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Assessing Carbon Footprint for Organization (CFO): Case Study of the Faculty of Environment, KU

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Abstract

Assessing carbon footprint in the higher education sector is a crucial step toward achieving carbon neutrality. This study evaluated the carbon footprint for organization (CFO) using the Faculty of Environment, Kasetsart University, as a case study. The objectives were to quantify greenhouse gas (GHG) emissions from institutional activities and evaluate potential mitigation strategies. The results showed that in fiscal year 2024, total GHG emissions reached 827.02 tonCO_2e, representing an increase of 145.46 tonCO_2e from fiscal year 2023. Per capita emissions also rose from 0.93 tonCO_2e/person/year in 2023 to 1.08 tonCO_2e/person/year in 2024. The largest share of emissions originated from Scope 1 (direct emissions), followed by Scope 2 (indirect emissions from electricity consumption), while Scope 3 (other indirect activities) contributed the least. The highest emitting activities were refrigerant leakage and electricity consumption. To reduce GHG emissions, three key mitigation strategies were proposed and evaluated, including replacing R-410a refrigerants with R-32, transitioning from fluorescent lamps to energy-efficient LED lighting, and installing solar panels to promote renewable energy. The CFO assessment provides a critical framework for identifying emission sources, establishing a baseline, and providing targeted mitigation strategies for the Faculty of Environment to reduce its carbon footprint.

Keywords: Carbon footprint; Electrical consumption; GHG emission

1. Introduction

The Intergovernmental Panel on Climate Change (IPCC) has reported a continuous increase in global temperatures, driven primarily by rising greenhouse gas (GHG) concentrations (IPCC, 2021). This trend has led to global warming, with the Earth's average temperature already reaching a critical threshold of 1.5 °C above pre-industrial levels (UNFCCC, 2022). In Thailand, the average temperature in 2023 was recorded at 28.1°C, the highest in 73 years (1951 – 2023) (Thailand Meteorological Department, 2023). Concurrently, Thailand's GHG emissions have continued to rise, reaching 278.04 million tons of carbon dioxide equivalent (MtCO_2e) in 2022 a 1.5% increase from the previous year (DCCE, 2024). As a signatory to the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), Thailand has committed to reducing its GHG emissions by 30 – 40% by 2030 and aims to achieve carbon neutrality by 2050 and net-zero emissions by 2065, with peak emissions projected in 2028 (DCCE, 2024).

Higher education institutions play a crucial role in advancing sustainability and climate action (Clabeaux *et al.,* 2020;

Kiehle *et al.,* 2022; Cortes, 2022). Kasetsart University (KU) recognizes its responsibility in mitigating GHG emissions. Therefore, the university has implemented sustainability policies such as "KU Goes Green" and "Carbon Neutrality," aiming to achieve carbon neutrality by 2035 in alignment with national climate goals and the Sustainable Development Goals (SDGs). As part of these efforts, the Faculty of Environment at KU is committed to identifying and reducing its carbon footprint through data-driven strategies. However, systematic assessments of institutional carbon footprints remain limited, particularly at the faculty level, highlighting the need for comprehensive studies to guide emission reduction policies.

This study aims to assess the carbon footprint of the Faculty of Environment, KU, Bangkhen, of the years 2023 and 2024, by evaluating key activities contributing to GHG emissions. The findings will provide valuable insights into the faculty's current emissions profile, supporting the development of targeted mitigation strategies to minimize carbon footprint. Furthermore, this research can serve as a model for other faculties within KU and similar organizations, contributing to the university's long-term sustainability goals, carbon neutrality, and net-zero emissions.

2. Methodology

2.1 Organization boundary and scope

The Faculty of Environment at Kasetsart University, Bangkhen, occupies a total usable area of 3,500 square meters, comprising two main buildings, EV1 and EV2, along with the KU Tower, a near-surface meteorology and air pollution monitoring station (Figure 1). The EV1 building is a six-story structure consisting of classrooms, laboratories, offices, a conference room, and dedicated GIS and EIA offices. The EV2 building, a four-story facility, primarily used as classrooms, laboratories, and a co-working space for students' activities. In the fiscal year 2023, the faculty had 667 students and 68 staff members engaged in academic and administrative functions. These numbers increased slightly in the fiscal year 2024, with 698 students and 69 staff members. The boundary for calculating the carbon footprint in this study include the administrative and academic activities performed by professors, staffs, and students. The sources of GHG emissions were categorized into three scopes, including scope 1- direct emissions (sources owned or controlled by the organization), scope 2- indirect emissions (from electricity from an external origin), and scope 3- other indirect emissions than those already included in scope 2 (modes of transport for students and employees, business travels, and waste management). The greenhouse gas emissions assessment covered data collection across two fiscal years, i.e. 2023 (October 2022 – September 2023) and 2024 (October 2023 – September 2024).

2.2 Data collection

The carbon footprint was assessed through three key steps: defining operational boundaries, collecting activity data, and calculating greenhouse gas (GHG) emissions using appropriate emission factors (EFs). The methodology of assessment followed the guidelines set by the Thailand Greenhouse Gas Management Organization (TGO), which aligns with the ISO 14064 and ISO 14067 guidelines for carbon footprint assessment (TGO, 2023). Activity data were collected from all activities within the defined boundaries, as listed in Table 1.

2.3 Calculation of GHG emissions

The GHG emissions for the Faculty of Environment, KU, were calculated under the TGO guidelines (TGO, 2023). Most calculations use a basic equation to quantify GHG emissions, as shown in Equation 1.

$$\text{GHG Emission (kgCO}_2\text{e)} = \text{Activity data x Emission factor} \quad (1)$$

2.3.1 Scope 1: Direct emission

To calculate GHG emissions from activities within Scope 1, including fuel consumption of vehicles, LPG usage, and refrigerant leakage, the emissions are calculated using Equation 2:

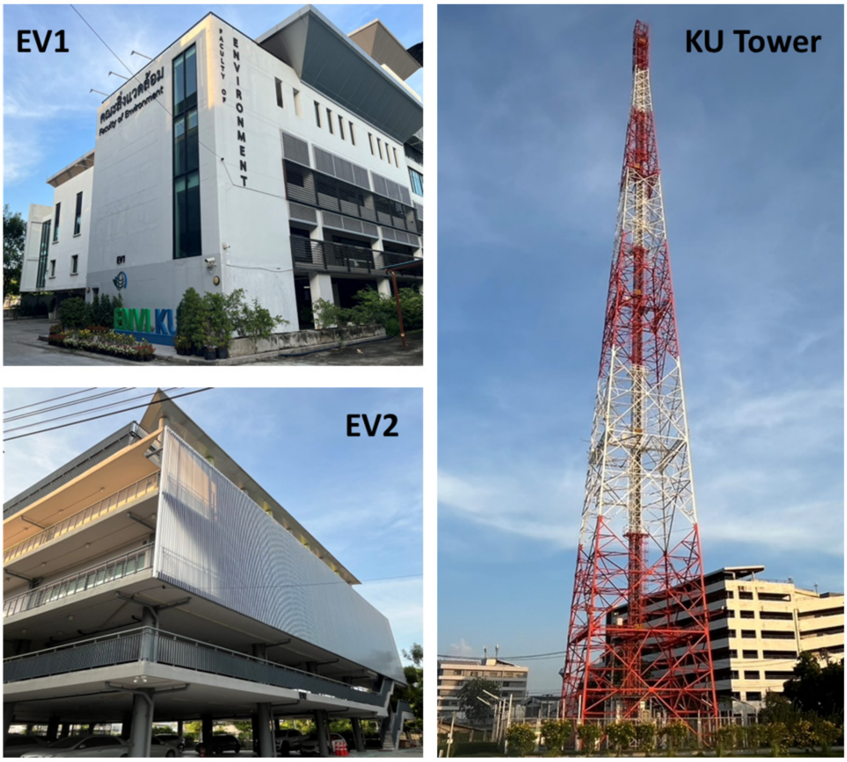


Figure 1. Buildings of the Faculty of Environment, Kasetsart University, Bangkhen

$$\text{GHG Emission (kgCO}_2\text{e)} = \sum AD \times EF \times GWP \quad (2)$$

where AD is activity data from scope 1, EF is emission factor according to the type of activity data as expressed in TGO (2023), and GWP is the global warming potential of a specific gas (AR5 is used in this calculation).

Methane emissions produced by the septic tank are estimated by considering the total number of days students are present on campus for classes, the number of students attending off-site classes as scheduled, and the number of staff working on-site. The emissions are calculated based on IPCC guidelines (IPCC, 2006) using Equations 3 and 4:

$$CH_4 \text{ Emission} = \left[\sum_{i,j}(U_i \times T_i \times EF_i)\right](TOW - S) - R \quad (3)$$

$$TOW = P \times BOD \times 0.001 \times I \times 365 \quad (4)$$

where; CH_4 Emission is CH_4 emission in inventory year (kg CH_4/yr), TOW is total organics in wastewater in inventory year (kg BOD/yr), S is organic component removed as sludge in inventory (kg BOD/yr), U_i is fraction of population in inventory year, $T_{i,j}$ is degree of utilization of treatment/discharge pathway or system j, for each fraction i in inventory year, i is income group, j is treatment/discharge pathway or system, EF_j is emission factor (kg CH_4/ kg BOD), R is amount of CH_4 recovered in inventory year (kg CH_4/yr), BOD is country-specific per capita BOD in inventory year (g/person/day), 0.001 is a conversion from grams BOD to kg BOD, I is correction factor for additional industrial BOD discharged into sewers (for collected the default is 1.25, for uncollected the default is 1.00)

Table 1. Scope and sources of activities used to calculate the carbon footprint of the Faculty of Environment, KU

Scope	Source	Type	Activities	Data collection
1	Stationary combustion	Fire pump Generator	Fuel used to generate fire pump/ generator	Bill of purchase
	Mobile combustion	Gasoline Diesel	Institution's vehicles Students' field trip	Bill
	Fugitive emissions	Refrigerant R-410 leakage	Usage and maintenance of A/C system	Bill
		Fire extinguisher CO_2	Leakage	Survey and observation
		Methane released from septic tank	Wastewater treatment	Refer to IPCC (2006)
2	Electricity consumption	Electricity consumption annually (kWh)	Electricity consumption in physical units (e.g., offices, classroom)	Electricity bill
3	Employee commuting	Type of transportation Types/ no. of vehicles Type/amount of fuel Distance Working days/yr	Travel between the faculty and the places of residence	Question-naire
	Business travel	Type of transportation Types/ no. of vehicles Type/amount of fuel Distance	Travel from the faculty for work outside	Memorandum for travel permission
	Office supplies	Paper	Office supplies usage	Bill of purchase
	Chemicals used	Type/amount of chemical	Chemical use	Bill of purchase
	Water consumption	Water supply	Water consumption in the faculty	Water supply bill
	Waste management	Solid waste Recycle waste	Composition of waste Amount of waste Types of waste handling	Direct measurement
	Downstream lease assets	Food and refreshment stalls	Electrical /fuel consumption of tenants	KWh meter/ bill
	Transportation of supplies/ chemical/ waste	Pick up Drop off	Transportation for pick-up or drop-off of supplies chemicals, or waste	Bill of payment

2.3.2 Scope 2: Indirect emissions

The calculation of GHG emissions from electricity consumption involves using the emission factor derived from the Electric Grid Mix as listed in the Thai National Life Cycle Inventory LCI Database (TGO Electricity data from 2016-2018). The emissions are calculated using the Equation 5.

GHG Emission ($kgCO_2e$) = $\sum AD_E \times EF$ (5)

where; ADE is activity data from the electricity consumption (kWh), EF is the emission factor according from the Electric Grid Mix as listed in the Thai National Life Cycle Inventory LCI Database (TGO, 2023).

2.3.3 Scope 3: Other indirect emissions

The emissions for each activity within Scope 3 are calculated using the fundamental equation presented in Equation 1.

The total greenhouse gas emissions from all activities under Scope 3 are then aggregated to provide a comprehensive assessment. To evaluate the significance of these emissions, the analysis adheres to the guidelines established by the TGO (TGO, 2023). This approach ensures that the assessment aligns with standardized methodologies and provides a reliable basis for identifying key emission sources and prioritizing mitigation efforts.

3. Results and Discussion

3.1 GHG emissions of scope 1: Direct emission

Scope 1 GHG emissions in fiscal year 2023 were recorded at 276.53 tonCO_2e, rising to 385.23 tonCO_2e in fiscal year 2024. These emissions resulted from the use of the faculty's vehicles, liquefied petroleum gas (LPG), refrigerant leakage, and methane release from the septic tank system, as illustrated in Figure 2. A comparison of data from both fiscal years indicates an increase of 108.7 tonCO_2e in 2024 compared to 2023.

The main contribution of this increase was refrigerant leakage, which had a significant impact on overall emissions. Notably, emissions from refrigerant leakage during the installation and maintenance of air conditioning (AC) systems were recorded and reported in 2024 but had not been accounted for in 2023. This underscores the need for improved AC maintenance record-keeping and the establishment of a comprehensive maintenance log for each unit. Additionally, implementing stricter refrigerant management protocols would be essential in mitigating future emissions.

3.2 GHG emissions of scope 2: Indirect emissions

Scope 2 GHG emissions in fiscal year 2023 amounted to 241.40 tonCO_2e, rising slightly to 246.18 tonCO_2e in fiscal year 2024. These emissions were entirely attributed to the faculty's electricity consumption. A year-on-year comparison indicates a modest increase of 4.77 tonCO_2e in 2024 compared to 2023 (Figure 3). Although the increase in Scope 2 emissions was relatively small (approximately 2%), it suggests a slight rise in electricity consumption. This can be attributed to several factors, including increased operational hours, expanded use of electrical equipment, or higher demand for air conditioning. A key contributor to electricity consumption is the EV1 building, which serves as the faculty's main facility. It consists of administrative offices, conference and meeting rooms, classrooms, and laboratories for both teaching and research, leading to higher energy demand. In contrast, the EV2 building is primarily used for classrooms and teaching

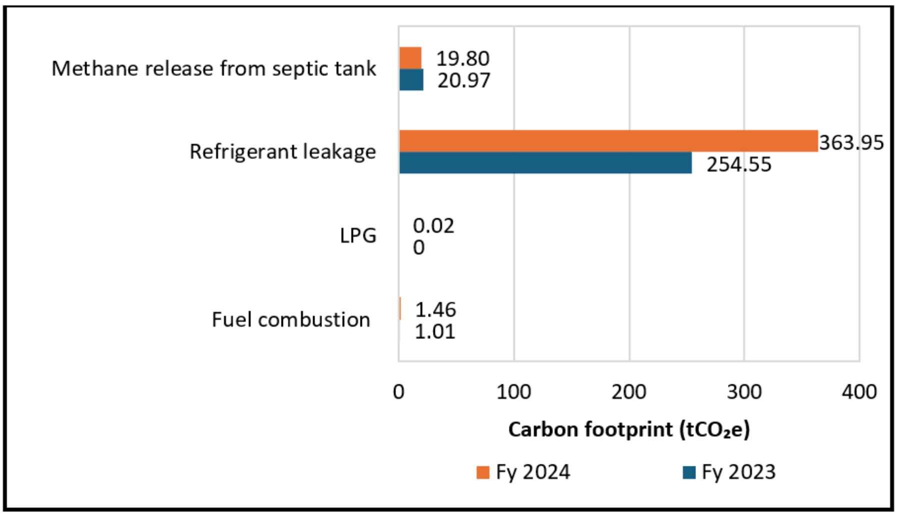


Figure 2. Comparison of GHG emissions from scope 1 of the Faculty of Environment, KU, in fiscal years 2023 and 2024

laboratories, operating mainly according to the academic schedule. Particularly, the EV2 building has a rooftop solar power system, which has effectively reduced its reliance on grid electricity.

Given that electricity consumption remains a significant component of the faculty's carbon footprint, further measures to enhance energy efficiency should be considered. These may include optimizing air conditioning use, upgrading to energy-efficient lighting and appliances, and promoting energy-saving behaviors. Additionally, expanding the use of renewable energy sources, such as installing additional solar panels on the EV1 building, could further contribute to reducing Scope 2 emissions in the long term.

3.3 GHG emissions of scope 3: Other indirect emissions

Scope 3 GHG emissions in fiscal year 2023 were recorded at 211.60 tonCO_2e, increasing to 246.17 tonCO_2e in fiscal year 2024. The calculation of Scope 3 emissions required a significance assessment in accordance with the TGO calculation guidelines to determine key emission sources. The assessment results identified four significant activities within Scope 3, including purchased goods and services, waste generated in operations, business travel, and employee commuting. Only emissions from these activities were considered in the final calculations. The evaluated Scope 3 emissions amounted to 163.63 tonCO_2e in fiscal year 2023 and increased to 195.62 tonCO_2e in fiscal year 2024. A year-on-year comparison (Figure 4) shows an increase of 31.99 tonCO_2e in 2024 compared to 2023.

Among these activities, employee commuting contributed the highest emissions, reflecting a growing impact from travel-related activities. The increase may be linked to changes in commuting patterns, higher travel frequencies, or shifts in transportation modes. Addressing emissions from commuting could be a key area for future carbon reduction strategies, such as promoting public transportation, carpooling, remote work options, and the use of low-emission vehicles.

3.4 Total GHG emissions

In the fiscal year 2023, total greenhouse gas (GHG) emissions were recorded at 729.53 tonCO_2e, originating from various direct and indirect sources, as detailed in Table 3. Direct emissions (Scope 1) accounted for 276.53 tonCO_2e, while indirect emissions from purchased electricity (Scope 2) contributed 241.40 tonCO_2e, and other indirect emissions (Scope 3) contributed 211.60 tonCO_2e. The distribution of emissions by scope revealed that Scope 1 was the primary contributor,

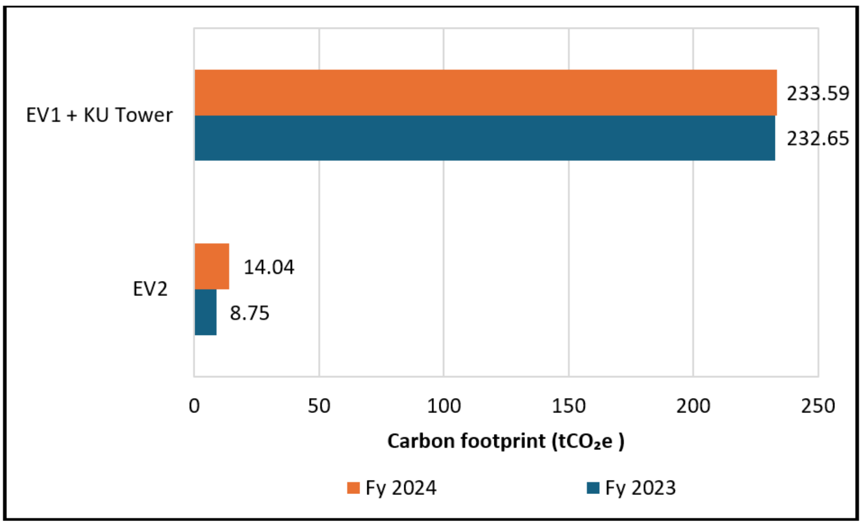


Figure 3. Comparison of GHG emissions from electricity usage (scope 2) of the Faculty of Environment, KU, in fiscal years 2023 and 2024

representing 37.91% of total emissions, followed by Scope 2 at 33.09%, and Scope 3 at 29.00% (Figure 5a).

In fiscal year 2024, total GHG emissions increased to 877.58 $tonCO_2e$, marking a rise of 148.05 $tonCO_2e$ (20.3%) from the previous year. This increase was primarily driven by a substantial rise in Scope 1 emissions, which grew by 108.7 $tonCO_2e$ (39%) to 385.23 $tonCO_2e$. A key factor contributing to this increase was the inclusion of emissions from the installation and maintenance of the air conditioning (AC) system, which had not been recorded in 2023. Scope 2 emissions saw a marginal increase from 241.40 to 246.18 $tonCO_2e$, while Scope 3 emissions remained increased from 211.60 at 246.17 $tonCO_2e$. The proportional distribution of emissions in 2024 showed a shift, with Scope 1 emissions rising to 43.90% of total emissions, while Scope 2 and Scope 3 contributed 28.05% and 28.05%, respectively (Figure 5b).

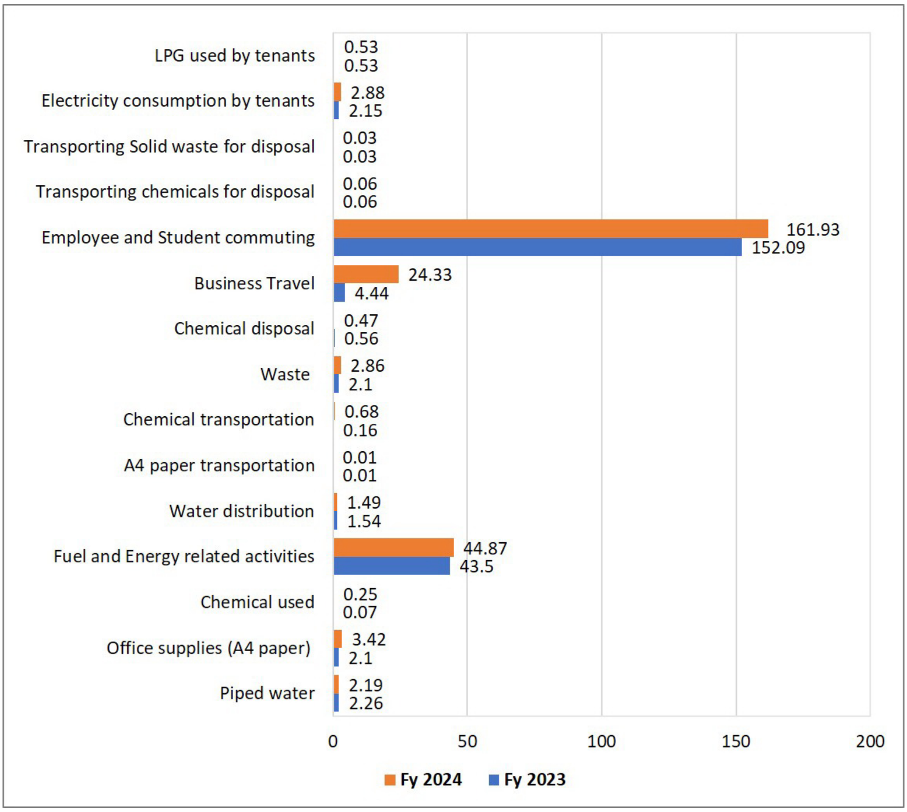
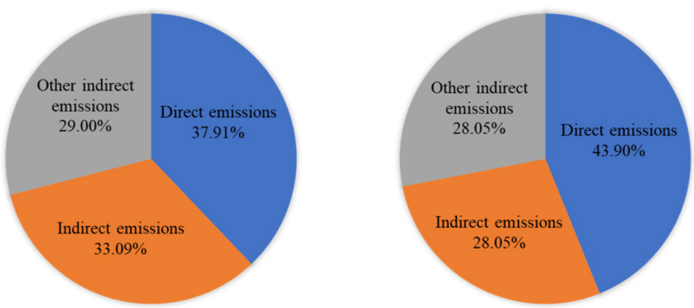


Figure 4. Comparison of GHG emissions from other activities (scope 3) of the Faculty of Environment, KU, in fiscal years 2023 and 2024



(a) 2023 (b) 2024

Figure 5. Contribution of carbon footprint from different sources of emission in fiscal years (a) 2023 and (b) 2024

The findings of this study highlight the GHG emissions profile of the Faculty of Environment, KU, across different scopes. Scope 1 (direct emissions) emerged as the largest contributor, followed by Scope 2 (indirect emissions from electricity) and Scope 3 (other indirect emissions). These results provide a critical basis for developing targeted strategies to reduce GHG emissions within the faculty, supporting Kasetsart University's goals of achieving carbon neutrality and promoting sustainability.

When compared to other university faculties, the Faculty of Environment at Kasetsart University exhibited lower emissions than the Faculty of Environment and Resource Studies at Mahidol University, which reported 1,091.85 tonCO_2e/year (Aroonsrimorakot et al., 2013). However, its emissions were significantly higher than those of the Faculty of Environmental Engineering at Chulalongkorn University, which recorded 138.6 tonCO_2e/year (Janangkakan *et al.,* 2019). Internationally, the University of the Philippines Cebu (UPC) estimated its total emissions in 2018 at 1,520.6 tonCO_2e. (The University of Oulu in Finland reported a carbon footprint of 19,072 tonCO_2e in 2019 (Kiehle *et al.,* 2022). In the United States, Clemson University reported a carbon footprint of 3,000 tonCO_2e in 2014, primarily contributed by electricity consumption (Clabeaux *et al.,* 2020). These variations can be attributed to differences in data sources, the scope of activities included in calculations, teaching and learning processes, building and laboratory utilization, as well as variations in the number of staffs and students.

On a per capita basis, the Faculty of Environment, KU, recorded 0.93 and 1.08 tonCO_2e/person/year for the fiscal years 2023 and 2024, respectively. These number are comparable to those of the Faculty of Engineering at Chulalongkorn University and the University of the Philippines Cebu (UPC), which reported 1.08 and 1.1 tonCO_2e/person/year, respectively (Janangkakan *et al.,* 2019; Cortes, 2022). In contrast, Clemson University reported an average of 4.2 tonsCO_2e per student in 2014, highlighting significant differences in per capita emissions across institutions (Clabeaux *et al.,* 2020).

3.5 Proposed strategies for reducing greenhouse gas emissions

Based on the findings of this study, proposed strategies were simulated to evaluate their potential for reducing GHG emissions, as follows:

1) Replacing R-410a refrigerants with R-32

The replacement of R-410a refrigerants with R-32 demonstrated a significant reduction in GHG emissions. The simulation revealed that this method reduces emissions by 235.89 tonCO_2e/year. This reduction is attributed to the lower carbon emission factor of R-32 compared to R-410a, making it a more environmentally friendly alternative.

2) Replacing fluorescent lamps with LED lighting

LED lighting not only consumes less energy but also has a longer lifespan, further contributing to sustainability efforts. The replacement of 1,228 fluorescent lamps with energy-efficient LED lamps was found to reduce electricity consumption by 42,793.34 kWh/year. This reduction in energy use can reduce GHG emissions by 21.40 tonCO_2e/year.

3) Installing solar panels for a renewable energy

The installation of 60 solar panels was simulated to assess its impact on energy consumption and GHG emissions. The results indicated that this measure could reduce electricity consumption by 78,791 kWh/year, leading to a reduction in GHG emissions by 39.27 tonCO_2e/year.

Table 3. Quantification of carbon footprint of the Faculty of Environment, KU, in the fiscal years 2023 and 2024

Scope	Activity	Description	Activity data			Emission (tCO_2e)		Contribution to total	
			Unit	2023	2024	2023	2024	2023	2024
1	**Direct emissions**					**276.53**	**385.23**	**37.90%**	**43.90%**
	Fuel combustion (organization vehicles)	Gasoline (van)	L	383.62	574.78	0.87	1.31	0.119%	0.149%
		Gasoline (motorcycle)	L	62.25	66.44	0.14	0.15	0.019%	0.017%
	LPG	LPG	kg	0	8	0	0.02	0.000%	0.002%
	Refrigerant leakage	R-410a filled	kg	0	56.5	0	0	0.000%	0.000%
		R-410a leakage from A/C (usage)	kg	132.3	132.3	254.55	254.55	34.892%	29.006%
		R-410a leakage from A/C (installation/maintenance)	kg	0	0.36	0	109.40	0.000%	12.466%
	Methane from septic tank	CH_4 leak	kg CH_4	748.92	707.29	20.97	19.8	2.874%	2.256%
2	**Indirect emissions**					**241.40**	**246.18**	**33.09%**	**28.05%**
	Electricity consumption	EV 1 + KU Tower	kWh	465,387	467,276	232.65	232.14	31.890%	26.452%
		EV 2	kWh	17,510	28,076	8.75	14.04	1.199%	1.600%
3	**Other indirect emissions**					**211.60**	**246.17**	**29.01%**	**28.05%**
	Tap water	Tap water usage	m^3	2,847	2,759	2.26	2.19	0.310%	0.250%
	Office supplies (paper)	Paper usage	kg	1,000	1,625	2.1	3.42	0.288%	0.390%
	Chemical used	Bill chemical ordering	kg	6.11	109	0.07	0.26	0.010%	0.030%
	Fuel and Energy related activities	Vehicle	L	445.87	641.215	0.18	0.26	0.025%	0.030%
		LPG (Fire drill)	kg	0	8	0	0.01	0.000%	0.001%
		Fire extinguishers (Drill)	kg	0	405	0	0.43	0.000%	0.049%
		Electricity consumption	kWh	482,897	495,352	43.32	44.17	5.938%	5.033%
	Water distribution	Tap water usage	m^3	2,847	2,758.91	1.54	1.49	0.211%	0.170%
	Paper transportation	Pick up	tkm	21.25	31.75	0	0	0.000%	0.000%
		Drop off	km	58	58	0.01	0.01	0.001%	0.001%
	Chemical transportation	Pick up	tkm	567.36	2762.43	0.12	0.6	0.016%	0.068%
		Drop off	km	163.5	345.8	0.04	0.08	0.005%	0.009%
	Waste	Solid waste	kg	2,614	3,541	2.07	2.81	0.284%	0.320%
		Recycle waste	kg	38.5	66.5	0.03	0.05	0.004%	0.006%
	Chemical disposal	incineration	ton	0.38	0.42	0.46	0.51	0.063%	0.058%

Table 3. Quantification of carbon footprint of the Faculty of Environment, KU, in the fiscal years 2023 and 2024 (Cont.)

Scope	Activity	Description	Activity data			Emission (tCO_2e)		Contribution to total	
			Unit	2023	2024	2023	2024	2023	2024
		recycling	ton	0.65	0.82	0.1	0.12	0.014%	0.014%
	Business travel	Transportation by bus	Liter	1,362.11	2,797.62	3.73	7.67	0.511%	0.874%
		Transportation by van	Liter	257.55	513.72	0.71	1.41	0.097%	0.161%
		Transportation by plane short-ranged	pkm	0	55,036	0	2.95	0.000%	0.336%
		Transportation by plane long ranged	pkm	0	85,984	0	12.3	0.000%	1.402%
	Employee and student commuting	Car (Gasoline)	Liter	21,342.42	22,096.45	30.97	31.58	4.245%	3.599%
		Car (Diesel)	Liter	1,969.58	1,994.22	6.23	8.62	0.854%	0.982%
		Motorcycle	Liter	2,130.44	2,298.78	4.37	4.75	0.599%	0.541%
		Motorcycle taxi	Liter	2,121.84	2,221.23	2.41	2.52	0.330%	0.287%
		Bus	Liter	52,112.84	62,676.77	4.46	5.37	0.611%	0.612%
		Van	Liter	3,810.27	5,593.10	0.78	1.02	0.107%	0.116%
		KU bus	Liter	13,733.05	17,930.67	1.18	1.54	0.162%	0.175%
		Skytrain and Subway	Person-trip	2,422	2,452	1.72	1.74	0.236%	0.198%
		EV car	km	3,537.20	3,581.60	0	0	0.000%	0.000%
		Electric tricycle	km	2,268	2,296	0	0	0.000%	0.000%
		Electric scooter	km	648	656	0	0	0.000%	0.000%
		Walk/Bike cycle	km	2,948.40	3,968.80	0	0	0.000%	0.000%
		GHG emissions from non-respondents	kg CO_2e	99,969.50	104,791.52	99.97	104.79	13.703%	11.941%
	Transporting chemicals for disposal	Pick up	km	118	118	0.03	0.03	0.004%	0.003%
		Drop off	tkg	121.54	146.5	0.03	0.03	0.004%	0.003%
	Transporting solid waste for disposal	Pick up	tkg	104.56	141.64	0.01	0.01	0.001%	0.001%
		Drop off	kg	40	40	0.02	0.02	0.003%	0.002%
	Electricity used by tenant	Electricity usage	kWh	4,300	5,754	2.15	2.88	0.295%	0.328%
	LPG used by tenants	LPG usage	kg	450	450	0.53	0.53	0.073%	0.060%
	Total					**729.53**	**877.58**	**100%**	**100%**

4. Conclusion

This research was conducted to assess the carbon footprint for organization (CFO) of the Faculty of Environment, Kasetsart University (KU). Based on the analysis of all activities, it was found that in fiscal year 2024, the Faculty of Environment, KU, reported total greenhouse gas emissions of 827.02 tonCO_2e, reflecting an increase of 145.46 tonCO_2e from the fiscal year the fiscal year 2023. In the fiscal year 2024, the average greenhouse gas emissions per person were 1.08 tonCO_2e/person/year, an increase from the fiscal year 2023, which recorded 0.93 tonCO_2e/person/year. The breakdown of emissions shows that Scope 1 (direct emissions) was the largest contributor, followed by Scope 2 (indirect emissions from electricity consumption), with the lowest emissions arising from Scope 3 (other indirect activities). Three key strategies were proposed and simulated to evaluate their potential for reducing GHG emissions, including replacing R-410a refrigerants with R-32, transitioning fluorescent lamps to energy-efficient LED lamps, and installing solar panels for promoting renewable energy. Research finding on the carbon footprint for organization (CFO) serves as a tool for identifying emission sources, establishing a baseline, and quantifying total greenhouse gas emissions for the Faculty of Environment, KU, that will help inform strategies to reduce emissions.

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