STUDY ON LOCATIONS FOR FUTURE COAL-FIRED POWER PLANTS

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

Evaluation of suitable sites for coal-fired thermal power plants is very important as there are several such plants to come up in the future. All generating plants except Upper Kotmale Hydro Power plant in "Long Term Generation Expansion Plan 2009-2022" published by the CEB are coal power plants.

Two locations already have been identified for coal power plants at Norochcholei and Sampur for 900MW and 1000MW respectively. The study reveals that there is no provision to expand beyond the designed capacity at Norochcholei plant. There is no technical limitation to expand the designed capacity at Sampur plant.

The aim of this study is to evaluate a further eight proposed sites analyzing following important factors which influence site suitability. These factors are;

1 Supply of coal and transportation facilities on land and at sea
2 Availability of sufficient cooling water and feed water
3 Proximity to the load centers / access to the national grid
4 Distance from populated area (Environmental aspects including impact on the population)
5 Depth of the sea near the coast
6 Availability of sufficient area for power plant, coal storage and ash disposal
7 Other factors
   - 7.1 Access to the land
   - 7.2 Topography/ geology
   - 7.3 Meteorology
   - 7.4 Hydrogeology
   - 7.5 Natural hazards

Of the eight sites to be evaluated the CEB has identified five tentative locations in its "Long Term Generation Expansion Plan 2009-2022" near Athuruwella, Mawella, Mirijjawela, Karagan Lewaya, and Mirissa along the southern coast. No detailed study has been done for these locations. Hence, initially, these five locations were taken into consideration for the study from among the eight proposed sites.

Three additional locations are proposed by the author for consideration along the eastern coast. They are near Panama, Sangamankanda Point and Vakarei.

Although CEB proposed Karagan Lewaya to be considered as a site it had to be abandoned subsequently because the GOSL has used this site for the recently commissioned Hambantota harbor. As a result of that the study is carried out based on the other seven proposed sites for detailed evaluation.

Sri Lanka has no coal mines, thus coal needs to be imported to the sites from countries such as Indonesia, South Africa or Australia who have indigenous coal mines. Hence coal transporting has to be done by vessels to the site especially with Panamax size vessels and Cape size vessels to keep the cost at a minimum level. Another major factor is the supply sufficient water to the site in order to cool the process and process water. These two factors require that the site has to be close to the coast.

It can be seen that the four sites Athuruwella, Mawella, Mirissa and Mirijjawela on the southern coast are close to the populated areas and the lands in the vicinity are ideal for agriculture as well as tourism. Some major resettlement plans are required with a suitable compensation scheme when acquiring the lands for the sites at these four locations in the southern province. In contrast, however, the population density at Panama, Sangamankanda Point and Vakarei in the eastern province is comparatively low but the infrastructure needs to be developed.

The grid substations at Ambalangoda, Matara, Hambantota, Ampara and Valachchena are considered as gateways to the national grid from the proposed locations. These can access only the 132kV grid and needs to be augmented to handle 220kV at the substation and transmission lines.

Other major factor to be considered is the depth of the sea near the proposed site as this determines how far the vessels can approach the coast and hence estimates the distance of the coal unloading conveyor and the size of the jetty in the sea. Mirijjawela has the advantage of having use of the newly commissioned Hambantota harbor for this purpose as it is about 1km away from the site.

Acquiring of required land area for the proposed site needs to be carefully done. When it is needed to acquire the lands from the residents in the area a reasonable compensation scheme and resettlement plan has to be introduced. Therefore it is of great benefit and cost saving if government owned bare land is available in the proposed areas.

Although access to the lands, topography/ geology, meteorology, hydrogeology, natural hazards are minor factors for site selection of a coal power plant, these should also be taken into consideration because the damages can be very high when natural hazards occur like the Tsunami in 2004, although this occurs rarely.

The proposed locations should be selected away from any protected wildlife zones, sanctuaries and places with historical values in the country.

Then proposed locations are analyzed based on the above factors and for comparison a site validation matrix is prepared with introducing a suitable marking scheme in order to select the best location for the next coal power generation plant.

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LIST OF ABBREVIATIONS

Abbreviation	Description
C	Celsius
CCP	Coal Combustion Products
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CO_2	Carbon Dioxide
DS	Divisional Secretariat
DWT	Dead Weight Tones
GDP	Gross Domestic Products
GHG	Green House Gas
IEA	International Energy Agency
IPCC	Inter Governmental Panel on Climate Change
IT	Information Technology
K	Kelvin
MSL	Mean Sea Levels
NARA	National Aquatic Resource Agency
SCADA	Supervisory Control And Data Acquisition
SCCM	System Control Centre Modernization
SO_2	Sulfur Dioxide
USA	United States of America

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