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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 CO₂ (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 CO₂ 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 CO₂ 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

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 km² 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

$$CO_2 \text{ emission} = \text{Activity data (kg / km / liters / etc.)} * \text{Emission factor (CO}_2 \text{ per unit)}.$$

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	CO ₂ (Kg)	% of Total 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

Table 2 Traffic survey towards inside the campus

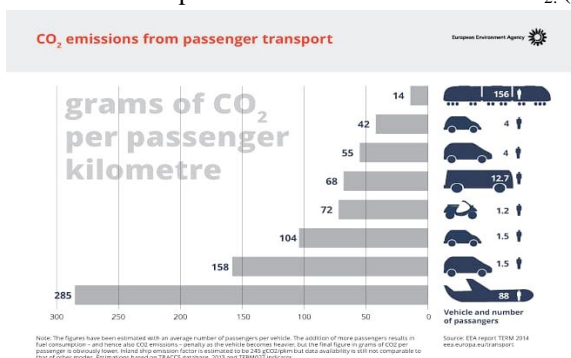
Road :	AU road											
Date and day :	20.12.2018											
Direction toward :	In											
Hours :	1 Hours (peak)											
Time	Two wheeler		Three wheeler		Car/ Van		Bus		Mini lorry		Agriculture tractor	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	With Tailorr	Without Tailor
8.45-9.00	120	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 increasing the public transport so reduced the number of cars and autos and also it help us to Control the emission of Co₂. (Refer the fig.3)



REFERENCES

- [1] Paul G HöglundJarkkoNiittymäki : Estimating Vehicle Emissions and Air Pollution related to Driving Patterns and Traffic Calming Urban Transport Systems, Lund, Sweden, 1999-06-07--08.
- [2] K. S. Nesamani, Jean-Daniel Saphores, Michael G. McNally, R. Jayakrishnan Estimating impacts of emission specific characteristics on vehicle operation for quantifying air pollutant emissions and energy use journal of traffic and transportation engineering (2017) ; 4(3) : 215 -229
- [3] AliakbarKakouei, Ali Vatani and Ahmed Kamal Bin Idris : An estimation of traffic related CO2 emissions from motor vehicles in the capital city of, Iran Iranian Journal of Environmental Health Sciences & Engineering 2012, 9:13
- [4] Ronald J. Dickson , William R. Oliver & Howard W. Balentine Emission : Estimates for Assessing Visual Air Quality, Journal of the Air & Waste Management Association, (1997) 47:2, 185-193
- [5] Dmitry Tartakovsky, David M. Broday , Eli Stern : Evaluation of AERMOD and CALPUFF for predicting ambient concentrations of total suspended particulate matter (TSP) emissions from a quarry in complex terrain Environmental Pollution 179 (2013) 138-145
- [6] felixr.vogel, balendrathiruchittampalam, jochentholoke, robertokretschmer, christophgerbig , samuel hammer and ingeborg Levin : Can we evaluate a fine-grained emission model using high-resolution atmospheric transport modelling and regional fossil fuel CO2 observations February 2013.
- [7] Yuan-yuanSong,En-jian Yao, Ting Zuo, and Zhi-feng Lang : Emissions and Fuel Consumption Modelling for Evaluating Environmental Effectiveness of ITS Strategies 15 December 2012.
- [8] Yan Zhou, John A.D. Aston Adam M. Johansen Bayesian model comparison for compartmental models with applications in positron emission tomography Journal of Applied Statistics 27 Feb 2013.
- [9] HatemAbou-Senna and EssamRadwan :Developing a Microscopic Transportation Emissions Model to Estimate Carbon Dioxide Emissions onLimited-Access Highways Journal of the Transportation Research Board 2014, pp. 44–53.
- [10] Cao Zi and ShenZhenyaofIndustrial Carbon Emissions Status and Analysis Based on Energy ConsumptionChinese Journal of Population Resources and Environment (2011), 9:1, 33-41
- [11] Ranu Gad, D. P. Singh, T. Saud, T. K. Mandal, M. Saxena : Emission Estimates of Particulate PAHs from Biomass Fuels Used in Delhi, India, Human and Ecological Risk Assessment: An International Journal(2012), 18:4, 871-887.
- [12] L. Gomes , G. Bergametti , B. Chatenet A.L. Dutot : The use of a simple predictive model to quantify trace element emissions from an industrial complex (Fos/Mer, France), Environmental Technology Letters(1988), 9:7,721-730
- [13] BardiaHeidari and Linsey C. Marr : Real-time emissions from construction equipment compared with model Predictions Journal of the Air & Waste Management Association 65 (2015) 115–125
- [14] Tran Thu Trang, Huynh Hai Van & Nguyen Thi Kim Oanh : Trafficemission inventory for estimation of air quality and climate co-benefits of faster vehicle technology intrusion in Hanoi, Vietnam, Carbon Management(2015), 6:3-4, 117-128
- [15] Anna Font, Gary W. Fuller : Did policies to abate atmospheric emissions from traffic have a positive effect in London, Environmental Pollution 218 (2016) 463-474
- [16] M. El-Fadel& L. Abi-Esber : Simulating industrial emissions using Atmospheric Dispersion Modeling System: Model performance and source emission factors, Journal of the Air & Waste Management Association(2012), 62:3, 336-349,
- [17] Xuanwu Chen, Mohammed Hadi, Yan Xiao, and Lily Elefteriadou : Development of Macroscopic Emission Estimation Model Based on Microscopic Operating Modes (2016) Transportation Research Record: Journal of the Transportation Research Board,No. 2570
- [18] Veronica K. Figueroa , Kevin R. Mackie , Nick Guarriello& C. David Cooper : A Robust Method for Estimating Landfill Methane Emissions(2009), Journal of the Air & Waste Management Association, 59:8, 925-935
- [19] Guilherme de Oliveir, Deise Maria Bourscheidt : Multi-sectorial convergence in greenhouse gas emissions Journal of Environmental Management 196 (2017) 402-410
- [20] Yongdai Kim, Young-Oh Kim, Jaeseok Kim, Woosung Kim, IlsangOhn Scaled ridge estimator and its application to multi-model ensemble approaches for climate prediction Journal of the Korean Statistical Society 45 (2016) 307–313



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