

capacity addition to the system. It does not emphasise on other methods of investment for example extending the life of existing plants, hence lower capital expenditure. Demand side management is also not a scenario in TNB capacity planning, although it is carried out external to the planning exercise.

What was not considered in LCP

Capacity planning is not a question limited to WHAT, HOW and WHEN to add capacity. It also have to consider the production costing of the plans. The energy mix, plant by plant performance will have to be simulated through a production costing model. Hence the capacity planning model have to be referred again if the production simulation results indicated constraints to the inputs in the form of limitation of certain fuel usage, role of the existing power plants and also the future plants for example the capacity factor in the long term etc.

In many of the approaches, screening curves (Karen Guziel, 1992) are recommended in the initial phase of capacity planning. This is a good investigation to determine the probable candidates for the capacity addition in terms of fixed and variable costs.(refer appendix 2)

best combination for different technologies at hand and WHEN is the appropriate time to incorporate them to the system.

This approach is relevant even for the private sector. This is because in providing a necessary infrastructure, TNB have to consider the consumer end, whether the tariff imposed is affordable to the nation. If a decision of adding capacity to meet a segregated customer only, i.e. only for industrial customer then the decision on price is only what is affordable by the industrial customer and not necessarily the same as a domestic customer. However, this is not the case for electricity sector. Basically TNB as the utility have a social responsibility also in ensuring that all customers could enjoy electricity at a reasonable price, keeping low price as a target to meet and on the other hand a cost effective method for TNB to provide this electricity. Therefore the least cost planning approach is relevant because it is a reference and guide in determining the optimised capacity addition to the system.

Critics to LCP

Critics to this method included what is the least cost to the nation may not be the least cost to TNB. The question is why not?. This can be looked at in three aspects. Firstly from the point of view of an independent power producer. For the independent power producer a capacity addition project is viable if there is a committed purchaser to the product that is produced at

whatever cost necessary to make a project viable. Hence the least cost planning is not relevant in this scenario because as long as there is constant demand from a power purchaser, the power producer will be in business. the responsibility of the producer is to obtain a price to ensure adequate returns. This is easily achieved through power purchase agreements presently between the utility and power producers.

Secondly from the point of view of the government. The LCP approach is certainly favourable because it provides power in the lowest cost, optimising resources and technology. Therefore theoretically it should be at lowest cost to the nation. Today, the Government is continuously emphasising on low tariff, which makes least cost capacity addition as positively relevant approach.

Thirdly from the point of view of a utility. In Malaysia the situation is rather awkward because the utility is a public listed company and the Government at present is directly and indirectly the major shareholders. Therefore the interest have to be looked at in two angles, as a Government maintaining at low cost and as a private entity to maximise profit to the shareholders. In this situation the LCP approach is still relevant because it fulfill the requirement for lowest evaluated cost. As capacity addition is already an open market TNB as a utility have to optimise profits to shareholders by improving plant efficiency and enhance value added in the transmission and distribution sectors.

Another concern on least cost planning is normally looked at new

CHAPTER 2

LITERATURE REVIEW

Through past research and findings, in general capacity planning decision for a project must be able to meet five criterions which are, firstly, it fits the country development strategy, secondly meet the electric sector objectives, thirdly be economically viable for the country, fourthly be within the institutional capabilities and lastly be able to be financed. The approach taken by TNB is the Least Cost Planning or LCP (International Atomic Energy Agency, 1980) which was designed to handle these criterions.

Least Cost Planning (LCP)

Over the years institutions and consultancy specialising in generation capacity addition have basically look at capacity planning from the least cost point of view for the nation. This includes the modelling gnathite used by TNB, developed by the International Atomic Energy Agency (refer Appendix 1) known as the Wien Automatic System Planning.

The model provides the least cost expansion plan in terms of WHAT capacity to install to ensure appropriate level of reliability, HOW to pick the