difficult to invest, in particular for long term investment for infrastructure. In a situation under fierce completion, many elements become more unpredictable increasing risks for investment. Therefore, it is necessary to set out a scheme to enhance investment as discussed in Section 4.1, while such institutional scheme has a contradictory effect to distort market, as players may come in the market regardless of the signal given at the market. In reality, contracts with distributors may be providing liabilities for suppliers. Thus, measures to enhance competition may work as barriers and make players intimidated to move for new investment.

At present, motivation for investment in the power industry is not high enough in the Philippines. It is an economic principle that capital funds moves for profitable projects, without regulation or guidance, beyond industries and even international borders. Setting national plans and policy objectives is one thing, but for their implementation, it is necessary to set up an appropriate scheme in which sufficient capital fund will flow-in at appropriate timing, and also create an entity with sufficient mandate and capability to plan and implement them righteously.

4.3 Enhancing Rural Electrification

Rural electrification can be understood as a social policy objective beyond market principles, and thus government is supposed to implement it with strong determination. Many countries has pursued rural electrification under national initiative, typically China aimed at 100% electrification before the Olympic Game in Beijing.

Vietnam has rapidly improved its electrification rate, which was achieved assigning a policy priority on it and pouring in substantial budget and implementing team. In Vietnam, their top down approach may have functioned well under the socialist system. In Thailand and Indonesia, rural electrification has also been driven under strong initiative of the governments. As well in the Philippine, it will be possible to speed up the progress by preparing more capable entities and budgets under strong government initiative.