

WHY COAL POWER FOR SRI LANKA ?

by

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Sri Lanka's power system has been mainly based on hydropower. But by virtue of her topography she has a limited hydropower potential. Only about 12% of the land area lies between 500 ft and 4000 ft contours within the SW monsoon belt and is suitable for hydro power development. This represents a very limited resource - by no means as abundant a potential as previously believed. This fact has been made quite evident, since the completion of the Kehelgamu/Maskeliya oya complex and the Accelerated Mahaweli which consist of the major hydropower schemes, that the power system is faced with shortages of power and it has to resort to thermal power generation. With this background the CEB had to look for an alternative source of power and approached the problem as follows:

Alternative power sources

- All the major hydro power plants, except Samanalawewa which is under construction and Upper Kotmale, are complete and what are left are mostly small run of the river power plants without reservoir capacity. However, all such schemes have to be provided with thermal backing. Nilambe Scheme 3 MW is a good example. Planning started in 1982. There are 80 Chinese on the job. This shows that even a small scheme takes such a long time. This too requires thermal backing during dry weather.
- Moreover hydropower has turned out to be so expensive, such schemes are currently planned only to meet peaking duties and not base loads which are met by thermal or nuclear.
- Nuclear has no place in our power system as it is too small and our local technology is not advanced enough to go nuclear, which means Sri Lanka will have to depend very heavily on foreign expertise. Moreover it is too much of a risk for Sri Lanka.
- Gas fired power is too expensive unless gas is found in the country or it can be delivered in pipe lines.
- OTEC is not a proven technology and it has not been developed anywhere in the world.
- Fuel wood cannot by any means be considered for power generation. Already environmentalists consider that there will be no forest cover left at the rate fuel wood is being used in Sri Lanka. Fuel wood will have to be imported in time to come.
- Solar, wind, wave, bio-gas too have not been developed anywhere in the world for large scale power generation. Here again massive battery installations are required to store energy for use when sun and wind are not available.
- The renewable sources of energy installation at Pattiapola near

Tangalle funded by UNEP to serve as a demonstration centre for the whole of South East Asia has proved to be ineffective. It is an excellent example to show how futile it would be to attempt to obtain power from these sources for large scale power generation.

- Oil is too expensive and here too oil supplies are limited for long term power planning. Moreover Sri Lanka is too heavily dependent on oil, and a diversification of energy is a necessity. All over the world in power generation the trend is to go in for coal where feasible in preference to oil. The Asian Development Bank (ADB) has not funded an oil power plant since the oil prices shot up in 1973. When the small nuclear power plant at Kalpakan in Tamil Nadu started giving trouble the Indians decided to go in for a coal power plant and did not consider any other power. With this firm decision they secured ADB funds for the project in 6 months which is considered a record.

Decision for Coal Power

In the light of the above facts which are so clearly obvious the practical source of power for Sri Lanka is coal especially as she has the deep water natural harbour at Trincomalee to enable coal imports in large ships. The very concept of coal power for Sri Lanka originated because of the availability of Trincomalee harbour and it is a part and parcel of the coal power project. Therefore the decision to go in for coal power was made by the CEB and not by any foreign consultants. Then the CEB sought Australian assistance for guidance in this matter as the Australians are well versed in coal power technology.

Studies

A pre-feasibility study was made by the Australians in 1981 and they too confirmed the view held by the CEB that Trincomalee harbour is an outstanding asset Sri Lanka possesses with regard to coal power generation. Thus the feasibility study which followed the pre-feasibility study was confined to only Trincomalee to find a suitable location round about its harbour. This study Rs. 150 millions is being funded by the ADB. The concept of coal power for Sri Lanka developed from the time of the oil crisis in 1973 and active studies took place since 1981. So the decision for coal power by the CEB should not be considered a hasty one.

In selecting a site for the power station in Trincomalee, the most important consideration is to get the power plant as near as possible to a coal unloading jetty in the inner harbour. Only a jetty in the inner harbour will offer the required facility to unload coal from large ships with a range of 100,000 - 160,000 dwt without investing in a massive break water to protect them during the unloading process. Colombo harbour can receive only 30,000 dwt ships and Galle about 6000 dwt ships. The site in Snug Cove for the power station and the North side of the Great Sober Island for the coal unloading jetty met these requirements.

Objections against Coal

Coal power was hotly debated during the past few weeks so let me answer some of the objections made against coal.

O - 'Acid rain'

A - There is some talk about this in advanced countries. But

there are also many authorities who discount the claim that acid rain is due only to power station emissions. There are huge chemical industries, a vast number of automobiles and many other factors which could contribute to acid rain. Some say that the withering of plants in certain places is due to various soil conditions. The Central Environmental Authority reports that the soils in the Sri Lankan tea estates are already acidic without there being any coal power. Acid rain is largely a controversial issue.

The 900 MW coal power plant that the CEB is proposing is nowhere near what other countries are doing. When compared to the pollution concentration in New York city in the 1960s, what will be caused by this power plant will be minute. Our giant neighbour India has now about 32,700 MW of coal power. Every year India is adding about 2500 MW to it. China has over 50,000 MW of coal power and every year she adds about 5000 MW. Over 60% of the electricity generation in the world is from coal power generation in the USA is 300,000 MW (60%), UK 50,000 MW (80%), Germany 55,000 MW (70%), Australia 20,000 MW (90%), India 68%. Coal power in advanced countries is as common as motor traffic is on their highways.

No country considers that it has done something wrong in having coal power generation. My argument is, if such large scale coal power generation is good for the Chinese, Indians, Australians, Europeans, Japanese, Americans, Russians why is it only bad for Sri Lankans. Actually we want to know what is different or special about Sri Lankans. Does Sri Lanka a third world country really think that her living standards are superior to those in the rest

of the world? Indian planning circles consider that investing an excessive pollution controls for a third world country is a luxury. Their primary concern is providing cheap power for development to relieve unemployment. In the Sri Lankan power plant proposal a large battery of precipitators to arrest particulate matter is provided. Such precipitators are often not provided in many of the Indian power stations.

In South India itself there are about 12 coal power stations. In Tuticorin just a few miles away from Sri Lanka there is a 630 MW power plant. Correctly speaking the environmentalists should be more concerned with the large number of coal power plants operating in India and her coal power expansion targets - 18,000 MW in the next few years than with this 900 MW coal power proposal, because emissions from these power plants travel many hundreds of miles. Scandinavians talk of the various pollutants they get in the air from emissions originating in the U.K., while Canadians blame the U.S.A. for their atmospheric pollution and Alaska blames Japan.

If a simple calculation is made, say 100 tons of emissions per day from a power plant spread over an area - 1000 miles radius, the contribution will be minute, even if a long period of 100 years is considered. That is why people who are really experienced in coal power generation do not pay much attention to this. They provide normal safety devices. It is significant that 6200 MW of coal power is operating in the tiny island Hongkong, one of the most thickly populated centers in the world - 2.5 million population in 400 sq. miles. Most of the coal mines and coal power

plants are in North East India i.e. Bihar, Bengal while the flourishing tea gardens in Darjeeling, Assam are also in the same region. Are they not the best teas in the world?

Environmentalists should be more concerned with the pollution created in Colombo by the large number of motor vehicles on the roads and the diesels at Sapugaskanda which burn oil with over 3% sulphur content while the coal power plant will use low sulphur coal with sulphur content in the region of only 0.6%. The high concentration of pollution in New Delhi is attributed to motor vehicles on the roads and the diesel generating sets in the city. Studies reveal only 15% of the pollution in U.S.A. is due to power station emissions, this includes oil fired stations.

O - 'Warm water emissions to the sea will raise the temperature in the water in the whole Koddigar Bay about 20 sq. miles and destroy all marine life'.

A - In the design of the power station the temperature in the neighbourhood is limited to rise within 7°C. That influence is not expected to travel more than 500 metres. This is common practice all over the world when power stations are located by the sea or large rivers. In Japan all their large thermal and nuclear power plants are located along the coast and sea water is used for cooling, yet the Japanese remain leaders in fishing. It is the same in Singapore, Hongkong, Taiwan, Thailand and in all the other countries where power plants are sited by the sea.

If the objection raised is correct the temperatures at the cooling water inlet and the warm water

outlet separated by only half a mile will be the same at a higher temperature. If this is so then this power station cannot be operated. What a strange situation.

O - 'Trincomalee's great natural harbour is to be reserved to rear fish and water sports'.

A - If this is the plan how can oil tankers come into the harbour when the Oil Tank Farm is rehabilitated according to the Indo - Lanka Peace Accord. The Oil Tank Farm, Coal Power Plant, Prima Flour Mill, Mitsui Cement and plans for commercial port development like the container terminal at Clappenberg Bay are in the same area, which has been marked by the UDA for industrial development. This area in the Inner Harbour where the best harbours sites exist, should certainly not be reserved for the recreation and enjoyment of a small privileged class. Such thinking is blasphemy.

O - 'Noise pollution'

A - In fact outside one of these power plants no noise is heard. Traffic on road or railways, gas turbines, diesels at Sapugaskanda make more noise. Aeroplanes in the Airport which is by the side of the power plant site make louder noise. Moreover plans are already being drawn for an International Airport in Trincomalee. For that about 1000 acres of jungle will have to be cut. Then what will happen to the so called wild life sanctuary in Trincomalee. The IPKF is already cutting the jungle for security purposes.

O - 'The plant siting will wipe out for all time a unique coastal feature of our country, Snug Cove'.

A - During world war II a British army camp was located there. The Snug Cove was the receiving end of the drainage of this camp. It is dirty now and one is reluctant to step into the water. It is advocated that the power plant be sited elsewhere in Trincomalee; that means, the protesters consider that when the power station is moved a few miles away from Snug Cove, the tea plantations and Colombo are safe - A wonderful theory.

O - 'Tourism in the Snug Cove, Clappenberg area will get affected by the coal power plant there'.

A - The fact is not one tourist hotel has come up in this area. All the tourist hotels are located in Nilaweli about 8 miles north of Trincomalee. There is one tourist hotel in Marble Point area. No one went there even before 1983 and it was deserted. All the tourists went to Nilaweli. This shows where the tourist potential lies. Deep water is not suitable to swim in. Hundreds of tourist hotels in Hongkong are occupied to full capacity with 6200 MW of coal power in that tiny island, while most of Sri Lankan hotels are either closed or empty even without coal power. So the argument that a coal power station will drive away tourists has no validity. That is why for the Indian planner economic development is more important than unnecessary expenses on pollution controls. Development prevents upheavels and crisis situations which keep away tourists.

O - 'The latest startling news is that suddenly there is an application to put up a 3000 room tourist hotel in Snug Cove'.

A - The objection considers that the hotel to serve the foreigners

is more important than the power plant to serve Sri Lankan needs. It is doubtful whether this ghost applicant has ever seen Snug Cove or is even aware that it is bordered by the air port, oil tank farm, oil jetty, deep water harbour, and the proposed container terminal at Clappenberg. Surely such a hotel will only provide quarters for drug smugglers, because no tourist in his right mind will visit a place which would be such a busy harbour for rest and recreation.

O - 'A coal power plant is so ugly it will be an eye sore in Trincomalee'.

A - But they recommend a more prominent site at the entrance to the great outer harbour. How then can this so-called 'ugly power station' stand like a sentinel, as the statue of liberty does at the entrance to New York city. It is strange that the Inner harbour area of Trincomalee is expected to be reserved as a play ground for recreation.

O - 'The power plant proposed for Trincomalee is based on old Technology of the 1950s as scrubbers have not been provided to arrest SOx emissions'.

A - The CEB has engaged one of the leading consultants in the United States on coal power technology. They have experience in planning 27,000 MW of coal power in the United States alone and adopt the most advanced methods. Sri Lanka's power station will therefore incorporate the best technology available in the world today. Is it the Sri Lankan aim to do better than the Americans, the leaders in coal power technology with 300,000 MW of coal power installations.

The USA has a good percentage of high sulphur coals. All these years they had used even such coals without scrubbers. Now to get the power industry to use more of these high sulphur coals in areas where high concentrations of pollution have been already created by the vast number of automobiles and industries in the country, the use of scrubbers has been specified. Scrubbers will increase the cost by about 30%. But even with scrubbers all the sulphur cannot be removed. In fact some sulphur is necessary for the electrostatic precipitators to be effective.

In Winipeg Canada there is a coal power plant built in 1923 located in the centre of the city. It is still in operation. In the USA the great majority of coal power stations located amidst large agricultural fields are not provided with scrubbers. The most modern Castle Peak coal power station 4200 MW, Lammar 2000 MW both in Hongkong are not provided with scrubbers.

The countries from where Sri Lanka could import coals which have low sulphur content are as follows - Australia 0.43%, South Africa 0.56%, Peoples Republic of China 0.65%, Indonesia 0.40%, Columbia 0.59%, Alaska 0.15%. With such low sulphur coals, and with pollution concentration from industries in Sri Lanka *so minute, hardly any thing to speak about there is absolutely no case to invest in such expensive scrubbers, and increase the price of electricity. Increase in electricity rates will be a severe set back to industry and hotels and make the employment situation worse.

O - 'build an off-shore all in one berthing facility that could handle coal oil and other commodities

nearer Colombo'.

A - Coal unloading is not possible from an unprotected off-shore pier or from a single mooring point to send coal in slurry form like oil through a pipe line. When Sri Lanka has such a great natural resource like the Trincomalee harbour which can be developed as a harbour for industrial use; to bring in oil tankers, coal carriers and enable power production for industrial development to meet the needs of the citizens of Sri Lanka, there is absolutely no reason to reserve this great natural resource to be used merely as a holiday resort for pleasure.

O - 'Alternative sites'.

A - The C.E.B. and the pre-feasibility team in consultation with the Port Authority have looked for alternative sites. Any site other than Trincomalee needs a massive break water which itself will be a large harbour project costing several billions of rupees. So the CEB finds it untenable to seek out these unsuitable, more expensive sites and to further burden the common man of this country, whose average income is Rs.500/- per month with prohibitive power costs, just to satisfy the unreasonable desires of an elite who have Rs.500/- plus per head to spend each day.

O - 'Poses a threat to the tea estates in the central hills from the chimney emissions'.

A - It is certain that the proposed power plant is the best, since it is provided with the necessary emission arresting devices needed for the country. But the planters fear could be justified if the CEB fails to operate the plant

as it should be. The cement plants at KKS and Puttlam are good examples of bad operation. Here you see the trees in the area are covered with cement dust. This is in peoples' minds when they express their anxiety about the Coal Power Project. To see coal power generation in the proper perspective, the Castle Peak Power Station in Hongkong could be visited. This station ideally suits Sri Lankan conditions. It is a very large modern power plant in the most thickly populated island in the world. It depends on imported coals from Australia, China, U.S.A. No trace of coal dust can be observed and there is no objection from any quarter.

A sound practical way to get over this operational problem is for the Sri Lankan Government to get a reliable foreign organisation in partnership with the CEB to build own and operate the plant and sell the power to the CEB. It is believed that at least the first stage 2 x 150 MW of this power plant should be handled in this manner. This method will serve as a real technology transfer and will impose discipline in the operation of the power plant, which is badly lacking among Sri Lankans. The Castle Peak Power Station in Hongkong operates in this manner. Even Communist China is adopting these methods to gain technology transfer in nuclear power and obtain funding for their projects.

When speaking about power plant operation let me point out that the 1960 oil fired steam station at Kelanitissa has been broken down for the past 10 years or

so, while the 1923 coal power plant at Winnipeg is still working.

Conclusion

In conclusion, bearing in mind that 1.2 million people are unemployed of which 800,000 are young people with 5500 graduates without employment, let it be clearly understood that the great natural harbour at Trincomalee should be used as a harbour for the industrial development of the nation and definitely not as a play ground to satisfy the selfish interests of a minority. One must also remember that important Government Departments like the Urban Development Authority, Port Authority, Central Environmental Authority who are really involved in the siting of the coal power plant in the Trincomalee Inner Harbour have agreed to the site and are in favour of the project.

TRINCOMALEE COAL POWER PROJECT

Client - Ceylon Electricity Board

Consultants -

Pre-feasibility Study granted by Australia
Crooks Michell Peacock Stewart (Pty) Limited, Australia

Feasibility Study funded by ADB - Rs. 150 million
Black & Veatch International USA
Principal Consultant (Power Plant) in association with
Gutteridge, Haskins & Davey (Pty) Limited, Australia (Coal handling),
Alex Macknight & Associates, Australia (Harbour & Navigation)
Built Environment Consultants, Sri Lanka (Housing)
Tippetts - Abbott - McCarthy - Station, USA (Environment)

APPENDIX

Trincomalee Coal Power Project

GENERAL DATA

. Land area

Power plant 131 ha (323 Ac.)
Housing complex 50 ha (120 Ac.)

. Installed power 2x150 MW 2x300 MW
GWH at 60% PF 1800 3600

. Boiler 150 MW

Pressure 140 kg/cm² (2000psi)
Temp 538°C
Coal burn rate 60 T/hr
Max continuous rating (MCR)
evaporating 540,000 kg/hr
Make up water 1,200 g/h
3 cfs.

. Coal Analysis

Coal size 50 mm (max.)
Calorific value 11,340 Btu/lb
(6175 kcal/kg)
Ash content 12.8%
Moisture content 9.7%
Sulphur content 0.65%

. Coal usage

150 MW @ 70% PF = 400,000 T/a

300 MW @ 70% PF = 800,000 T/a

In the year 1995 1.1 M tons

In the year 2000 2.6 M tons

. Coal storages

2 x 150 MW
Reserve (250mx100mx12m) 174,000 T
Active 30,000 T
Silo 9,000 T

900 MW

Reserve 500,000 T
Active 100,000 T

. Turbines

Steam conditions

Pressure 131 bar
Temperature 538°C

Cooling water flow rate

2 x 150 MW 11.4 m³/s

400 cfs.

. Transmission

2 x 150 MW 132 kv
220 kv
2 x 300 MW 400 kv

. Costs

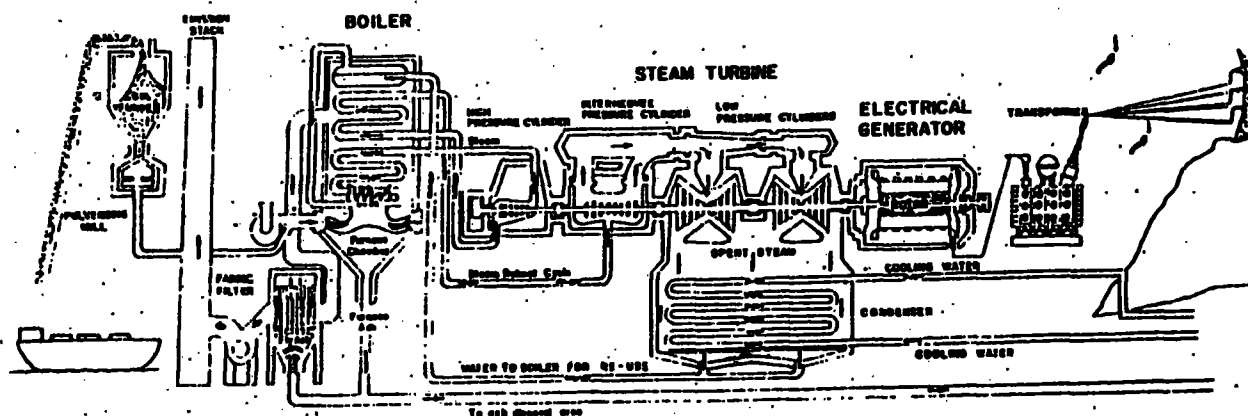
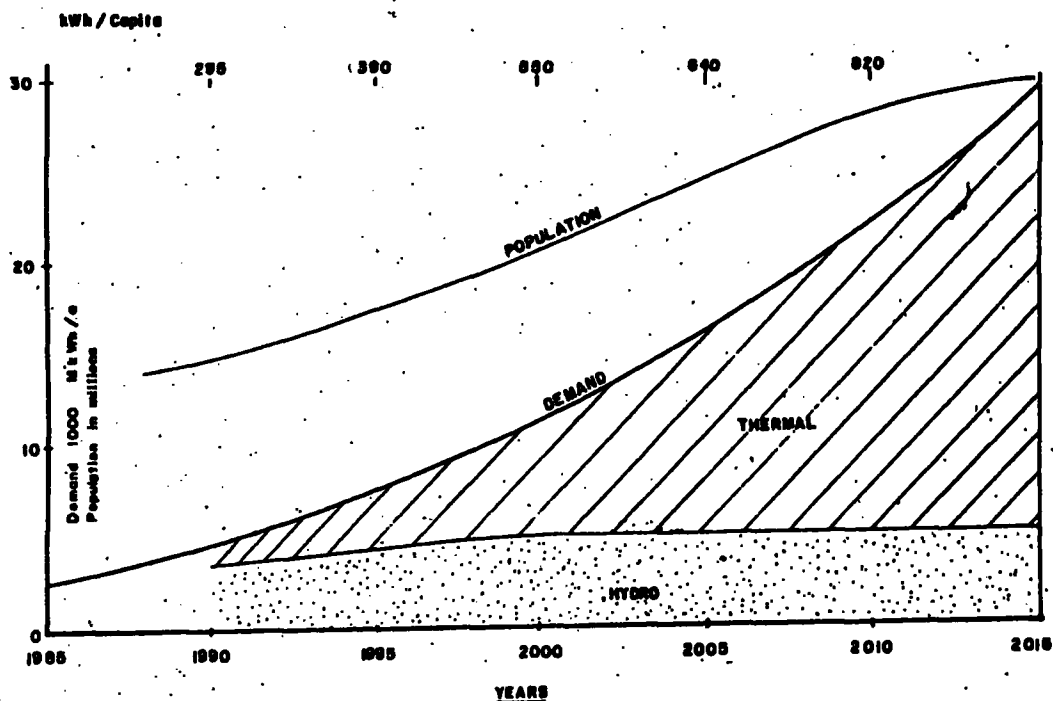
First phase of the project

2 x 150 MW - Rs. 10 billion.

Second phase of the project

2 x 300 MW - Rs. 15 billion.

Housing Rs. 200 million.



Coal Power Installation in 1984.

Coal Power Additions over the next few years.

