Thermal Power with

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Sri Lanka's electrical energy will be met mostly by her hydropower resources until the 1990's. After that, the development in this source of energy will be slow due to

— limited potential in this resources;

— restricted speed for irrigation development in the multipurpose projects (caused by constraints posed in the fields of manpower, organisation and management, timely preparation of studies, social infrastructure and settlement;

— slow progress possible in installing numerous medium hydropower plants; and

— the minute contribution our mini-hydropower plants can make in this respect.

If the CEB's demand curve grows at 10-11% per year, the total energy demand will be about 14,000 million kwh units in the year 2000.

This is particularly true in the context of the accelerated Mahaweli Programme, the Free Trade Zone and the increased industrial activity in the island, and also in view of diminishing oil supplies and their resulting high costs together with the changing over of oil operated machinery, transport and urban cooking to electricity.

Assuming hydropower development is in the range of 5,000 million units by that time, the alternative energy requirement is (14,000 - 5,000) 9,000 million kwh units. Even if a lower growth rate is assumed and the alternative energy requirement will be say 6,000 million kwh units, a power plant of about 1,000 MW is required to provide this energy.

FIREWOOD

By the year 2000, the population is expected to be about 20 million. This large population in this small island will need energy to cook their meals. Already our forest reserves have been depleted on a large scale to grow food. If our forests continue to be cut down to meet the firewood requirements of the increase in population, the forest cover is bound to reach a dangerously low level, making the country barren. If energy is not provided to meet at least some percentage of the cooking requirements of the population, trees will continue to be felled

Imported Coal for the 1990'S

at an undesirable rate, with disastrous ecological results.

Now, very high level priority is being given to afforestation. But two tree planting campaigns (though these were sponsored at the highest level), have to all practical purposes been complete failures. So we have to be cautious about plans to meet energy requirements for cooking by firewood. As an Indian official has aptly put it "even if we somehow grow enough food for our people in the year 2000, how in the world will they cook it."

It is said that 62% of the total energy consumption in the country is met by firewood and more than 90% of the population still use firewood for cooking purposes. So, to sustain a large population, large blocks of alternative energy are required if the country is to be saved from soil erosion, increasingly severe flooding, expanding deserts and declining soil fertility as has already occurred in some parts of the world. Already the increase in kerosene prices to Rs. 10.70 a gallon (now Rs. 13.68) is moving the people toward electrical cooking

To meet these large blocks of energy demands, any thought of developing alternative sources like solar, wind, bio-gas, tidal waves, ocean temperature gradient, geothermal is not the answer. None of these sources have been technologically developed to meet our requirements. Even mini-hydro could solve only a minute fraction of the problem.

All the high hopes regarding these sources of energy will end up in the same way in which Sri Lanka planned for 7 years to sell power to South India. If we plan to depend on these sources we will finally have to end up having to install gas turbines fuelled with oil in an oil-starved world.

NUCLEAR

At the present level of power development in the international field, and taking the oil crisis as well into account, to produce base load energy of the magnitude required in Sri Lanka in the 1990's, coal is the only likely source available. Advanced countries which hold a monopoly over nuclear technology have raised the cost of nuclear power from small power plants to be on a par with oil. Thus, at today's costs the economical nuclear power plant is in the order of 600 MW. This coal proposal is an alternative to nuclear and not to oil, as oil is not being considered at all.

The shortage for an alternative source of energy will start in the late 1980's at, say, zero and develop to 6,000-9,000 Gwh units in the years 2000-2005. In power systems, the largest set has to be within 15% of the load in the system. This, following the high growth rate of 10 to 11% per year, will be 1,000 MW in 1990, 1,600 MW in 1995 and 2800 MW in the year 2000. The economic size of a nuclear set according to today's costs is said to be 600 MW; 15% of 2,800 MW is 420 MW. So even by 2000 a 600 MW set will not fit into Sri Lanka's power system. Moreover, by that time the economical size will not be 600 KW but will be considerably larger. This means nuclear power has to be ruled out in Sri Lanka in this century.

When dealing with this subject we should realise that Sri Lanka's power system is very small and we should not imitate those giant power complexes in the advanced countries, in planning. Even in Taiwan, the installed capacity today is 8.000 MW whereas it is only 300 MW in Sri Lanka. Taiwan is only one half the size of Sri Lanka.

The development of alternative energy has to take place in stages in the order of, say, 250-300 MW at each stage, and this should develop to about 1,000 MW by 2000. For such progression at the present level of power development in the international field, coal is the only source available.

The recent accident at the Three Mile Island Nuclear Power plant in Pennsylvannia USA, which reached near crisis proportions, clearly shows the need not only for extremely advanced technology and high precision maintenance but also for a great deal of precaution. This should make us aware of our very scant knowledge of nuclear technology, our sloppy maintenance of machinery and the generally careless, off-hand manner of our equipment and plant operators. The population of our whole island (an area of 25,000 sq. miles) could be severely contaminated with radioactive elements, if such an accident were to occur here. The question in the case of an accident is where can the population be evacuated in this small island. Here we should note how efficient our fire brigade has been. The fire at the milk factory at Welisara was smouldering for nearly a month.

COAL

Sri Lanka has no coal and thus a thermal power plant fuelled with imported coal has to be planned. Although a 1,000 MW installation is required in the year 2000 or so, the first stage (250 MW) will have to be commissioned in the late 1980s. Even in advanced countries, for a power plant of 1,000 MW fuelled with local coal, the lead time necessary for planning, design and construction activities is about 10 years. So, in the case of Sri Lanka, a developing country where coal has to be imported, it is already rather late as the required lead time which will apply, possibly about 15 years, has already been cut into, with no steps in this respect taken at all so far.

The design of the power plant has a very strong bearing on the type of coal. So the power station has to be tied up with a particular coal mine. To change from one type of coal to another, the power station has to go through major changes involving about 30% of the cost of the power plant. In this respect, as Sri Lanka has no coal, it has to be imported. First, she has to negotiate with countries like India, Australia, China with large coal reserves and has to sign an agreement for the supply of coal from a particular mine to the power plant for a period of about 30 years, the life of the plant. Some of these countries are eager to enter into long-term agreements to supply coal. Such an agreement is undoubtedly an advantage to us.

This involves an international agreement and it will take a fairly long time to weigh the pros and cons before a settlement can be reached. In some instances a new mine has to be surveyed and planned. Opening a new mine to produce 10,000 - 30,000 tons of coal a day is in itself a vast problem. If they are open cut projects as found in Australia for brown coal, it occupies some thousands of acres.

Next, the transport from the mine to the harbour in that country and from there to Sri Lanka

has to be looked into. Coal required for a 1,000 MW power plant is in the order of about 10,000 tons of coal per day of superior quality, enough to fill a freight train more than a mile long. In the case of inferior coal this requirement can be about 30,000 tons per day. As the coal will be transported in ships, the best location for the power plant is by a harbour. The power plant can be located by an existing harbour or by a harbour which has to be constructed for this purpose. This will eliminate costly land transport and double handling.

Apart from eliminating the costly land transport of coal by incorporating the harbour and the power plant together, its vicinity to the sea solves the large cooling water requirements of thermal power generation. So, in Sri Lanka's case where coal has to be imported, siting the power station by the sea with harbour facilities will serve a dual purpose, eliminating costly land transport and also eliminating complicated problems involving cooling water requirements.

Following the main guidelines regarding installing a large power plant fuelled by imported coal, as pointed out above, a suitable site for such a plant is in the vicinity of the harbour at Trincomalee. Here a large natural harbour lies idle. Vast unbuilt-up areas of hard laterite soils suitable to receive heavy loadings of between 20 to 60 foot contour are available. However, Trincomalee is some distance away from the load centre, the Colombo area.

But here in Colombo new harbour facilities will have to be provided and suitable un-built up areas are not available. Pollution in the metropolitan area will be an added problem. In this case power transmission has to be weighed against the provision of new harbour facilities and the acquisition of vast areas of built up land required for the project. Trincomalee is suitable for further power plant extensions say for another 1,000 MW as the need arises.

In the case of a 1,000 MW power complex fuelled by imported coal the area of affected land may be some thousand acres. Large areas are necessary for coal storage reserves to meet a few months supply in case of a break down in supply lines due to strikes, war and the like. Added to these, disposal grounds to receive wastes have to be provided.

The problems involved in siting and planning a 1,000 MW power plant are very complex indeed. It is not a matter for one or two individuals. Only a firm of consultants well experienced in this specialised field could prepare a worthwhile feasibility report on this project taking into account all multi-disciplinary and long-term aspects.

While planning for a 1,000 MW power plant, it would be prudent to leave provision for an extension of a further 1,000 MW to make use of the same harbour facilities. Trincomalee is suitable for such an extension of the power plant.

IMPLEMENTATION

A 1,000 MW plant's total coal requirement during a period of 30 years will range from about 100 million to 250 million tonnes depending on the grade of coal. In a case like this, a new mine has to be explored, developed and kept reserved for this plant. The power station has to be sited simultaneously, with harbour facilities and transmission factors taken into account. The first set will have to be commissioned by about 1988 or 1990. The development of the mine, the construction of the harbour, railways if necessary, and that of the power plant, will take a minimum 5 years. That means the construction will have to start in 1983-85. Thus, we are left with only 4-5 years to negotiate long-term international agreements, plan, design, seek finance, prepare contract documents, call for bids and start construction.