28/07/99 The Island

It's time to make up our minds about the coal power programme

By Dr. Tilak Siyambalapitiya

Only 52% of our households have electricity. The electricity demand grows by at least 8% every year. This means, our requirements double in nine years. We require about 1200 Megawatts of new electricity generating capacity available over the next 10 years. This additional capacity is mainly needed as base load capacity. It is more economical to install a few large power plants, than many small ones because the specific investment costs and the operating costs of larger plants are lower.

We should look for the most economic, reliable and proven technology to build these new generating plants. The country has only a few more hydroelectric power plants to build. Solar electricity, wind power and small hydroelectric power plants cannot give us the large new capacity we require. They can contribute only a small portion of our requirement. For example, Denmark is the country which obtains the highest portion of its electricity from wind power. They have achieved only a 2% contribution from wind, while they operate 5000 Megawatts of coal - fired power plants.

So we have only two options: to develop more oil-burning power plants or build coal-fired power plants. Both oil and coal have to be imported. Coal fired power plants can generate electricity at least one rupee cheaper per unit, than oil fired ones. Furthermore, coal fired power plants are reliable, last longer and used mostly for base load operation, which is needed in our country now.

Coal-power provides for over 40% of world's electricity needs. All developed countries such as USA, UK, Germany, Australia, Japan and Canada, have very large coal power plants. Developing countries such as India, China, Malaysia, Indonesia, Thailand and Philippines have large coal power plants, and they are building more and more. That is because they know the economy and reliability of this technology.

Extensive economic and technical studies, the reports of which are available to the public, show that Sri Lanka needs 900 Megawatts of coal power plant by the year 2010, and a further 900 Megawatts by year 2017. By the year 2004, coal power should provide about 20% of our electricity needs, which will rise to about 45% by 2011. (Fig. 2)

As all countries around the world have done, Sri Lanka needs a strategic "fuel mix" in electricity generation. By adding coal to our fuel mix, our reliance on oil will be reduced, and our fuel supply for electricity generation will be stabilised. Also the cost of electricity will be lower. Sri Lanka will have electricity at a competitive price to drive its next phase of social, commercial and industrial development.

Trincomalee, Mawella and Puttalam

Sri Lanka needs not one but several coal-fired power plants. One basic criterion to select a site is how coal supply to the plant can be arranged economically. Large coal ships should be able to come close to plant site at the beach to unload. Trincomalee can accommodate the largest (140,000 Ton) coal-carriers in the world. The Mawella Bay in Matara district can accommodate medium-sized (50,000 Ton) ships. On the West Coast, the same medium-sized ships can reach only Kalpitiya, Negombo and Marawila but stop at distances of 2 to 5 km, and unload coal. The extremely high population density and non-availability of vacant land rule out Negombo and Marawila. This leaves us with Trincomalee, Mawella and Kalpitiya as the only three viable sites in Sri Lanka.

Although a feasibility study and an engineering design for a coal power plant was done for Trincomalee in the 1980s, security constraints make this site non-viable for the moment. The site at Mawella in the South requires over 200 families to be relocated, and the Mawella lagoon to be partly reclaimed. In 1992, the ruling Government decided to place Mawella on-hold, and study the sites along the West Coast.

The Site

Extensive studies at locations between Mundal and Thalawila, conducted over 1994-98 by teams of Sri Lankan and overseas experts of various specialities, have now confirmed that the most feasible site is west of the village Panniaidi. The site location is now commonly known as Norochcholai, which is the village to the north of the site. Ceylon Electricity Board has prepared plans to cover every aspect of the project, including the social, environmental and technical issues.

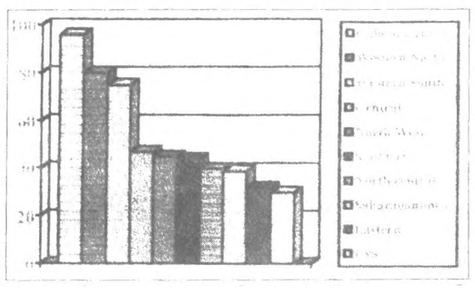

Fig.1 Half the population has no electricity at home The coal power programme will ensure that they have access to electricity

The entire land required for power plant and a buffer zone is 300 acres, which now has very little cultivation. The cultivated land is mainly in the buffer zone where coconut and other crops are grown. This cultivation can continue even after the power plant is built. Along the beach, the site is 11 kilometres south of the Thalawila St. Anne's shrine.

The Land

Of the 300 acres of land, only 160 acres will be required for the power plant including the coal stock yard. The balance 140 acres will be reserved as a buffer zone. The land required for the power plant is mainly bare and comprise largely of sand dunes and shrubs with very little cultivation (Fig 4).

Resettlement Plan

In total, there are 54 families living in the 300-acre plot, to be resettled. They presently live on this mostly Government-owned land under permits. Most of them are engaged in agriculture as unskilled labourers and live in temporary cadjan huts (Fig. 5). They will be resettled at locations within a few kilometres of the site. Land to relocate them has been already identified. Each family will be provided with a permanent house on a half-acre lot, and a further 1 1/2 acres will be provided for agriculture.

They will be provided full ownership of the house and the land. All assistance will be given to commence agriculture on the new land. Ceylon Electricity Board will directly handle the resettlement program in close collaboration with the local population.

Environmental Impacts

Plant Concept and Technology for coal power plants is well established all over the world since the beginning of this century. Similarly, technology to control their impacts on the environment is also well established. This power plant will be no different to a modern coal power plant found in USA, UK, Germany, Japan or Malaysia. As such, there are no unknowns or experiments to be conducted with this power plant. All its impacts are known. The technology to control its impacts on the environment are known. It will use state of the art equipment and technology similar to any other coal power plant presently being built in USA, Europe or Japan.

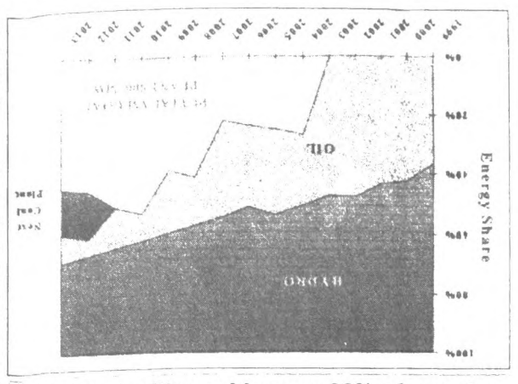

Fig.2 Coal will provide over 20% of our electricity needs by Year 2004

The power plant will require a 4.2 kilometre long jetty, supported on pillars, along which a conveyor belt will carry coal from the ships to the shore. Experts designing the power plant have also designed an alternative coal supply from large coal carriers and transport it to the site using barges. The site will also require a 500 meter long jetty to unload heavy equipment during construction and receive coal from barges (Fig. 6). This method of coal supply would not only enhance the security of coal supply but could even be used during the initial stage of the project.

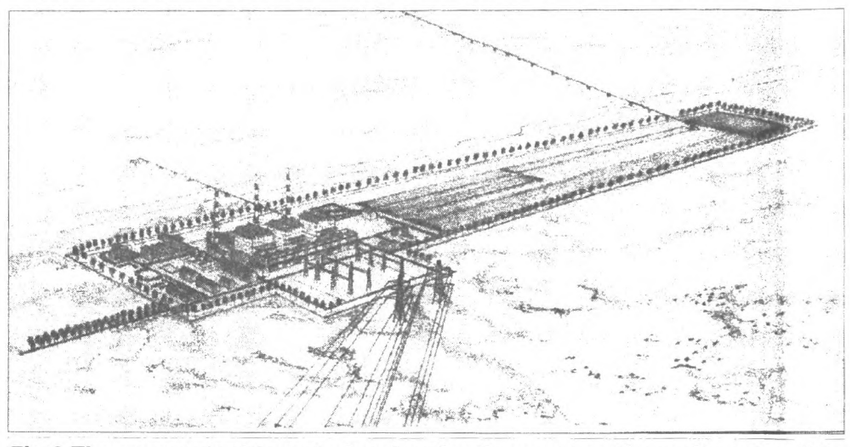

Fig.6 The power plant layout showing the three generating units, when it is fully developed by the Year 2009

Engineering studies have not shown any adverse impacts of the jetty on the beach by way of increased erosion. However, the project will have in place a comprehensive monitoring system by which all its environmental impacts, including the erosion at the beach near the Thalawila shrine will be monitored and rectified if necessary, throughout the lifetime of the Power Plant and beyond.

The Power Plant design has already moved through the process of Environmental Impact Assessment, public hearing of comments and the approval procedure. All the concerned authorities and institutions have granted the environmental clearance to the project.

Smoke emissions from the power plant will be released from 150 meter (485 feet) tall chimneys. The quantity of ash particles, and sulphur dioxide and nitrogen dioxide gases emitted will adhere to all Sri Lanka and international standards. International standards are those of the World Health Organisation (WHO) and the World Bank. Technology used to control ash emissions is well proven, and presently used in modern coal power plants all over the world.

The power plant will require cooling water. The practice worldwide in coastal power plants is to use sea water, such that the warm water discharged will not be more than 7 degrees centigrade above the intake temperature. Water will be taken at a distance of 300 m from the beach and released at the sea-bed at a different location, again 300 m from the beach. Extensive mathematical studies have shown that the temperature difference of 7 degrees centigrade drops to half (3.5 degrees centigrade) immediately after release. At 100 meters away from the discharge the temperature difference will be just 1 1/2 degrees centigrade. If there are any concerns about impacts of warm water on fishing, such impacts will be limited to a 100 meter square (that is 2 1/2 acres) of the Indian ocean.

The power plant will also require fresh water for its boilers. This will be obtained by desalinating sea water, as it is done in many power plants worldwide, when their location does not provide a freshwater stream.

Air quality

Air pollutants caused by coal burning are sulphur oxides (SOx), nitrogen oxides (NOx) and suspended particles. Mitigation measures given below have been included in the engineering design of the power plant and its operation plan. These safeguards will ensure that there are no negative impacts on the environment. Operation of the power plant will be governed by the conditions of the Environment License issued by the relevant authorities. National Environmental Act and other statutes will provide the legal basis for the relevant authorities and the general public to ensure that the power plant operates within safe limits.

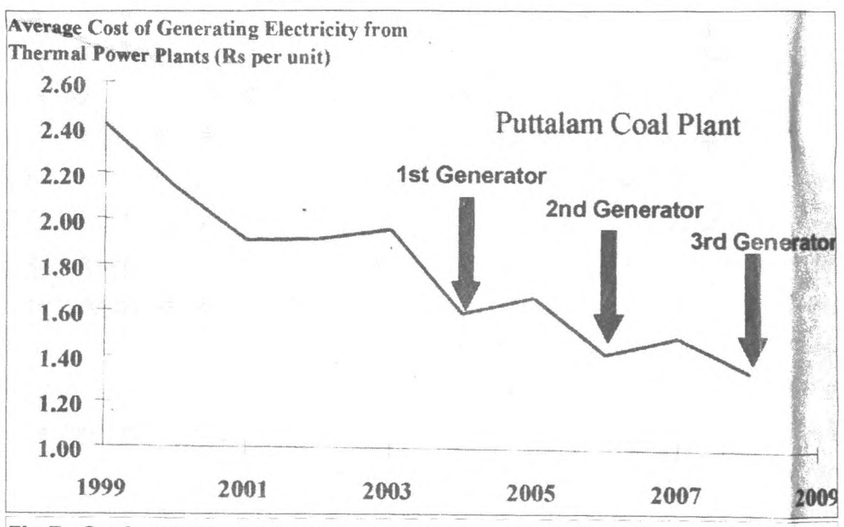

Fig.7 Coal power plants will reduce the real price of electricity. This means that electricity price increases in the future will be well below the rate of inflation.

See page 10

It's time to make up...

From page 8

The plant will burn low sulphur coal to meet the SOx limits in the regulations. However, provisions are available in the design to add a flue gas desulphurization (FGD) plant, if the limits specified by Sri Lankan and International Environmental agencies become more stringent in the future. The best electrostatic precipitator (ESP) design available worldwide with 99.3% collecting efficiency will be installed to satisfy the standards for particulate emissions from the stacks (chimneys). The furnace and the burners (low NOx) are designed to satisfy NOx emission standards of Sri Lanka as well as those of the World Bank.

Coal Dust from the Storage Yard

Coal dust will be suppressed by spraying the stock-piles with water, compacting the piles, and employing de-dusting equipment during coal handling operations. Further protection from the wind will be achieved by planting trees around the site perimeter.

Ash Handling

The average production of ash is estimated at 11% of the combustible coal (110 tons per hour), resulting in a total ash production of 12.2 tons per hour at each generating unit. Of these, approximately 80% will be ash that attempt to rise will be trapped by the emission control system. This is known as Fly Ash The Bottom Ash will constitute the remaining 20%. On this basis and assuming that the plant operates 75% of the time in a given year (which is the typical operating duty of similar plants worldwide), the expected annual ash production, from a 300 MW generating unit is 79,500 tons, subdivided into:

- Fly Ash: 63,600 tons per year
- Wet Bottom Ash: 15,900 tons per year

The fly ash will be reclaimed by means of closed, pneumatic systems. This dry ash will then be loaded on to closed trucks for transport to end users.

Coal ash is a raw material and can be utilized in many manufacturing processes. With regard to the fly ash, cement, brick and other industries in the country will absorb all this ash. Already, the Puttalam Cement Company has indicated a strong desire to absorb the entire annual fly ash production from the first 300 MW power plant.

The site wet ash will be deposited in a dedicated landfill facility within the 300-acre power plant itself. This ash dump is engineered with appropriate containment barriers and leachate controls to prevent the ash from polluting the ground water system of the area. There is also the possibility to use this bottom ash as an aggregate in concrete or as a base material in road construction.

Effluent Discharge

All effluents released to sea will be treated, to remove metals, organic, and suspended solids. A sewage treatment plant will be built on site before the construction work begins. After treatment, the effluents will comply with the tolerance limits specified in the Sri Lanka Standards for marine coastal discharges.

Project benefits

This power plant project, once fully developed to 900 Megawatts by year 2010, would be an investment of Rs. 60,000 million rupees (which is 900 million US dollars). This investment is almost equal to the current value of investment on the accelerated Mahaweli Project of the 1980s. In addition to significant improvements to the physical infrastructure of the area (roads, electricity, water supply and transport), the project will provide 2,000 jobs during construction for 10 years and 500 permanent jobs in the power plant operation and its associated services.

Electricity Prices will Drop in Real-terms

We presently supply 30% of our electricity from oil-burning power plants. In 1999, the average cost of oil to generate one unit of electricity is Rs 2.44 excluding taxes. When we build the coal power plant, we can reduce this to Re. 1.60 by year 2004, and further to Re. 1.40 by year 2009. As coal power will provide over 55% of our electricity by 2009, this benefit will be directly felt by electricity customers. Furthermore, the price of coal does not fluctuate in the world market as oil does. Therefore, when we build coal power plants, first at Puttalam and later in other locations, we can look forward to a stable and lower price of electricity. Certainly, the price of electricity will rise lower than the rate of inflation when we build the coal power plants. (Fig.7)

Conclusion

The country needs more than one coal-fired power plant. There is no sense of moving the project from one site to another, because all the three sites (Trincomalee, Mawella and Puttalam) will be required for development over the next three decades. Unless the country declares that our industry, commerce and lifestyles require no further development, there is no alternative but to develop a coal-fired power program, first at Puttalam, later extending to other sites. Electrification is the driving force behind the economic successes of all major industrialised countries. They continue to build coal power plants even today.

The delay in building this first coal power plant by just one day, will cost the country at least Rs. 4 million extra for alternative forms of electricity generation, and if the hired unit is not built Rs. 13 million extra and brings us dangerously close to the next major power crisis. To avoid the next power crisis of year 2004, decisions have to be taken now. It takes five years to build the power plant.

It's time to make-up our minds, and work towards the common objective of social and economic development, to which the coal power program will be a vital input.

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