

CARBON FOOTPRINT ASSESSMENT AND CARBON OFFSET STRATEGIES OF AN ENERGY INDUSTRY, A CASE STUDY OF 50MW THERMAL POWER PLANT, SRI LANKA

Sapugoda H S D P D¹, Premasiri H D S², Dias S V²

¹ Faculty of Agriculture, University of Ruhuna, Matara

² Environmental Studies and Service Division, National Building Research Organization

poornimadeshajali@gmail.com

Abstract

It was observed that the global temperature has increased during the past decade is the highest rate recorded in history. It enhanced that greenhouse effect within the atmosphere are the main reason to this increase of the planetary temperature. Uncontrolled greenhouse gases (GHGs) emission is the most affected cause to accelerate the global warming and adverse climatic changes. In such, it is very important to recognize the local, regional and global levels contribution to GHG emissions that affect to global warming. In consider the local level contribution; it has to be consider individual, organizational and sectoral contribution. Carbon footprint (CFP) accounting is the initial step to making GHG estimations in which measures all of GHGs emissions caused directly and indirectly by a person, an organization, an industry, an event or a product in a given period of time in tonnes of CO₂ equivalent (CO₂-e). An energy industry that significantly contribute to GHG is one of industry in this sector that to be consider in this regards. Therefore, it is very important to calculate the CFP of Energy Industry and to identify and target reductions from its major emission sources.

The main objective of this study is to assess Carbon footprint of Thermal Power Plants. As a case study, a thermal power plant of 50 MW in Sri Lanka was selected. It was identified all GHG emission sources and activities with setting boundaries under three scopes according to GHGs protocol. CFP was calculated by using emission factors, obtained from 2006 IPCC Guidelines for National Greenhouse Gas Inventories. GHG boundary includes CO₂, CH₄ and N₂O emissions due to fuel combustion. All the emission factors for CO₂, CH₄ and N₂O of fuels were calculated and converted into CO₂-e per unit of activity data. The total CFP of the power plant was then obtained and it about 79,976.077t CO₂-e per year (CO₂-e/yr) base on the year 2017. Direct GHGs emission of stationary combustion of fossil fuel is estimated as 79,827.43 t CO₂-e/yr. It has represented the highest portion of the total CFP of the plant. Indirect emission of purchased electricity is 0.217 t CO₂-e/yr, Transportation is 94.11 t CO₂-e/yr, water usage is 0.120 t CO₂-e/yr, solid waste disposal 54.20 t CO₂-e/yr. CFP of all indirect

emissions of the plant is about 148.647 t CO₂e/yr. CFP of stationary combustion of heavy fuel oil accounts higher percentage of the total CFP, combustion of diesel oil represents the second largest portion of the total, while lubricant oil combustion show the third largest portion of the total. GHG emissions from the generation of purchased electricity and usage of water and waste disposal account lowest percentage respectively. Direct GHG emissions show the highest value, than indirect emissions. Power plant can implement suitable methods to reduced and offset the CFP based on this estimations.

Keywords: Carbon Footprint, Greenhouse Gases, Carbon Offsetting