# FITTING GENERALIZED LAMBDA DISTRIBUTION AND IDENTIFYING A SUITABLE MODEL FOR SOLAR RADIATION DATA IN COLOMBO, SRI LANKA

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There is a need to look at the country's potential to develop solar power as a key power resource. As increasing the importance of solar radiation it is essential to identify a proper statistical distribution and a model, to get an idea about the availability of solar radiation. The daily solar radiation data ($MJ/m^2$) collected by the Meteorological department from 1997 to 2007 at a station in Colombo at latitude $6^0$ 54' and longitude $79^0$ 51' were used for the analysis.

This study aims for fitting the Generalized Lambda Distribution (GLD) to daily solar radiation for each month and identifying a suitable model for monthly average solar radiation in Colombo, Sri Lanka. GLD was fitted to the daily solar radiation in each month. The quality of the fits was assessed using histograms, qqplots, and KS (Kolmogorov-Smirnov) test. The fitted distribution was compared with the distributions in the literature namely the Weibull, Logistic, Normal and Lognormal using root mean square error. The above mentioned goodness of fit test and the plots show that the GLD fits the data well, when compared with the distributions in the literature. The daily solar radiation totals from February to September show strong negative skewness ($-1.643 \leq$ skewness $\leq -0.863$). Further the months January, October, November and December show the least skewness ($-0.730 \leq$ skewness $\leq -0.653$). The above fitted distribution can be used to find the probability that the daily solar radiation above any threshold value.

Next objective of this study was selecting the most appropriate model for monthly average solar radiation in Colombo. Suitability of the models in the literature was tested for the monthly average solar radiation in Colombo. According to the statistical results a new simple linear model $H/Ho=0.243+0.364(S/Z)$ based on Angstrom model (H- Monthly average daily global solar radiation, Ho- Monthly average daily extraterrestrial radiation, S- Monthly mean daily number of hour of observed sunshine hours and Z- Monthly mean value of day length at a particular location) was identified as the best model to estimate monthly average daily solar radiation for Colombo.