# Chapter 4

# Policy Implication

This study presents seven recommendations aimed at reducing the Philippines' costs in the whole electricity supply chain, ranging from fuel supply to distribution.

**Table 4-1. Recommendations to Reduce Electricity Cost in the Philippines**

| | | Effect to reduce cost |
|---|---|---|
| 1 | Coordinate open tender for power plant development | |
| 2 | Shift back to economic dispatch | ✓ |
| 3 | Reduce fuel cost | |
| 4 | Adopt thermal efficiency standard for power generation | ✓ |
| 5 | Consider renewable electricity as an economically feasible option | |
| 6 | Reduce T&D loss | |
| 7 | Create good business environment to reduce WACC | ✓ |

Source: Author.

Among the options, recommendations to 'Shift back to market-based load dispatch', 'Adopt thermal efficiency standard for power generation', and 'Create good business environment to reduce WACC' could have the most significant impact on cost reduction.

### 4.1 Coordinate Open Tender for Power Plant Development

To reduce the power supply cost, development of power sources should be implemented in a balanced manner and in accordance with a through plan on the onset. The development of power plants should first start with a power development plan – a plan that specifies the time, location, the fuel and technology to be used, and the capacity of the plant, based on the potential power demand.

Thereafter, such plan must be implemented under a competitive environment.

Indonesia, Malaysia and Thailand's grid system operators (PLN, TNB and EGAT, respectively) recruit IPPs through open tender in accordance with their respective plan. In the tender of IPPs, the year of operation, plant capacity (MW), and type of fuel are indicated, and competitive bidding is conducted. Therefore, power sources in accordance with a long-term power development plan can be secured at minimum cost.

In the case of the Philippines, its government has formulated a power development plan; however, the country has no tangible means to implement it. Its power development is left to private companies' decision on investments. Thus, cases of inconsistency with the plan could arise in terms of the required year of operation, plant capacity, and type of fuel.

To address the problem, this study suggests that the Philippine government's requirements for new power plants should be defined in open tenders. The idea is to control the time, generation capacity, and fuel type – all of which are currently left to the judgment of its private companies. Through bidding, power development projects will be under pressure to control costs.

As long as power development is left to the judgment of private companies, it will be impossible to reduce the uncertainties and difficult to achieve economical power development projects.

### 4.2 Shift Back to Market-Based Load Dispatching

From the viewpoint of daily load-dispatch order, all power distribution companies must procure electricity from the wholesale market through competitive bidding rather than bilateral transactions. Capturing change in the power generation cost and reflecting it in the dispatch order would be ideal. In addition, the approach will be effective in that that it would urge high-cost power sources to withdraw from the market.

Table 4-2 lists examples of wholesale markets. Here, all participating power producers supply generated electricity to a single wholesale market, while retailers procure electricity from this wholesale market.

**Table 4-2. Examples of Wholesale Markets**

| | |
|---|---|
| Germany | All market participants form a balancing group by region. |
| Nordic countries | All market participants sign a contract with the 'balancing responsible party' or become one themselves. |
| United Kingdom | All power producers and retailers with a capacity 50 MW or more are placed under the control of the TSO as 'units participating in supply-demand adjustment.' |
| United States | Under the PJM system, all market participants follow the transmission system operator's instructions. |

TSO = transmission system operator, PJM = Independent system operator covering Pennsylvania, New Jersey, and Maryland

Source: Author's compilation.

Although the Philippines has WESM, a competitive wholesale electricity market, its actual utilisation rate remains approximately 10% of the total power demand. Therefore, the load-dispatch orders conducted by NGCP are each bound by a contract with a power generation company of each power distribution company, and are not necessarily cost-efficient.

In transitioning from the present electricity transaction/load-dispatch order to the ideal mechanism (i.e. market-based load dispatch), how to deal with the existing contracts between a power generation company and a power distribution company is a problem. Low-cost power generators will not be an issue as they will preferentially be dispatched under the proposed mechanism. However, dispatched orders for high-cost power generators will decline – to lower than the amount contracted in PPAs – exposing the power generators to potential shortages in investment recovery and operating losses.

The Philippines used to practice economic dispatch in principle in the past. However, due to this very problem mentioned above, the country shifted back to the maintenance of existing PPAs.

One of the solutions to this problem is to mandate newly built power plants to adopt the market-based dispatch mechanism, while allowing existing power plants to manage their power supplies per their PPAs. Although this solution will pave the way for a shift to the economic dispatch system, it will take a long period for the transition to be completed, and high-cost PPAs will survive.

Possible methods to minimise the impact of high-cost PPAs include the following:

1) Set Capacity Charge as a minimum payment for high-cost power plants to allow them to recover their fixed costs (i.e. minimise the payment).

2) Review the PPA-contracted charges based on the present cost structure.

The country should fundamentally aim for option (2), although it is difficult to implement. The factors that affect power generation costs have now substantially changed since the time when each PPA was signed. Therefore, the new review of charges is justified.

**4.3 Reduce Fuel Cost**

The Philippines' power generation sector has been liberalised, and IPPs independently procure fuels. Thus, it is difficult for the government to intervene in this sector.

However, as the Philippines' coal and natural gas prices are higher than in other countries, the government is required to lower the prices. Given that the main actors in fuel procurement are the IPPs, it makes sense to obligate IPPs to reduce operating costs. In the present mechanism, earnings of each IPP are protected under a long-term PPA with a power distribution company. Therefore, it can be inferred that the IPPs' incentive to reduce fuel costs is weak. There needs to be a mechanism where IPPs autonomously take the initiative to reduce the power generation costs. One such mechanism is a load-dispatch order that reflects the power generation cost or full-scale competition in the wholesale electricity market. The fuel cost represents a great portion of the power generating cost. If the selling price of electricity is exposed to competition, IPPs will race to lower the fuel costs.

Assuming IPPs do strive to reduce the fuel costs, such costs could remain high in some cases. Their ability to drive down the fuel costs could depend on the fuel procurement expertise of each IPP and the market environment. The fuel procurement expertise of an IPP includes the company's ability, know-how or bargaining power. And these are the factors that are beyond government's oversight.

The market environment, meanwhile, may consist of trade practices, a supply-demand balance specific to the region, and others. Take the trading of LNG as a straightforward example. Prices of LNG traded in Asia are higher than that in the Atlantic market. However, this price disparity cannot be resolved by a single company. To eliminate the disparity across markets, it is necessary to increase the liquidity of commodity trading. If energy products such as LNG are traded more frequently and more freely, the price disparity between markets will be reduced, in theory. By supporting the increase of the trading liquidity in the international market, the government can help Philippine IPPs procure fuel for power generation at more competitive prices.

**4.4 Adopt Thermal Efficiency Standard for Power Generation**

In countries with high fuel costs, an increase in the thermal efficiency will significantly reduce the fuel cost. The use of highly efficient technologies can likewise control the cost of power generation in many cases. It is, thus, high time to establish an efficiency standard for power plants.

Certain quarters have argued that high-efficiency power plants are expensive. The investment involved in such huge projects will simply offset fuel cost reduction efforts. Other studies, on the other hand, indicate that larger initial capital expenditure of high efficiency technology can be compensated by a reduction in fuel cost. For instance, Otaka et al.[14] estimated levelised cost of electricity for different combinations of coal price and plant cost. The study showed that in most cases, Ultra-Supercritical technology with 42.1% thermal efficiency can be less expensive than Subcritical technology with 38.2% thermal efficiency.

[14] Yasuo Otaka and Han Phoumin, *Study on the Strategic Usage of Coal in the EAS Region: A Technical Potential Map and Update of the First-Year Study*, 11 January 2016.

**Table 4-3. Sensitivity Analysis of LCOE of Coal Power Plant**

| | | Ultra-Supercritical (42.1%) | | | Supercritical (41.1%) | | | Subcritical (38.2%) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | High EPC (USD 2,076 million) | Medium EPC (USD 1,941 million) | Low EPC (USD 1,867 million) | High EPC (USD 2,043 million) | Medium EPC (USD 1,908 million) | Low EPC (USD 1,796 million) | High EPC (USD 1,925 million) | Medium EPC (USD 1,796 million) | Low EPC (USD 1,688 million) |
| Coal prices | High (USD 60/ton) | 5.39 | 5.27 | 5.20 | 5.46 | 5.34 | 5.23 | 5.68 | 5.55 | 5.45 |
| | Medium (USD 50/ton) | 4.87 | 4.74 | 4.68 | 4.93 | 4.80 | 4.69 | 5.10 | 4.97 | 4.87 |
| | Low (USD 40/ton) | 4.35 | 4.22 | 4.15 | 4.39 | 4.26 | 4.16 | 4.52 | 4.39 | 4.29 |

LCOE = levelised cost of electricity; USD = United States dollars.

Source: ERIA, 11 November 2016.

The section below introduces Japan's cases as reference. Its experiences can show nations such as the Philippines how to take the lead in requiring power producers to increase the energy efficiency in some form.

In Japan, electric utilities are required to implement the following energy-saving measures:

- Annual energy efficiency reporting
- Minimum thermal efficiency requirement for 'new' power plant
- Minimum thermal efficiency requirement for 'existing' power plant

Measure (1) requires each electric utility to record and report the energy efficiency of the whole company (including the power plant) and an improvement measure, every year.

Measure (2) stipulates a minimum standard that newly constructed thermal power plants should achieve for each fuel type. To observe this standard, any entity constructing a new power plant must adopt a high-efficiency technology.

**Table 4-4. Efficiency Standards for Newly Built Power Plants in Japan**

| Fuel | Efficiency Standard | Basis for Establishment |
|---|---|---|
| Coal | 42.0% | Established in the light of the value of USC, which has already started operation as a commercial plant with no problem in economic efficiency and reliability. |
| Gas | 50.5% | Established in the light of the value of combined cycle power generation, which has already started operation as a commercial plant with no problem in economic efficiency and reliability. |
| Oil | 39.0% | Generating efficiency of cutting-edge coal-fired and other thermal power generating equipment |

USC = ultra-super critical water boiler technology.

Source: Ministry of Economy, Trade, and Industry, the government of Japan, 9 February 2016.

Measure (3) stipulates two index types. In Table 3-4, the figures 41%, 48% and 39% contained in the formula for Index A represent thermal efficiency values that existing coal-fired, gas-fired, and oil-fired thermal power plants should achieve, respectively. To achieve these values, it is necessary to maintain the efficiency of the existing thermal power plants and abolish low-efficiency thermal power plants. On the other hand, the target value 44.3% in Index B is based on the minimum thermal efficiency requirement (41%, 48% and 39%) of existing thermal power plants, and the power supply mix targets for 2030 (consisting of 26%, 27% and 3% for coal-fired, gas-fired and oil-fired thermal power plants) in the total electricity supply.

### 4.5 Consider Renewable Electricity as an Economically Feasible Option

Depending on the project, the utilisation of renewable energy may also help reduce the generation costs. In recent years, the decline in the cost of solar PV has been noticeable. As mentioned in Chapter 2, large solar parks are likely to compete with existing thermal power stations. In Luzon, where the demand is strong and the absorption margin for variable renewable energy is large, active use of renewable energy must be considered although the accompanying costs should be scrutinised, too.

**Table 4-5. Efficiency Standards for Existing Power Plants in Japan**

| | **Index A** | **Index B** |
|---|---|---|
| Purpose | • Appropriately maintain and control the existing thermal power plants and the thermal efficiency achieved at the start of operation.<br>• Urge retirement of low-efficiency, old thermal power plants. | • Urge constitution of a power supply mix for 2030, which the government should aim for. |
| Formula | $\frac{\eta_{coal}}{41\%} \times S_{coal} + \frac{\eta_{gas}}{48\%} \times S_{gas} + \frac{\eta_{oil}}{39\%} \times S_{oil} > 1.00$<br>η: annual average thermal efficiency [%]<br>S: share amongst fossil power generation [%] | $\eta_{coal} \times S_{coal} + \eta_{gas} \times S_{gas} + \eta_{oil} \times S_{oil} > 44.3\%$<br>η: annual average thermal efficiency [%]<br>S: share amongst fossil power generation [%] |

Source: Ministry of Economy, Trade, and Industry, Government of Japan, 9 February 2016.

### 4.6 Reduce Transmission and Distribution Loss

Although the power T&D loss in the Philippines is on the downtrend, and the ERC has recently set a target for T&D losses, there is still room for improvement. Transmission and distribution losses are divided into (i) technical loss resulting from overloaded wires, dilapidated transformers, etc.; and (ii) commercial loss resulting from electricity theft, metering error, etc.

To reduce the technical loss, there is no other option but to continuously invest in improvements (e.g. enhancing lines or updating the transformer equipment) so as to keep up with the growth of power demand. For instance, in 2006, the United States provided incentives such as a higher pay rate and accelerated depreciation to investments to projects that meet political purposes such as investments in transmission, system enhancement associated with renewable energy power generation, and adoption of advanced technology. Provision of such an incentive in the review of transmission/distribution charges may also be helpful.

Meanwhile, there are many ways to reduce commercial losses. For instance, when Indonesia increased its electricity charge from 2000 to 2003, electricity theft increased. The distribution loss rose from 9.1% in 2000 to 14.4% in 2003. In response to this, PLN and the police jointly formed an electricity theft investigation team and took measures against violators. Partly due to this effort, the transmission/distribution loss went down to around 9% by 2015.

### 4.7 Create Good Business Environment to Reduce WACC

There are various risk factors affecting the WACC. One of these is the sovereign risk. Based on to ratings published by a credit rating agency, the ratings of the Philippines and Indonesia are lower than that of Malaysia and Thailand.

In addition, the Philippines ranked 113th amongst 190 countries in terms of its risk in doing business – the lowest ranking amongst the four countries covered by this study.

This indicates that in the Philippines, businesses may be exposed to higher risks at the start of their operation or funding than in other countries. To reduce the WACC, it is essential to establish a favourable business environment.

One of the notable risk factors in the Philippines is natural disasters. Although climates cannot be controlled, energy infrastructure's ability to withstand the wrath of natural disasters should be improved. Such readiness can reduce risks and positively impact the funding cost directly and indirectly. While countermeasures against natural disasters are naturally costly, well-built infrastructure may have lesser life cycle costs than vulnerable infrastructure.

In addition, government must not forget to build the capability of regulatory bodies' officers to conduct quality rate reviews. Officers need to be adequately trained to effectively negotiate a reduction in projects' rate bases and WACCs. They may, for instance, be sent on exchange programmes with counterpart regulatory bodies in other countries to gain the needed skills.

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