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Self-Evaluation of the Faculty of Sciences of Engineering and Technology UABC According to UI Green Metric 2023

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Abstract. The objective of this study is to use the Guideline UI GreenMetric World University Rankings 2023 guide, with the purpose of evaluating the sustainability performance of the Faculty of Sciences of Engineering and Technology (FCITEC) Valle de Las Palmas Academic Unit of the Autonomous University of Baja California (UABC). According to the available documentary information from years 2020 to 2023 of the annual activity reports of the faculty's Dean, in addition to statistical data and Study Plan documents of the Educational Programs offered at FCITEC, as well as activity reports of environmental management, all published on the institutional website, which are used to evaluate according to the six categories of the UI GreenMetric 2023; with the intention of generating a baseline to help propose actions and strategies for continuous improvement for the benefit of the university community, as well as the local environment and community. With the self-assessment, the findings of compliance with the categories were between 27% and 75%, where the highest global average corresponds to waste management and the lowest for transportation. Continuous work and improvement are necessary to achieve the sustainable performance of FCITEC, so that it can comply with the UI GreenMetric standards, in a way in which the academic unit can reduce negative environmental impacts in its surroundings.

Keyword:

Green University, rainwater harvesting, recycling, Self-assessment, Sustainability.

1. Introduction

Higher Education Institutions (HEI) have an important role in their contribution to sustainability (Association of University Leaders for a Sustainable Future, 2023) at the community in which they intervene, from the administrative, academic and operational area, as well as the impact it generates with the society with which it interacts externally,

through which it reaffirms its position through the example of its sustainable practice (Fissi, Roimolini, Gori, & Contri, 2021) Therefore, it is pertinent that the HEIs carry out a system of evaluation of their performance to contribute to the fulfilment of the objectives and goals of sustainable development. (Torres Ramos, 2021) of the United Nations Organization (United Nations Publications, 2023) through the creation of goals, planning and sustainability reports, attended from the high organizational hierarchy in HEI (Fernández-Sanchez, Berzosa, & Bernaldo, 2017). Baris and collaborators (2021), point out that, as a result of the responsibility for the sustainability actions carried out by universities, during the 90's they were named "green", but since the year 2000 terms such as "green university" or "green campus" were used, and characterized by being based on sustainability actions, environmentally friendly buildings, cultural activities, commitment to the community and sustainable education practices (Zhu & Dewancker, 2021); in this sense, it is pertinent that HEIs incorporate sustainability content and transversal sustainability competencies into their study plans. (Ramos Torres, 2021).

Likewise, it is important that HEIs on their path towards sustainable and lasting development and, as a benchmark for change within the institution and for local society, shall have pertinent policies that ensure divulgation across the university and the external community about the efforts carried out in sustainability and, although it is true that for some European HEIs this practice is common, other authors also point out that it is still scarce (Alonso-Almeida, Marimon, & Casani, 2015).

The purpose of this study is to self-evaluate the sustainability performance of the Faculty of Sciences of Engineering and Technology (FCITEC) Valle de las Palmas Academic Unit (UAVP) of the Autonomous University of Baja California (UABC) according to the Guideline UI GreenMetric World University Rankings 2023 (UI Green Metric Secretariat, 2023) and generate a baseline to propose actions and strategies for continuous improvement for the benefit of the university community, the environment, and with a positive impact on and for the local community with which it interacts.

2. Methodology

The studied HEI, which is object of this self-evaluation, is the FCITEC Valle de las Palmas Academic Unit of the UABC. Research was carried out based on the documentary information from the year 2020 to 2023, which is available in the annual reports of activities of the dean of the faculty, as well as statistical data and documents from the Study Plans of the Educational Programs that are offered at the FCITEC and published on the institutional website of the UABC, reports of environmental management activities, which were evaluated according to the six categories of the UI Green Metric 2023: (UI Green Metric Secretariat, 2023) environment and infrastructure, energy and climate change, waste, transportation, and education and research. It is important to mention that because common spaces such as the library, parking lot, community center and cafeteria are shared, for the evaluation of the Environment and Infrastructure category, the information corresponding to the Faculty of Health Sciences (FACISALUD) was also considered, as it belongs to the Valle de Las Palmas Unit of the Tijuana Campus of the UABC.

3. Results and Discussion

3.1. Environment and Infrastructure

The Autonomous University of Baja California (UABC) has three Campuses: Ensenada, Mexicali, and Tijuana. Within these, there are schools, faculties, research institutes and academic units which are located on the periphery of the municipalities of the state of Baja California, Mexico. In the case of FCITEC, it is a unit that belongs to the Tijuana Campus. Altogether with FACISALUD it is part of the Valle de las Palmas Unit, located at geographic coordinates 32.43502° N and 116.67506° W (see Figure 1) with a total area of 500,000 m2 on a suburban environment, with a semi-dry Mediterranean-type climate with a Winter rain season. (H. XXII Constitutional City Council of Tijuana, B. C., 2019). FCITEC occupies 8,946 m2 and FACISALUD occupies 4,009.85 m2 of constructed area, with a ratio of open space to total area of 97.04%. The total constructed area (including the first floor and the levels in each building) is 124,093,606 m2. It is important to mention that for this section on Environment and Infrastructure, the description of the two faculties that make up the Academic Unit of Valley of the Palms (UAVP) is considered.

Figure 1. UABC Valle de las Palmas Unit. Source: (Google Earth, 2023).

The total area of the UAVP which features forest vegetation is 366,848 m2 and corresponds to 73% and of this percentage, while 5% is planted vegetation. In FCITEC, the area where the planted or garden vegetation is located is covered with a layer of black polyethylene, therefore, it is estimated that the surface for water absorption is that occupied by natural vegetation (see table 1) with 350,024 m2.

Table 1. Distribution of vegetation

Land Use	Area m2
Natural vegetation	350,024
Planted vegetation	16,824
Total	**366,848**

3.2. Total number of in-person and online students

The UAVP has an enrollment of 5,215 undergraduate and graduate students (see Table 2). Among these, there are eight students who are studying the postgraduate course in Master in Technologies for Organizational Learning (MTAO) online.

Table 2. Enrollment and open space in the Academic Unit

Faculty	Undergraduate enrollment	Graduate enrollment
Faculty of Health Sciences*	2720	8
Faculty of Sciences of Engineering and Technology**	2467	18

* (Autonomous University of Baja California, 2023), (Faculty of Engineering Sciences and Technology, 2023)

3.3. Academic and administrative staff

According to data from the FACISALUD and FCITEC websites, during the 2019-2022 period, the teaching and administrative staff at FCITEC and FACISALUD were 261 and 471 respectively (see Table 3).

Table 3. Teaching and administrative staff

	Full time teachers	Part time teachers	Academic Technicians	Administrative staff
FACISALUD*	85	356	10	20
FCITEC	75	160	4	22

(Autonomous University of Baja California. FACISALUD, 2023)

Total open area divided by the population of the Academic Unit, The open area in the UAVP is 487,044.15 m2 and the population in the university community is 5,957, which gives a ratio of 81.75 m2/person.

3.4. Total budget of the university.

In accordance with the Institutional Development Plan 2019-2023, the UABC operated with a budget of $212,800 US Dollars (Universidad Autónoma de Baja California, 2023) and this estimate is annually submitted for approval at a session of the University Council. The FCITEC had an average budget in 2020, 2021 and 2022 of $103,820 USD (Facultad de Ciencias de la Ingeniería y Tecnología, 2023) and approximately 10% was allocated to works and activities related to the environmental management of the Faculty. The UAVP allocates material and economic resources related to the protection of the environment and they are linked to Policy II Environment, indicated in the Institutional Development Plan (PDI) of the UABC, as well as those established in the PDI of FCITEC and FACISALUD. However, no available and published information on the annual budget allocated to sustainability efforts was found.

3.5. Campus facilities for disabled, special needs, or maternity care.

At the two parking lots numbered 3 and 4 (see Figure 2) which are in FCITEC only one parking lot (number 3) has a parking space for maternity and another for people with disabilities. The three-story buildings have elevators, as well as access ramps to the different spaces. Regarding maternity care, there is still no office or space available for this use.

Figure 2. Areas for people with special needs at FCITEC

Regarding the architectural features for access and transit for people with disabilities, there are the following accessibility conditions for these areas:

There is no access ramp from parking lot 4 to the area of buildings G, H and sports areas (Figure 3).

Figure 3. Access to buildings G and H, and sports areas

As can be seen in Figure 4, there is a safety railing, but access to this area is through stairs and there is no ramp from parking lot 3 to the bus stop.

Figure 4. Access from parking lot 3 to the bus stop

The access that connects the community center with the sports areas has a safety railing, but there is no access ramp to this area (see Figure 5).

3.6. Security and surveillance facilities

For security and surveillance in the Academic Unit there is the office of the University Assistance and Prevention Center (CAPU) which depends on the Integral University Security System (SISU) in the area of the General Coordination of Human Resources of the UABC and whose purpose is keep the institution safe through cameras and surveillance personnel 24/7, in addition to having a fixed system against fire, hydrants and fire extinguishers within the FCITEC's facilities.

Health infrastructure facilities for the well-being of students, academics, and administrative staff FCITEC and FACISALUD have two medical offices to provide health

services to the college community and these are attended by doctors affiliated with FACISALUD.

Figure 5. Access from community center to sports areas.

3.7. Conservation

Plant, animal and wildlife genetic resources for food and agriculture secured in medium to long-term conservation facilities. As part of the Institutional Development Plan, UABC has an Environmental Policy related to issues of conservation of natural resources which is carried out through the Coordination of Environmental Projects, however, there are no current conservation programs in the medium or long term, as well as the amount destined for the preservation of the natural ecosystem in the Academic Unit.

On the unbuilt areas of the Academic Unit there are spaces with native vegetation. According to a carried out transect, there were 26 identified species of vegetation belonging to the microphyllous coastal scrub, and some belong to the families Asteraceae, Amaranthaceae, Cactaceae, Polygonaceae, Simmondiaceae and Fabaceae, as well as 20 species of ornamental type which were identified in Figures 6, 7, 8 and 9, where some of these can be observed.

Figure 6. *Artemisia califórnica*

A conservation activity carried out by academics is the participation on the Naturalista website (https://www.naturalista.mx/) of the National Commission for the Knowledge of Biodiversity (CONABIO for its acronym in Spanish) where the aforementioned organism publishes the species of vegetation and fauna that have been identified within the Academic Unit. Reforestation campaigns are also promoted, and these have been supported by students as part of their provision of social service or specific projects related to Courses in environmental matters. Other activities that have been carried out are Lectures aimed at the college community, with topics related to the importance and conservation of the natural ecosystem.

Figure 7. *Cylindropuntia prolifera*

Figure 8. *Simondsia chinensis*

Figure 9. *Ferocactus viridescens*

3.8. Energy and Climate Change

Currently, FCITEC does not have any smart buildings, but in 2019, activities began for the development of the photovoltaic farm project in the parking area used by teachers, administrators, and visitors with an investment of 21 million pesos. This project, which began to operate by October 2020, consists of 1,298 photovoltaic panels of 385 Wm, 20 power inverters and a capacity to generate 500 kW, supplying electricity to the entire Academic Unit. (Facultad de Ciencias de la Ingeniería y Tecnología, 2023). According to FCITEC's website, during the period from October 2020 to April 2022 there was an energy saving of 1,032,341 KWh and ceasing emissions of 11,835 Kg of CO2 into the atmosphere (Facultad de Ciencias de la Ingeniería y Tecnología, 2023).

The Valle de las Palmas Unit (UAVP) consumes 1'779,865.65 kWh which, divided by the campus population results in an average of 299.28 kWh and the proportion of renewable energy divided by the total energy use per year is 1.92%. To date, there are no elements of sustainable construction in the buildings of the AU nor any program aimed to reduce

greenhouse gas emissions. Regarding the total carbon footprint (UI Green Metric Secretariat, 2023) it is 1,495.087 metric tons in recent months and the contribution made by a member of the college community at the UAVP is 0.25 metric tons. To date there is no specific energy and climate change program. However, there are several dissemination activities such as international academic conferences (see Figure 9), forums (Figure 10), volunteer participation with international organizations (Figure 11), field practices at environmental education sites (Figure 10), or training related to the "Zero Waste" Institutional Program, which was carried out during 2021 and 2022 (see Graph 1).

Figure 10. International Academic Day 2019

Figure 11. Dissemination activity "Tijuana Energy Forum 2020"

3.9. Waste

Since 2018, the UABC has implemented its "Zero Waste" Institutional Program, for which it has distributed around its campuses a number of metallic structures which support four colored containers where students and university staff can segregate the waste (see Figure 14) generated in the faculty, as it follows: red to deposit plastic, gray for aluminum cans, green for organic waste and black to deposit anything different from the previous three categories. FCITEC has 33 metallic structures for the separation of waste. In addition to these containers there are also some collection points for the recycling of paper and cardboard.

From 2018 to 2020, the vermiculture technique was used to treat the organic waste generated in the AUVP cafeteria, but after the COVID-19 pandemic, the process has not been activated, therefore, this waste is currently sent directly to the city landfill.

Plastic waste, aluminum cans, re-used paper and cardboard are sent to companies for recycling, while organic waste and the rest of the trash which is deposited in black containers are sent for final disposal to the city landfill. It is estimated that FCITEC has a generation of 0.04618 kg/person/day (Ravelo García & Castañón Bautista, 2022) of solid urban waste, from which approximately 15% corresponds to organic waste (Universidad

Autónoma de Baja California, 2018) and are generated mainly in food preparation and consumption areas.

Figure 12. Volunteer activity with international organization (GRID Alternatives) 2022

Figure 13. Field practice at Interpretive Trail “Las Abuelas” 2022

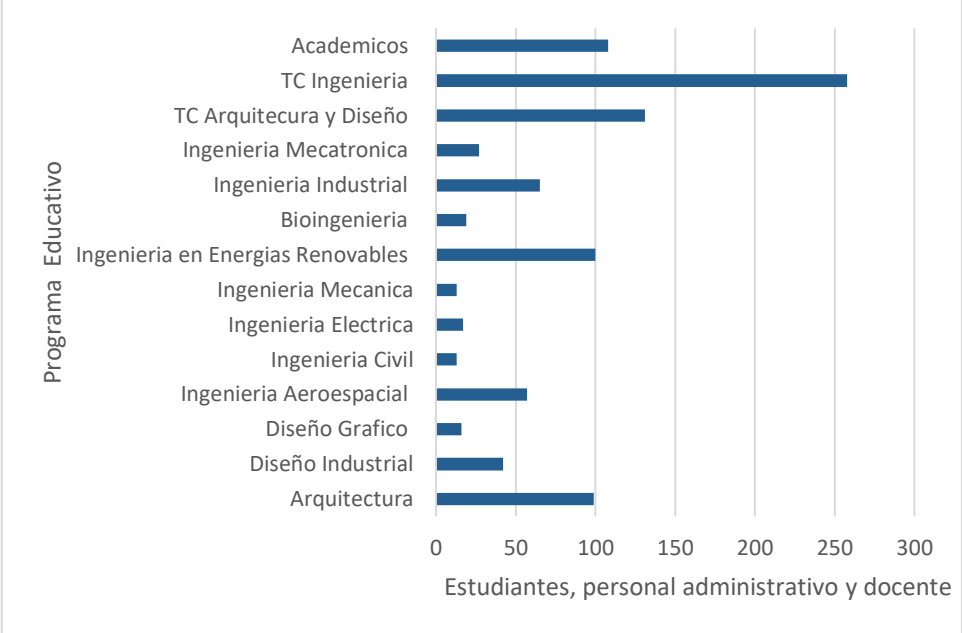
At FCITEC, hazardous waste is also generated (see Graph 2) in school practice activities that are carried out at workshops and laboratories, as well as in cleaning and office activities. Among this waste it can include organic and inorganic solvents, residual acids, broken glassware, metal burr, empty containers that contained hazardous waste, electronic waste, toners, and empty ink cartridges, which are sent for final disposal through a hazardous waste management service company. According to the Transport and Final Disposal Manifests of these companies, during the period from 2021 to 2022, 0.704 tons were generated (see Graph 2) and during the period from 2019 to 2022, 0.03325 tons of hazardous and biological-infectious waste were generated.

3.10. Transportation

According to the analyzed capacity, an average of 550 vehicles enters the Academic Unit daily. These are mainly private cars, urban buses, and a small number of motorcycles (six), in addition to two vans and a sedan (owned by FCITEC). Such total, divided by the population of the UAVP is 0.0938 people per vehicle. Personal travel of the student and faculty community within the Academic Unit is made through the pedestrian paths that connect classrooms, workshops, library, laboratory, community center and administrative areas.

To date, there is no zero-emission vehicle policy at FCITEC and there are a total of 13 hybrid cars. At the initiative of the university community, professors and students share a vehicle from different points in the municipalities, mainly from Tijuana and Playas de Rosarito.

The public transportation service to the UAVP consists mainly on sedan, minivan and bus vehicles (see Table 5).



Graph 1. Training in the "Zero Waste" Program 2019 – 2023.

Figure 14. Metallic structure supporting containers for the separation of solid urban waste.

Table 4. Waste generated at FCITEC

Waste	Tons (day)
Organic	6.48
Inorganic	19.440

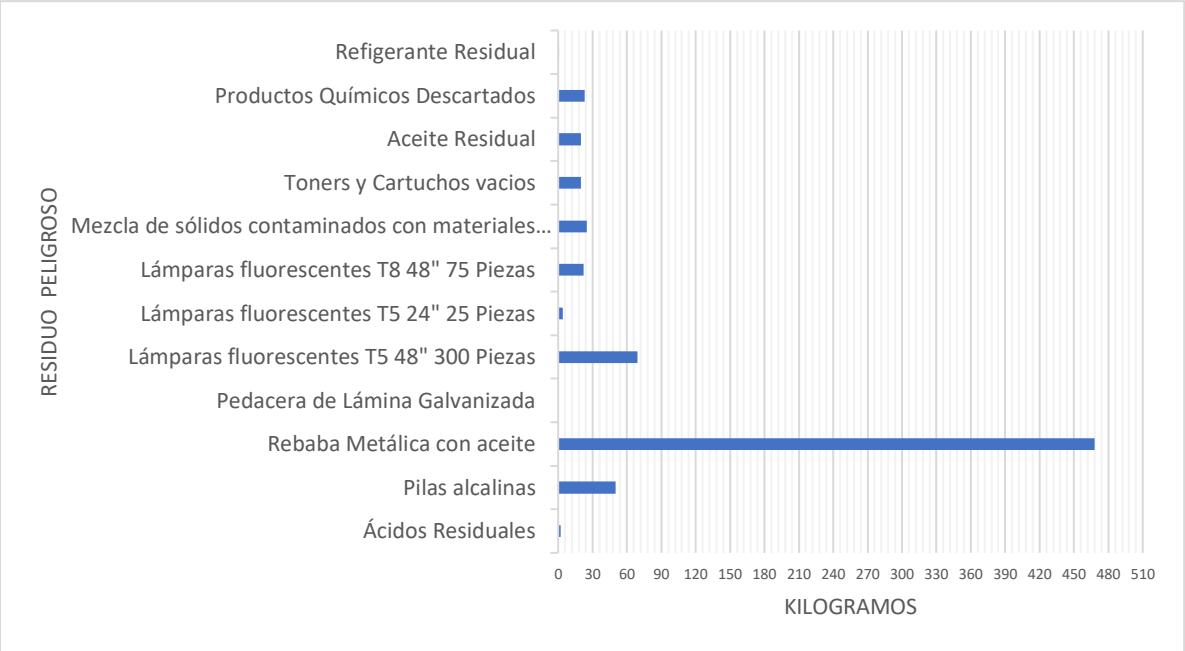
Table 5. Public Transportation

Transport	Passenger capacity
Sedan vehicle	5
Van	13 and 17
Urban bus	48

3.11. Parking Lot Areas

As it can be seen in Figure 15, the UAVP has four parking lots with an area of 27,087 m2, plus an additional one (Lot No. 5) with an area of 5,615 m2, the latter being private property, since it does not belong to the University, but it is also used by the college community thus having a total parking area of 32,702 m2 (see Table VI) and its proportion in relation to the total area of the UAVP is 6.5%. Any visiting motorized vehicle travels

between 0.90 to 1.0 km from the entrance to the AUVP to one of the five available parking lots.



Graph 2. Hazardous waste generated at FCITEC (2021- 2022)

Table 6. Parking Lot areas

Parking Lot	Perimeter (m)	Area (m2)
1	411	10,269
2	374	7,543
3	313	5,942
4	248	3,333
5	306	5,615
Total		**32,702**

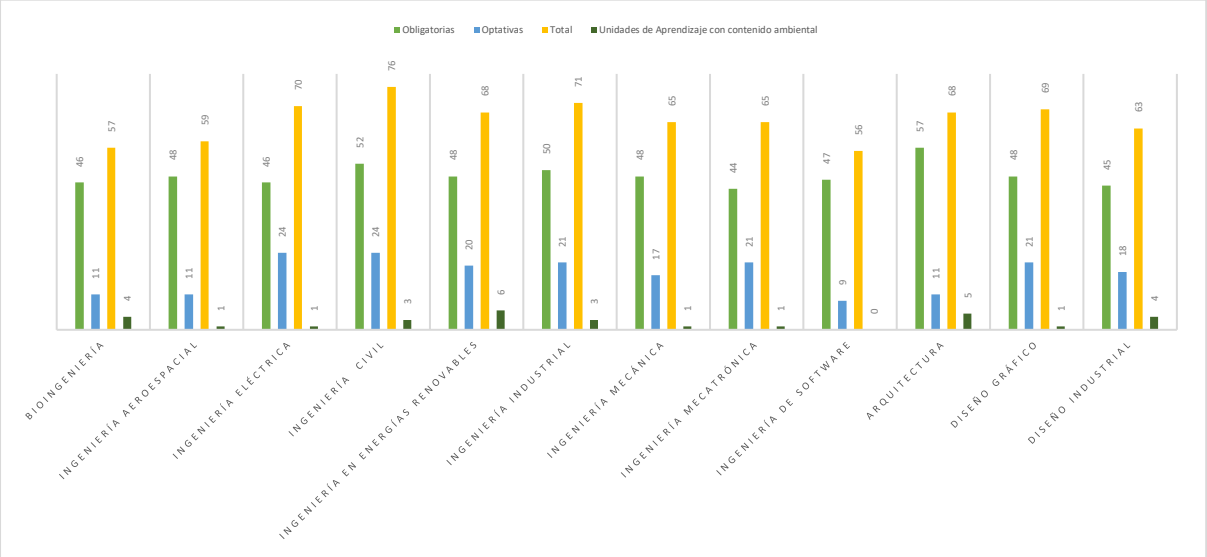
Figure 15. Parking Lots at the Academuc Unit

Note. The shaded numbered areas are the available parking lots in the Valle de las Palmas Academic Unit. (Google Earth, 2023).

3.12. Education and Research

FCITEC offers 12 Educational Programs and, in accordance with the current Study Plans, among these programs there are a total of 787 Learning Units (LU) taught, where 30 of them contribute to topics related to the environment and sustainability, representing 3.8% of the total. The Educational Programs with the most LU in this area are Renewable Energy Engineering, Architecture, Bioengineering and Industrial Design.

The Educational Program of Software Engineering and Emerging Technologies recently opened but its study plan does not considerates LU related to the matters of the environment or sustainability. Graph 3. Contents of Learning Unit programs related to Environment and Sustainability.



Graph 3. Environmental Content in Learning Units

Table 7. Learning Unit whose contents relate to Environment and Sustainability

EDUCATIONAL PROGRAM	FORMATIVE STAGE	LEARNING UNIT (course)	CREDITS (units)	LEARNING MODALITY
Aerospace Engineering	Terminal	Industrial Ecology	5	Elective
Bioengineering	Disciplinary	Environmental	7	Elective
	Terminal	Health Environmental	7	Mandatory
	Terminal	Biotechnology Environmental, Industrial and	4	Mandatory
	Terminal	Health Legislation Bioremediation	7	Elective
	Terminal	Urban Planning and Sustainable Development	6	Elective
Civil Engineering	Terminal	Environmental Engineering	6	Elective
	Terminal	Sewerage and Water Treatment Systems	7	Mandatory

EDUCATIONAL PROGRAM	FORMATIVE STAGE	LEARNING UNIT (course)	CREDITS (units)	LEARNING MODALITY
Electrical Engineering	Disciplinary	Environmental Impact	5	Elective
Renewable Energies Engineering	Basic	Environmental Systems and Renewable Energies	5	Mandatory
	Disciplinary	Geographic Information	5	Mandatory
	Disciplinary	Systems	5	Mandatory
	Disciplinary	Alternative energies	6	Elective
	Terminal	Energy, Water and Food	4	Mandatory
	Terminal	Environmental and Energy Legislation	5	Mandatory
	Terminal	Sustainable development	6	Elective
	Terminal	Environmental	6	Elective
	Terminal	Audit	6	Elective
	Terminal	Sustainable Building Energy and Environment	6	Elective
		Biofuels		
Industrial Engineering	Disciplinary	Sustainable development	4	Mandatory
	Disciplinary	Cleaner production	6	Elective
	Terminal	Industrial Ecology	5	Mandatory
Mechanical Engineering	Terminal	Evaluation of Sustainable Projects	3	Mandatory
Mechatronic Engineering	Disciplinary	Environmental engineering	6	Elective
Software Engineering and Emerging Technologies	-	--	--	--
Architecture	Disciplinary	Architecture, Environment and Energy	6	Mandatory
	Disciplinary	Bioclimatic Design	6	Elective
	Disciplinary	Sustainable Design	6	Mandatory
	Terminal	Comprehensive Design Workshop II	6	Elective
	Terminal	Landscape Architecture	6	Mandatory
Graphic Design	Disciplinary	Sustainable Graphic Design	6	Elective
Industrial	Disciplinary	Sustainable Design	6	Mandatory

EDUCATIONAL PROGRAM	FORMATIVE STAGE	LEARNING UNIT (course)	CREDITS (units)	LEARNING MODALITY
Design		Methodology		
	Disciplinary	Product Life Cycle	6	Mandatory
	Disciplinary	Sustainability	6	Mandatory
	Terminal	Engineering and Sustainable Management	6	Mandatory

Source: Own elaboration with data from the Faculty of Engineering Sciences and Technology (Universidad Autónoma de Baja California, 2023).

3.13. Proportion of sustainability research funding to total research.

According to UABC's website, the administrative unit in charge of environmental management is the Coordination of Environmental Management Projects, an office that implements strategic programs at the university such as the environmental agenda, or the Zero Waste institutional program. However, there is no published data related to the financing of research regarding sustainability or the amount allocated for this category (Universidad Autónoma de Baja California, 2023). For the case of FCITEC and, according to the transparency section from the faculty's website in 2019, as well as from the Activity Reports of the FCITEC's Director, from 2019 to 2021 there were 12 research projects with a total subsidy of $71,983.00 US Dollars, and among these, 27.62% are related to sustainability and had a total financing of $19,888.00 US Dollars.

3.14. Number of academic publications on sustainability

At FCITEC, the academic publications about sustainability that were made between 2020 and 2022 averaged nine per year. To determine this, a search was carried out in Google Scholar with the keywords green, environment, sustainability, renewable energy, and climate change.

3.15. Number of held events related to sustainability.

During the first 10 years of the faculty, that is, from 2009 to 2019, and according to data reported during 2009-2019 in FCITEC, a total of 48 events related to environment and sustainability were registered: 84% were held at spaces within the faculty and the remaining 16% corresponds to participation in environmental activities at different sites outside the university. The events held were mainly aimed at a college level audience and included workshops, courses, lectures, seminars, and academic conferences. (Reyes Ruíz, Nieto Caraveo, & Pech Pech, 2020). From 2020 to 2022 there was an average of five events per year.

3.16. Sustainability website run by the university.

Environmental and sustainability management at UABC is carried out through the Environmental Projects Management Coordination office, which publishes its information on UABC's website. However, FCITEC's website does not have a section where reports related to the environment and sustainability can be published. This information is included on the director's annual reports. Cultural activities that take place during the academic year are also reported, with an average of four events a year.

3.17. Number of sustainability community service projects organized and/or in which students participate.

According to FCITEC's website, to support the local community, the faculty has registered 18 community social service programs where students from the first three

semesters of their programs participate, and among these, 38.88% carry out activities related to the environment and sustainability (see Table 8).

Table 8. Social Service Programs

Community Social Service	Activities
Reforestation	Planting trees, taking care of plant species, cleaning gardens, organic material recycling
Cleaning my environment	Garbage collection in neighborhoods surrounding the Valle de las Palmas unit and at FCITEC.
Compost and Vermicomposting	Collect and segregate waste, prepare area for composting, and vermicomposting
Help low-income people to obtain a dignified life	Help with the layout of houses, block manufacturing, supervision, and advice in the self-construction system of the house, maintenance of greenhouses and help the community to fill out forms for permits and construction licenses
Community activation for environmental improvement	Participate in annual cleaning activities at FCITEC and in support of campaigns organized by civil society organizations.
Support in the permanent campaign to raise awareness of environmental care	Support in the preparation of material related to sustainability and environmental care.
Sustainable development, energy transition and environment in the college community	Participate in activities (dissemination and/or project) of clean energy, awareness (dissemination and/or project) of climate change

3.18. Water

The Valle de las Palmas academic unit is located in a semi-arid area, a region where the average annual precipitation is approximately 240 mm (Sistema Meteorológico, 2020). The supply of drinking water for the university campus is given through the municipal network, using a pressure system composed of a cistern and hydropneumatics equipment, which is connected to the hydraulic network of the buildings and feeds them. Water is used for toilets, as well as for the campus cafeteria and the irrigation of green areas.

Given the scarcity of water in the region, a rainwater collection project was carried out for arid areas, using two potential collection areas in the FCITEC which are: The “Prisma” building which has an area of 3,244.60 m2, and the administrative building, with a roof area of 1,624.63 m2. In addition, precipitation data from the Automatic Meteorological Station (EMA) in FCITEC was used.

Applying mathematical formulas proposed by (Vargas Tapia, 2016), the table 9 shows the results obtained. (Ravelo Garcia, Bautista Castañon, & Pitones Rubio, 2023).

The purpose of this project is to launch it at FCITEC since it is an area with a water deficit. Another purpose sought with the application of this methodology is to promote the culture of rainwater harvesting on the other campuses of the UABC, as well as at the community level and in elementary schools. In addition, the collected water would be used to irrigate green areas on the university campus.

Figure 16.- Rainwater collection potential on roofs, building 1 ("Prisma") and building 2 (Administrative) of FCITEC.
Source: Google Earth, 2023.

Table 9. Results obtained by applying the rainwater harvesting methodology.

Prisma building			Administrative building		
Vt	3810	m3	**Vt**	1908	m3

4. Conclusions and Future Prespectives

This self-assessment was carried out based on the UI GreenMetric (UI Green Metric Secretariat, 2023) the percentage of compliance with the categories is between 27% and 75%. The highest global average corresponds to waste management and the lowest for transportation. According to the results obtained, they indicate that there is a need for continuous improvement in the sustainable performance of FCITEC, so it will be pertinent to follow up on the measures of the categories:

Environment and Infrastructure.

In this category FCITEC has areas of opportunity in the design and conservation of landscaped areas with low water consumption, the publication of the annual budget in the institutional media and the investment of the Faculty destined to the management of sustainability.

Regarding the architectural characteristics of access, transit, and signage for people with disabilities, it is recommended to comply with universal design standards. (Secretaría de Educación Pública, 2014) where at least one parking space for people with disabilities must be provided among every 25 spaces (4%) in the case of parking lots 3 and 4 (see Figure 12), therefore, to comply with the standard, 5 and 4 parking spaces respectively.

Energy and Climate Change.

Energy and Climate Change. In this category, the areas for improvement include the application of energy efficiency measures in the activities of the Faculty, implementation of

smart buildings, increasing renewable energy sources, integrating elements of green infrastructure in buildings and having a program to reduce emissions of greenhouse gases.

Waste.

Waste. In this indicator, it is concluded that there is a necessity for a strategy of segregation for plastic, paper, aluminum waste, as well as to activate the Vermiculture program for the treatment of organic waste. In relation to the generation of hazardous waste, FCITEC must consider all policies and practices for the purchase of less toxic materials and chemical substances, as well as their efficient use.

Transportation.

The areas of opportunity include the implementation of policies on the use of zero-emission vehicles, improvement of urban transportation and thereby avoiding the increase of parking lot areas and the need for increasing initiatives to use shared vehicles. As for the pedestrian paths on campus, they are made of concrete, some have railings and not all have safety ramps, but there is a deficit in terms of lighting and signage.

Education and Research.

In this category the findings indicate that, from the total courses taught at FCITEC, there is 3.8% with environmental or sustainability content, so there is an opportunity for improvement that does not only rely on increasing the teaching of courses realted to these topics, but to include at least a compulsory LU in the next update of all current undergraduate level study plans at FCITEC ensuring education in relevant transversal sustainability skills (Ramos Torres, 2021).

Regarding transparency in the use of resources destined to sustainability, it will be pertinent for the FCITEC to develop and manage a website, where the statistical reports in this matter are published for each school period, as well as reports on the economic resource allocated to improvement actions in the faculty and the grants awarded to research projects related to sustainability.

Finally, it is estimated that the recommended measures are achievable in the medium and long term with the potential to obtain a competitive gain and added value for the FCITEC in comparison to other higher education institutions (Baris Atici, Yasayack, Yildiz, & Ulucan, 2021) in addition to being considered as an opportunity for substantial change towards a sustainable and lasting development for the Faculty of Engineering and Technology Sciences.

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