



The Impact of Technology and Reliability of Electricity Supply on Its Cost

By: Ir. Mah Soo

Electricity has become an integrated part of modern living to such an extent that it has been taken for granted and even a short interruption in the electricity supply would become intolerable. In the home front, its availability and reliability would bring quality of lifestyle and goodwill to its citizens. In the commercial context, electricity has been identified as an important prime mover towards the country's development and progress towards achieving Wawasan 2020. The progress of a country from a developing country to become a developed country would depend on the development of the country's electricity supply infrastructure. The reliability of the country's electricity supply could also contribute towards creating the confidence for foreign direct investment (FDI) into the country.

As the Electricity Supply Industry (ESI) is currently a regulated industry, it is of utmost importance that the Malaysian Government pays special emphasis on its strategic planning and implement for the way forward.

As the saying that "There are no free lunches" implies, there is a definite cost to everything. One could not get anything for free. The Chinese has another way of saying it: "One cent of Value for One cent of Worth of Quality of goods". The English version of similar meaning would be "If one pay peanuts, one would get monkeys". This is true for everything with not exception to the cost of production of electricity for some expected performance.

Malaysia has seen development by leaps and bounds. We could pride ourselves with the Petronas Twin Towers which has become the icon for Kuala Lumpur, just as the Eiffel Tower is for Paris. We have good integration of the National Grid for the Transmission

with its Distribution network to bring electricity to consumers. Our rural electrification efforts have brought electricity to consumers throughout the country. The same could be said of our transport infrastructure with our expressways, federal and state road systems and electrified commuter, Light Rail Transit, Monorail and Express Rail Link systems that could be rated to be on par with international standards. Our hospitality and service sectors have also gained international recognition. All the above showed that Malaysia could indeed be rated of having a First World infrastructure.

Malaysia has generation of electricity from various fuel types and wide varieties of generating plants both in types and designs that we could be rated as experienced operators in the electricity generation sector by international standards. The same could be said with the automobile industry, where we produce our own cars together with assembly plant for some other international brands. In fact, we have carried out projects in the conversion of cars from using petrol to palm oil and natural gas in line with the sustainable energy programs.

Our engineers have also gained world-wide recognition in the international engineering fraternity. One of The Institution of Engineers, Malaysia (IEM)'s Past President, Academician, Datuk Ir. Lee Yee Cheong has been appointed as the President to the World Federation of Engineering Organisation (WFEO) and our IEM's immediate Past President, Ir. Professor Abang Abdullah Abang Ali, the President to the Federation of Engineering Institutions of Islamic Countries (FEIIC). The Institution of Engineers, Malaysia is one of the founder members of the ASEAN

Engineers Register (AER) and has been appointed to be the first Secretariat to the ASEAN Engineering Commission/Asian and Pacific Engineering Engineering Commission, with our IEM's Past President, Ir. Dr Gue See Sew as AER Head Commissioner, our IEM's President, Ir. Prof. Dr Ow Chee Sheng and Ir. Rocky Wong Hon Thang, AER Executive Committee Member. This only shows that we, Malaysian, have achieved international standing in term's of technology and engineering expertise.

As for reliability of electricity supply, it has two components; namely adequacy and security of the supply of electricity. Electrical power adequacy is to have sufficient available generating capacity to cater for the aggregated demand of customers at all times. This requires careful planning of the scheduled outages and despatch of generating plants as well as planning for future growth and demand. Our current installed generation capacity and the availability of generating plants to meet the expected demand have so far been adequate with some excess margin of generation. New plant-ups of generating plants have to be carefully planned and implemented to cater for the expected growth in demand as there would be long gestation time from design, financial close, construction, commissioning to the final commercial operation stage.

The security of the electricity supply network or grid system has to be robust to ensure it can withstand unscheduled transient shocks from electrical faults in the system as well as at the generating plants. The electricity supply system has to have adequate ancillary services such as spinning reserves and reserve margins of generating plants to meet any eventualities.

As expected, there is a cost to the above two aspects. The cost factors towards electricity generation and making electricity available to the consumers would be from the three major sectors. These three sectors with their respective other supporting services has to be integrated into one whole process of supplying electricity to consumers to make it efficient as a single entity. The three major sectors are Generation, Transmission and Distribution. Each has its own priorities and benchmarks. With continual Research and Development (R & D) and advancement in technology in producing better plant and equipment, the Electricity Supply Industry (ESI) have been enticed to improve and upgrade its equipment and plant for improvement of reliability and efficiency. Another major consideration of improvements and upgrades is due to obsolescence of old equipment and plant where spare parts are difficult to procure and will cost much more as they might no longer be in production. All these do not come cheaply. In fact the utilities have to involve huge sum of capital in both the initial capital outlay in the form of new plant-ups and improvement and upgrades of existing equipment and plant as well as operational expenditure in operating and maintaining already installed to ensure its safety, availability and reliability. Hence it is not just a one-off type of investment but some perpetual spending up to their expected useful lifespan which is about 20 to 25 years.

To ensure adequacy of electricity generation, generators have to stock up spares, especially critical spares, to ensure they could be made available when needed during scheduled or unscheduled outages. This would ensure the generating plants could come back as fast as possible and within the specified time. This would again tie up capital. Inflation would definitely affect the cost of spares and this have to be factored in the budget for prudent financial control.

Next consideration would be the cost of fuel. As a rule of thumb, the cost of fuel factored in the operation expenditure (OPEX) of generating plant would be about 75% of the total OPEX, but would be about 10% of the total cost of the whole process. Currently, the gas price has been capped but would expire by end of December 2005.

A review is pending and it is everybody's guess on what the new price would be. It would definitely at best, be the same if not more to reflect on the current increased oil and gas prices in the global market place.

All the above would give us an idea of the costing for the whole process of electricity from start to finish till ending at the consumers end and it would be prudent to factor all these cost centers into the planning of financial budgets.

With the above, where would our electricity utilities stand with international benchmarks? Tenaga Nasional Berhad, TNB, though has already become a private entity, originated from the Central Electricity Board (CEB) which was a government statutory body. Though through such drastic changes from a public corporation into a private business entity, TNB has still been expected to maintain the role of national custodian of the supply of electricity to all Malaysian citizens, commercial corporations and industries that have make applications for electricity supply. In addition, TNB is expected to have a reasonable rate of return of equity to its stakeholders.

Comparison data of some utilities on the following considerations might give us some idea for benchmarking.

- i. System Average Interruption Duration Index (SAIDI), which is measured in minutes per customer per year, could be used to compare reliability performance of electrical supply system;
- ii. The average cost of electricity; and
- iii. The return of capital employed.
 - a. The SAIDI figures of Peninsular Malaysia would be in the order of about 106 as compared to Thailand around 120 to 200, Hong Kong around 5 to 8, Singapore around 2 to 5 and Japan around 2 to 5.
 - b. The average cost of electricity of the above utilities would be as follows: Peninsular Malaysia about RM0.23, Thailand around RM0.30, Hong Kong around RM0.40, Singapore around RM0.35 and Japan around RM0.65.

- c. The return on capital employed for the different utilities would be as follows: Peninsular Malaysia about 3.6%, Thailand around 12.5%, Hong Kong around 14.9%, Singapore around 8.5% and similar data for Japan not available.

There have been many reporting on TNB's numerous appeals to the Malaysian Government to review the electricity tariff as it has not been revised since 1997 to be in line with the inflationary increase in costs of equipment as well as fuel which had seen recent sharp hike of fuel cost as these increases have caused extra burden in the form of extra costs on energy generation, transmission and distribution. Many a times there is constant demand for better performance by consumers without any reference to the tariff. Could we expect something out of nothing? Do we check into a 5-star hotel and demand 3-star hotel rates?

The constant upgrading of equipment and plant to keep in step of current state-of-the-art technology, such as with automatic and remote control systems and instrumentation, has given some of the developed countries the edge in performance and this is reflected on their respective tariff. Hence, there has to be some balance between expected performance and a reasonable tariff to ensure financial viability of the utility.

Will there be any review of the electricity is on everyone's mind. With the above discussion of having First World facilities and Third World tariff, the answer to the above million Ringgit question would already have been formed. So far this commodity of electricity has been taken for granted. Consideration for any review has to be timely and affordable so as not to burden the general mass and contribute towards increases in the price of goods causing the inflationary spiral. On the same note, there could be some reasonable increase for sustainability for the electricity supply industry and it could also discourage abuse in wastage of cheap electricity as well as to entice the industrial sector to be more conscious of energy efficiency in usage which would be good for everyone and the country in totality. ■