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Assessment of Carbon Footprint for Traffic in Academic Campus of Annamalai University

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Abstract: ***Carbon dioxide is the principal greenhouse gas that emit from human activities and causes global warming and climatic change. The burning of the organic materials in fossil fuels produces energy and releases carbon dioxide and other compounds into the earth's atmosphere. Greenhouse gases can be emitted through transport, land clearance, production and consumption of food, fuels, manufactured goods, materials, wood, roads, buildings and services etc. A carbon footprint is the measure of the amount of greenhouse gases, measured in units of carbon dioxide, produced from human activities. A carbon footprint can be measured of an individual or an organization, and is typically given in tons of carbon dioxide equivalent per year. This study assess the emission of carbon dioxide emit from TRAFFIC in the academic campus of Annamalai University and suggest suitable remedial measures for the reduction of emissions in the campus.***
Keywords: Carbon footprint, climate change, emission

I. INTRODUCTION

Transportation is Carrying civilization to a brighter future. Now a day's transportation is one of the most burning Issues in every territory of the world. Growing greenhouse gaseous concentration in the atmosphere is distressing the environment to cause grievous global warming and associated consequences. Following the rule that only measurable is manageable mensuration of greenhouse gas intensiveness of different products, bodies, and processes are going on worldwide, expressed as their carbon footprints. The methodologies for carbon footprint calculations are still evolving and it is emerging as an important tool for greenhouse gas management. The concept of carbon foot printing has permeated and is being commercialized in all the areas of life and economy, but there is little coherence in definitions and calculations of carbon footprints among the studies. There are disagreements in the selection of gases, and the order of emissions to be covered in footprint calculations. Standards of greenhouse gas accounting are the common resources used in footprint calculations, although there is no mandatory provision of footprint verification. Carbon foot printing is intended to be a tool to guide the relevant emission cuts and verifications, its standardization at international level are therefore necessary. This journal pronounces the dominant carbon foot printing methods and raises the related issues with remedial measures.

II. LITERATURE REVIEW

MattGrote (2015) examined that the qualitative evidence indicates that LGAs do not necessarily have the right options to accurately include the effects of congestion on emissions of CO_2 (or other pollutants) from traffic on urban road networks. Based on readily available road traffic data, the hypothesis is put forward that the optimal model complexity for LGAs is a Traffic Variable EM. Doran (2007) had emphasis that Human activity is motivating unwanted climate change that resulting from the emissions of greenhouse gases (GHGs) into the atmosphere. To avoid the serious and potentially appalling environmental, economic and health consequences associated with an increasing global temperature, everyone has to reduced and slowed for global emissions of GHGs. Shukla (2007) covered the CO_2 Emissions in Energy sector in India. In energy sector, taking time series data for energy consumption and supply applying I-O model, while I-O show the flow of goods and services, in one economy. In I-O model, for the energy sector it was modified and taking five independent variables and CO_2 Emission as a dependent variable and find out the effect taking 1998 as a base year. Each and every study I-O model can be changed based on the assumptions used by the author. Robert (2008) stipulated that so far there is no structured policy to reduce the emissions of carbon dioxide and other greenhouse gases, majority of the previous researches were focused on the western countries. With reference to the emerging issue – global warming, majority of the country across the globe have started showing their serious concern for this issue, and need has been raised to form a structured policy to have fair distribution of emission allowances which also exert positive impact on the economy of the country. Guo et al. (2011) examined the carbon emissions in Chinese energy policy. The estimation of CO2 emissions reduction potential in China is an important issue for China's energy policy. In this paper, data envelopment analysis (DEA) is used to evaluate

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the carbon emission performance of 29 Chinese provincial administrative regions (Tibet and Taiwan are not included since of data lack) by computing potential carbon emission reductions for energy conservation technology (ECT) and energy structural adjustment (ESA). Since the Chinese National Assessment Report on Climate Change was published in 2006, a low-carbon economy has been advocated by the Chinese government. A series of policies to prompt the development of non-fossil energy has been proposed to reduce carbon emissions and mitigate climate change. As the largest developing country in the world, China has the highest CO2 emissions at 6.468 billion tones in 2007 corresponding to 4.9 tons per capita. The Chinese GDP accounts for no more than 6.2% of the world's total production, whereas China accounts for 20.85% of the world's total carbon emissions.

III. METHODOLOGY

A. Case Study

1) Annamalai University: Annamalai University is a state university located in Annamalai Nagar, Chidambaram, Tamil Nadu , India. The university is spread across 3.8 km^2 in Chidambaram and offers courses of higher education in Arts, Science, Engineering, Medical, Management (MBA), Humanities, Agriculture, and Physical Education.

B. Scope of Assessment

Annamalai University's campus, is chosen as the boundary set for this Study the scope previously discussed of the carbon footprint as follow

C. Carbon Footprint Calculations

"In general, this is the formula for calculating an emission

*CO_2 emission = Activity data (kg / km / liters / etc.) * Emission factor (CO_2 per unit).*

For each activity data and emission factors, a distinction can be made between primary data and secondary data. Primary data are direct measurements within the life cycle of a specific product. For example, the amount of liters of Diesel used per number of kilometers can be directly measured. Secondary data consists of external, averaged data, which are not specific to the product." The data gathered from the University will be used for calculating the footprint by writing the Excel tool which used to generate functions and graphs displaying various aspect of the carbon footprint. The typical carbon footprint calculated resulting from various internal and external activities are shown in below:

Table 1 Total Footprint Calculations

			Annual Quantity	EF	CO2 (Kg)	%ofTotal Emissions
Scope	Stationary Combustion	Diesel (KWh-therm)	4,595,800	0.30	1,378,740	13.1%
		Biomass (KWh-therm)	917,900	0.03	27,537	0.3%
	Direct (Km)	Transportation	555,980	0.26	144,555	1.4%

Traffic study done at Annamalai university Road of Traffic at Annamalai nagar where vehicles in and out towards University road.
Date : 20/12/2018 to 21/12/2018
Counting Period : 15 minute (short count)
Weather Condition :It was initially a sunny day but afterwards it became cloudy
Survey Location : Annamalai university Road
Observation : Classified Vehicle Count
Method : Manual Method.
Equipment's : Data Sheet, Stop Watch

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Table 2 Traffic survey towards inside the campus

Road :	AU road
Date and day :	20.12.2018
Direction toward :	In
Hours :	1 Hours (peak)

Time	Two wheeler		Three wheeler		Car/ Van		Bus		Mini lorry		Agriculture tractor	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	With Tailorr	Without Tailor
8.45-9.00	120	117	12	5	10	10	2	4	1		1	
9.05-9.20	88	87	6		10	8	4	2				
9.25-9.40	98	92	12	5	8	6	1	3			1	
9.45-10.0	104	98	13	5	10	5	1	5				

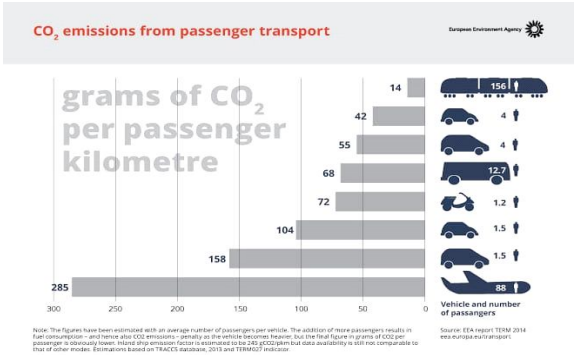
Table 3 Traffic survey toward Outside of campus

Road :	AU road
Date and day :	20.12.2018
Direction toward :	outward
Hours :	1 Hours peak

Time	Two wheeler		Three wheeler		Car/ Van		Bus		Mini lorry		Agriculture tractor	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	With tailor	Without Tailor
4-4.15	144	29	25	13	11	2	2		1			
4..20-35	213	29	26	6	12	2	4	2		1		1
4.40-55	101	13	24	2	15		3		1			
5 -5.15	55	40	13	2	21	1			1	1		

IV. CONCLUSION AND RECOMMENDATIONS

The numbers of bikes travelling are more when compared to autos and cars.The number of autos and cars are more when compared to buses. So, if numbers of buses are increased, then the dependency on Public transports increase. This will make decrease in number of personal vehicles. Hence the congestion gets reduced and free Flow of Traffic will be possible. It adds to comfortless of a road user. We are settled on a suggestion that if the No. of buses could be increased then the traffic system would become efficient. So huge modification is recommended in the public transportation. hence incresing the public transport so reduced the number of cars and autos and also it help us to Control the emission of Co_2. (Refer the fig.3)



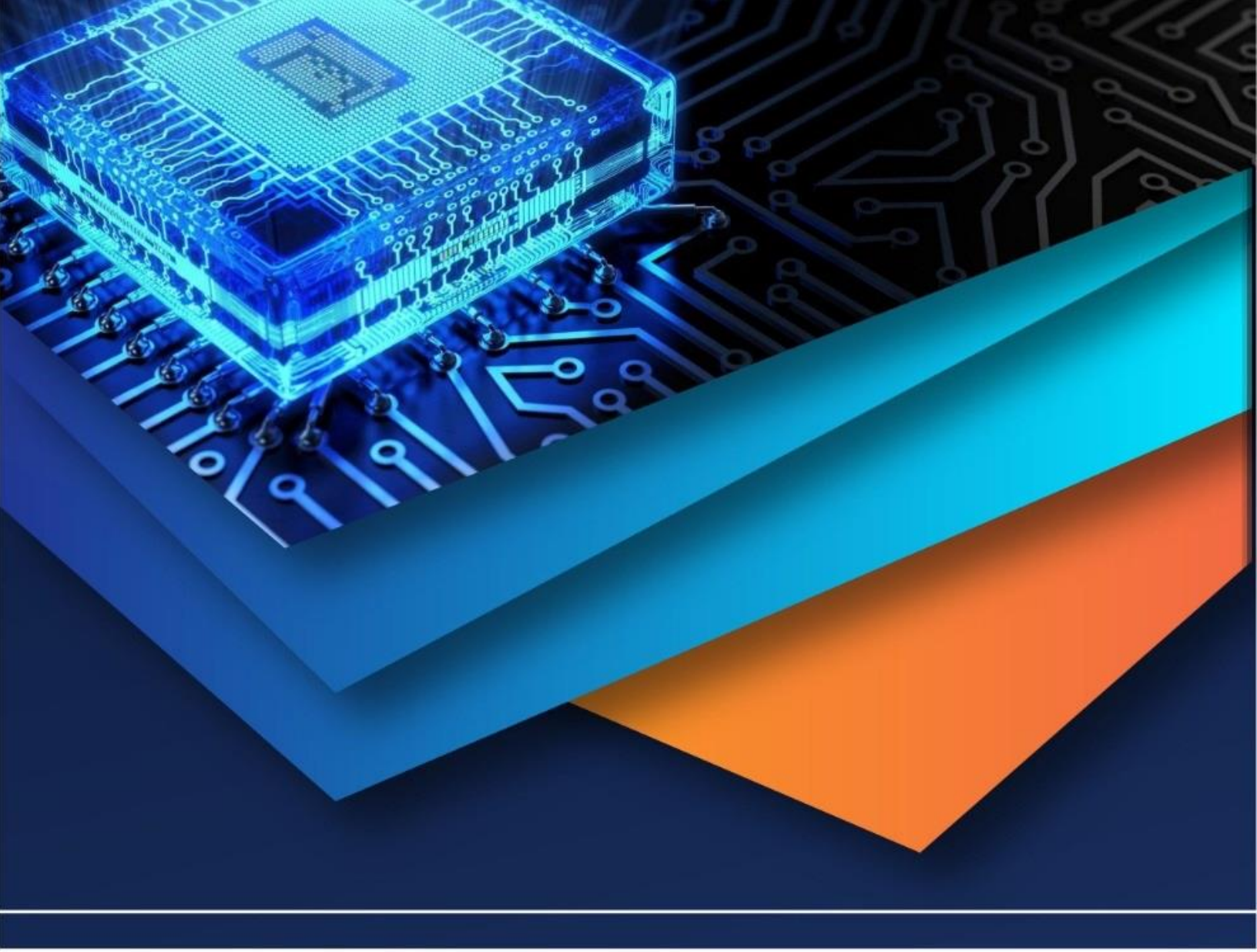


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