SAKARYA UNIVERSITY GREEN CAMPUS REPORT

2020
SAKARYA,TURKEY

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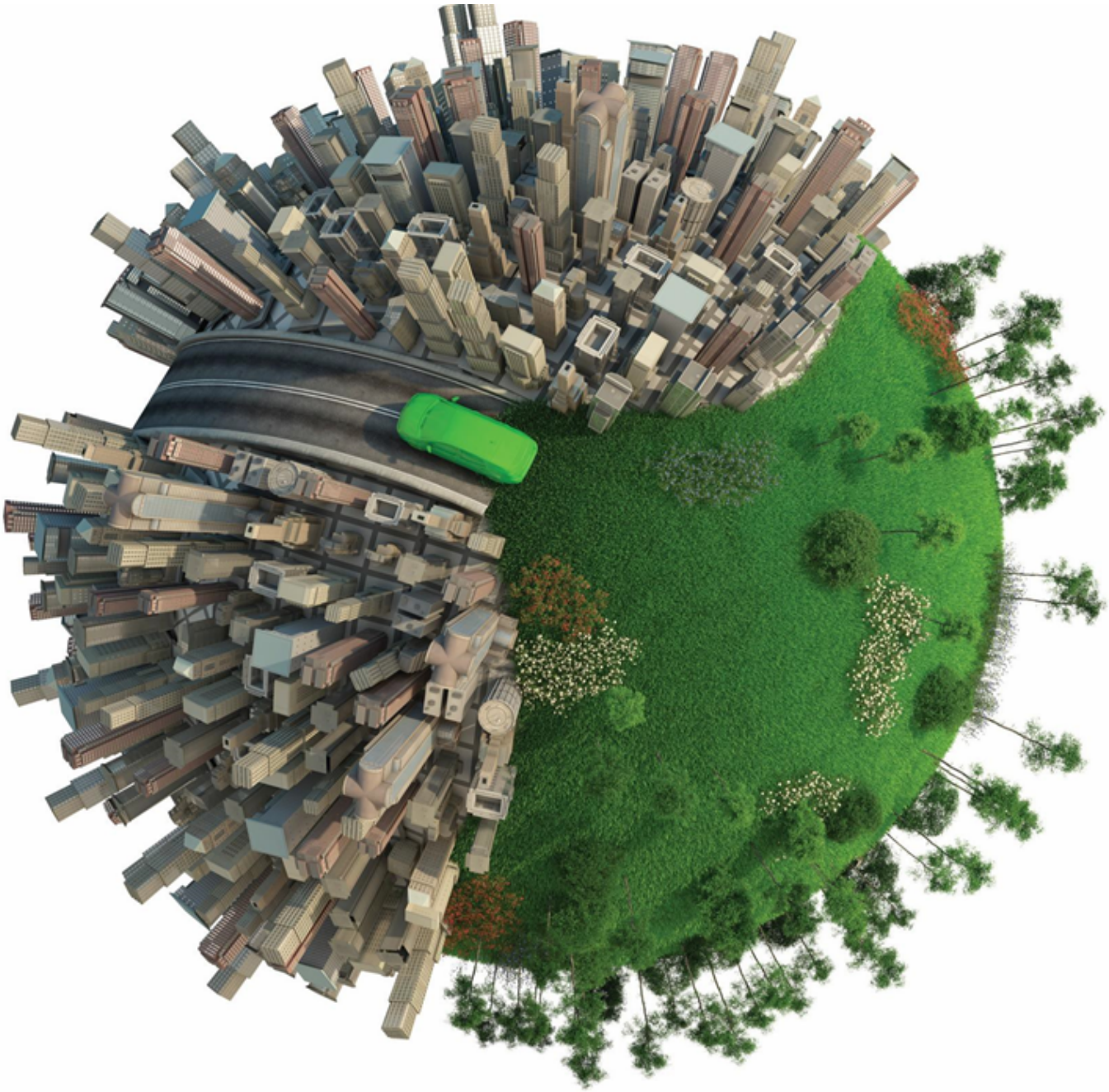


1. SETTING AND INFRASTRUCTURE

Sakarya University (SAU) is a public university settled in East Marmara which aims to train individuals with all kinds of equipment required by contemporary civilization. SAU is one of the most preferred universities for students because of its green campus, education and training facilities on an international level, diversity of education and training services, effective use of technology in its locations and processes, and importance of providing practical training. Managing its processes with its stakeholders, building its network of collaborators, and transferring the knowledge and technology it produces to the public have enabled SAU to become an increasingly valuable asset for other actors in the industry, public institutions, and society that benefit from its services.

SAU was founded in 1970 as Sakarya School of Engineering and Architecture and in 1971 was named Sakarya State Academy of Architecture and Engineering. In 1982, the academy continued its educational activities as an Engineering Faculty affiliated to Istanbul Technical University, and in 1992 it was transformed into Sakarya University.

There are 32 Research and Application Centers, six graduate schools, thirteen faculties, one state conservatory, three vocational schools, and 411 programs are offered; 22 in associate degree, 145 in bachelor's degree, 160 masters and 84 Ph.D. degree. Conventional, Evening-time, and Distance Learning options are available for associate degree and bachelor's degree programs. There are generalist, specialist master programs at the graduate level, with conventional and distance education alternatives and doctoral programs.

Apart from the main campus of SAU, there are four campuses, Hendek Campus, where the Faculty of Education operates; Adapazarı Campus, where Faculty of Dentistry operates; Korucuk Campus, for Faculty of Medicine Dentistry Campus.

The main campus is widely regarded as one of the greenest and attractive in the country. With the extensive greenery with an excellent lake view, the main campus is the focus of life for students, staff, and visitors. It is conveniently located only eight kilometers from the city center.

1.3. Number of Campus Sites

Figure 1: Main Campus

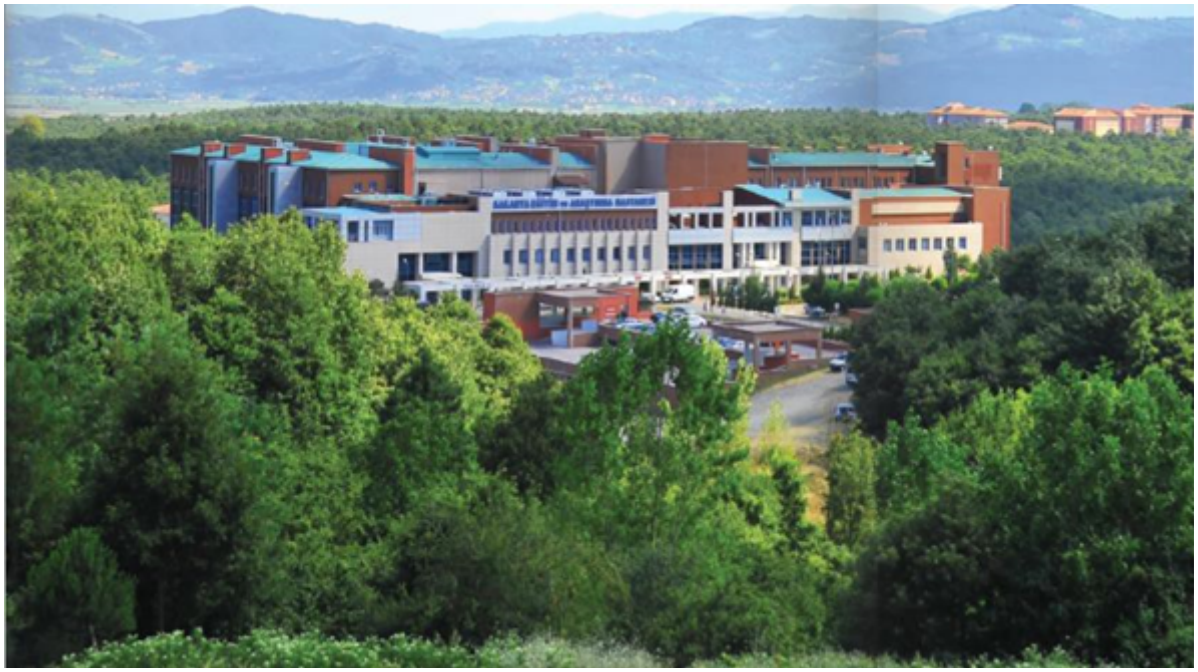


Figure 2: Korucuk Campus

Figure 3: Dentistry Campus

Figure 4: Hendek Campus

Figure 5: Health Services Campus

1.4. Campus Setting

Sakarya University campuses are located in the suburbs. As it is not located in the city center, the campuses are fascinating with their natural beauty and greenery. Especially the main campus is an oxygen paradise where blue and green meet.

Figure 6: Campus Setting - Suburban

1.5. Total Campus Area

Table 1: Total Campus Area

CAMPUSES	TOTAL AREA (in square meters)
MAIN CAMPUS	1600000
DENTISTRY	21.587,54
KORUCUK	390.584,24
HENDEK	11.067,58
HEALTH SERVICES	13.721,42
GRAND TOTAL	**2.036.960,78**

1.7. Total campus buildings area

Sakarya University has a total of 108 buildings used for many different purposes in many different campuses. Since it will not be possible to use photos of all these buildings, you can see some of the buildings with the Sakarya University Virtual Campus from the link below.

The total number of campus buildings area as meter is 211078,62m²

Additional link
https://tanitim.sakarya.edu.tr/sanalkampus/

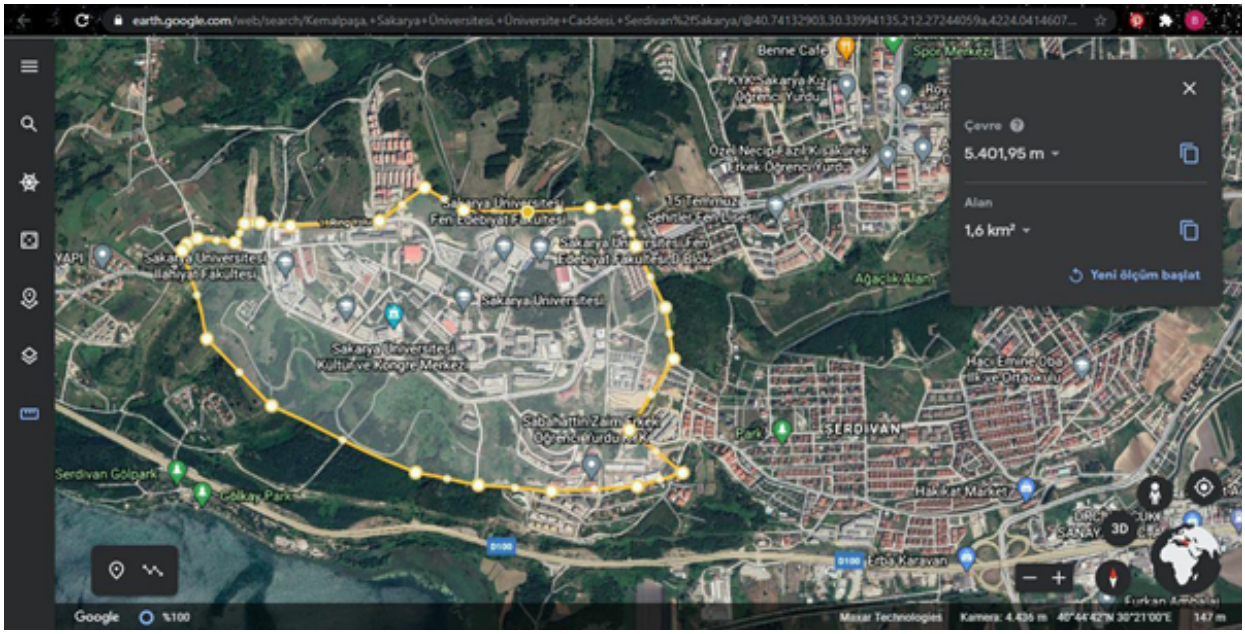


Figure 7: Main Campus Area

Figure 8: Dentistry Campus Area

Figure 9: Health Services Campus Area

Figure 10: Korucuk Campus Area

Figure 11: Hendek Campus Area

BUILDING	M2	BUILDING	M2
FACULTY OF ENGINEERING M2 BLOCK	2.752,61	FACULTY OF ENGINEERING M1 BLOCK DEAN'S OFI	2.721,02
FACULTY OF ENGINEERING M3 BLOCK	3.169,78	FACULTY OF SCIENCE AND LITERATURE DEAN'S BL	1.693,15
FACULTY OF ENGINEERING M4 BLOCK	1.756,92	FACULTY OF THEology A BLOCK	2.772,92
FACULTY OF ENGINEERING M5 BLOCK	3.622,05	FACULTY OF LAW DEAN'S OFFICE	480,91
FACULTY OF ENGINEERING M6	3.536,64	FACULTY OF BUSINESS A BLOCK	3.952,78
FACULTY OF ENGINEERING M7	7.695,82	FACULTY OF MANAGEMENT DEAN'S BLOCK	1.467,58
FACULTY OF ENGINEERING M8	2.753,51	RECTORATE BUILDING ADMINISTRATIVE	5.710,91
MACHINE CHEMISTRY LABORATORY	481,06	RECTORATE ADMINISTRATION BUILDING	2.148,52
MACHINE METAL LABORATORY	897,85	DISTANCE EDUCATION RESEARCH AND APPLICAT	1.882,14
METALLURGY AND MATERIALS ENG. R&D LAB.	1.111,21	STUDENT AFFAIRS	1.012,15
CONSTRUCTION LAB.	756,77	SAKARYA UNIVERSITY SECURITY BUILDING	208,91
CIVIL ENGINEERING (GEOTECHNICAL LAB.)	618,48	CONSTRUCTION WORKS AND TECHNICAL DEPART	606,22
ENERGY MECHANICS LAB.	1.139,76	BUILDING WORKS AND ONE. IN. HEAD. ELECTRICA	108,90
SAKARYA ENERGY LABORATORY	127,75	BUILDING WORKS AND ONE. DAI. BASQUE. CARE	141,81
FIRE APPLICATION AND RESEARCH CENTER	96,39	BUILDING WORKS AND ONE. DAI. BASQUE. META	151,50
AUTOMOTIVE LAB.	1.091,05	ENTRANCE DOOR WEST	24,27
THERMAL SPRAY LAB.	1.296,26	ENTRANCE DOOR EAST (MAIN ENTRANCE)	68,17
FACULTY OF SCIENCE AND LITERATURE A BLOCK	4.458,67	HENDEK FACULTY OF EDUCATION D BLOCK	756,32
FACULTY OF SCIENCE AND LITERATURE B BLOCK	4.533,51	STUDENT DORMITORY C BLOCK	2.523,49
FACULTY OF SCIENCE AND LITERATURE C BLOCK	8.523,00	3. ENTRANCE BESKOPRU GATE	12.6

1.9. Total Area on Campus Covered in Forest Vegetation

Table 2: Total Forest Vegetation Area

CAMPUSES	FOREST VEGETATION AREA
MAIN CAMPUS	534.134.52
DENTISTRY	9.365,96
KORUCUK	170.001,38
HENDEK	2.376,97
HEALTH SERVICES	1.313,17
GRAND TOTAL	717.192
FOREST / TOTAL AREA RATIO	**35,2%**

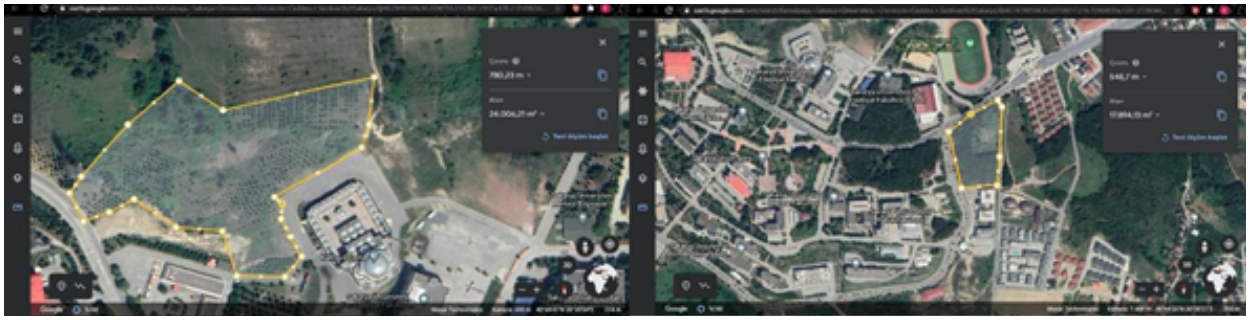


Figure 12: Total Forest Vegetation Area on Main Campus

Figure 13: Forest Vegetation Area – Hendek Campus

Figure 14: Forest Vegetation Area – Dentistry Campus

Figure 15: Forest Vegetation Area – Health Services Campus

Figure 16: Forest Vegetation Area – Korucuk Campus

1.10. Total area on campus covered in planted vegetation (meter²)


Total Planted Vegetation Area

Total planted vegetation area: 840.442,41 m²
Total Area: 2.036.960,78 m²
Percentage area: %41

1.11. Total area on campus for water absorption besides the forest and planted vegetation (meter²)

Total area on campus for water absorption besides the forest and planted vegetation

Total **water absorption** area: 421648
Total Area: 2036960
Percentage area: %20,6

1.18. University budget for sustainability effort (in US Dollars)

	2018	2019	2020	Average
Budget Total	$ 85817925	$ 75120500	$ 44652000	$ 68530141
Sustainability Budget	$ 13550295	$ 11869055	$ 7590960	$ 11003436
			Percentage	**16,05 %**

The average percentage university budget for our university is 16.05%

1.20. Percentage of operation and maintenance activities during Covid-19 pandemic

Sakarya University subjected all buildings, facilities and structures on campus to maintenance and repair work during the Covid-19 pandemic. All of the appliances has been changed with energy efficient appliances and the maintenance and repair activities are done with renewable or ecologically friendly sources. Therefore, the ratio of smart buildings has been increased and also the investment in sustainability efforts has been increased

1. Total campus buildings area	211078 m²
2. Total operated building	211078 m²
Percentage building that operated and maintenanced	100%

Internal and external maintenance and repair work of the Business Faculty.

Reconstruction of cafe where students can dine

Maintenance work of healthcare facility's parking lot

Maintenance and repair of sports facilities

Interior and exterior maintenance of the Faculty of Informatics

The Green House was built

1.21. Campus facilities for disable, special needs and or maternity care

Sakarya University closely cares about disabled people's rights. Therefore Sakarya University has so many facilities for disabled people.
1- There are a lot of lifts for disabled people. Sakarya University realized that it's so hard to use stairs for disables people and solved it quickly and put lifts next to stairs for disabled people.
2- Sakarya University uses Braille alphabets under the whole description tables in campus buildings.
3- Almost everywhere on campus we use sensible floors for visually disabled. And thanks to these floors visually disabled people can feel the ground and find their right way.
4- Photo is from the library of Sakarya University. There are elevated ways for disabled people to get rid of the stairs with their wheelchairs in the whole campus.
5- Sakarya University noticed one more issue for disabled. This issue is for disabled . It's really hard to use the toilet and it's really a problem for them. But in all WC on our campus there are WCs for disabled people.
6-(*)This unit caress about all problems and requests of disabled people. And maybe the most important thing is, there is a visually disabled employee in the Unit of Visually Disabled Persons.

Additional link
http://www.engelsiz.sakarya.edu.tr/
https://www.sakarya.edu.tr/engelsiz-sau-s63.html

1. Disabled Lift in Faculty of Law

2. Flood descriptions with Braille Alphabet in buildings

3. Sensible floor for the visually disabled

4. Wheelchair way around the whole campus

5. Eligible WC for disabled

6. Unit of people who are visually disabled.(*)

1.22. Security and safety facilities

Sakarya University Disaster Management Application and Research Center (http://www.aym.sakarya.edu.tr/)
A fire extinguisher with rapid cooling feature was developed at Sakarya University.
(https://www.sakaryakent.net/haber/sakarya-universitesinde-gelistirilen-hizli-sogutma-yangin-sondurucu-h3405.html)
Sakarya Üniversitesi'nden hızlı soğutan yangın söndürücü
We have developed a fire detection and warning system. The devices we have developed with domestic software ensure that in the tests in our center, in which region a fire broke out, the data is sent to the center within a second, and thus the flames are quickly detected.
(https://www.aa.com.tr/tr/bilim-teknoloji/sakaryada-gelistirilen-hizli-sogutma-ozellikli-yangin-sondurucu-madde-testlerden-basariyla-gecti/2337765)
Regulation on the implementation of the law on Sakarya University private security services: https://guvenlik.sakarya.edu.tr/sites/guvenlik.sakarya.edu.tr/file/5188_Say_l_zel_G_venlik_Hizmetlerine_Dair_Kanunun_Uygulanmas_na_li_kin_Y_netmelik.pdf

Sakarya University Disaster Management Application and Research Center

Fire Research and Application Center


Standard Fire Room Test Mechanism


Fire extinguisher with fast cooling.

Fire sensors in buildings

Sakarya University's natural disaster research and rescue team

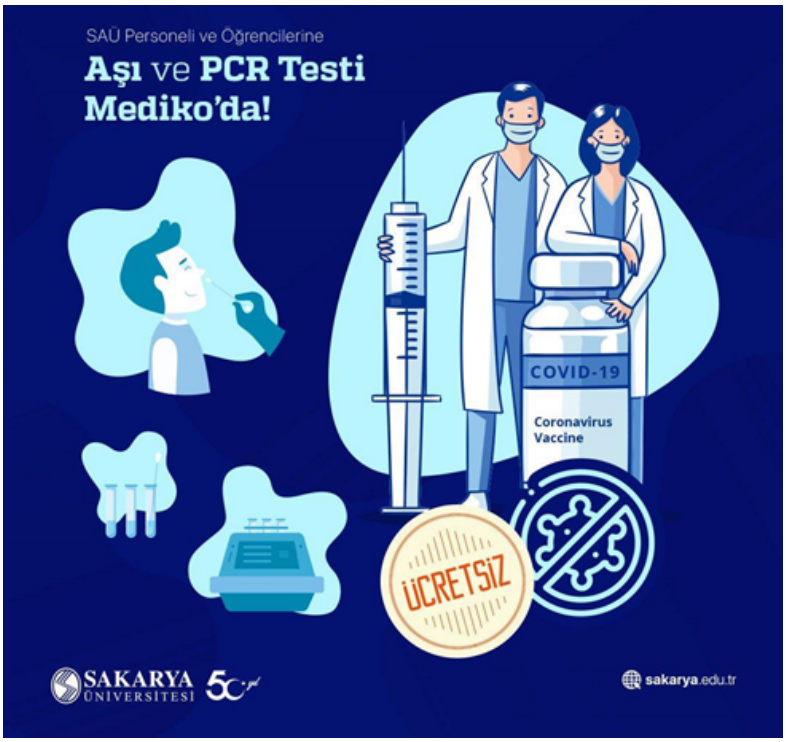
Sakarya University Earthquake Station on campus

Sakarya University's natural disaster search and rescue team

1.23. Health infrastructure facilities for students, academics and administrative staffs' wellbeing

Sakarya University has its own healthcare center where students and university's staffs can go and benefit.
Especially students really need Mediko. Mediko is located on campus and it's close to many faculties and easy
to reach there.
(*)Mediko also provides PCR test and Covid-19 vaccination service for free to students, teachers and all staff.
There are 2 kinds of Covid-19 vaccines; Sinovac and Pfizer/Biontech.

Sakarya University Mediko Healthcare Center



(*)

1.24. Conservation: plant, animal, and wildlife, genetic resources for food and agriculture secured in either medium or long-term conservation facilities

Many plant species that cannot be reproduced with traditional methods at home and abroad are sterilized under appropriate conditions and reproduced at low cost. Plants reproduced in special environments in the laboratory, where ideal temperature and humidity conditions are created, are sent to the areas where they are needed after they are acclimatized to the current weather conditions in the greenhouse.

https://sargem.sakarya.edu.tr/tr/icerik/16094/82738/vizyon-ve-misyon

2. ENERGY AND CLIMATE CHANGE

2.1. Energy Efficient Appliances Usage

All new buildings at Sakarya University are equipped with energy efficient devices. In the renovation works of the existing buildings, completely energy-efficient devices are used, and the products that are due for renovation are replaced with energy-saving products.
In addition, many of the lights used for campus lighting are LED lights equipped with solar panels. In this way, we produce energy source by utilizing the sun.

Table 3: Energy Efficient Appliances Usage

Appliance	Total Number	Total number energy Efficient appliances	Percentage
LED Lamp	116157	98508	84,8%
MDA	235	215	91,4%
		Average Percentage	**84,8%**

Figure 17: Use of LED lighting and lamps with light detection

Figure 18: Use of Energy Efficient MDAs

2.3. Smart Building Implementation

Table 4: Smart Building Features

No.	Name	Place	automation		safety				energy		water		ndoor environment				lighting				Building Area (m²)
			B1	B2	S1	S2	S3	S4	E1	E2	A1	A2	I1	I2	I3	I4	L1	L2	L3	L4	
1	Sakarya University, Faculty of Theology	Sakarya, Turkey	X		X	X			X								X	X	X	X	13858
2	Sakarya University, Faculty of Computer and Information Sciences	Sakarya, Turkey	X		X	X			X								X	X		X	11275
3	Sakarya University, Congress Center	Sakarya, Turkey	X		X	X	X		X				X				X	X		X	9450
4	Sakarya University, Library Building	Sakarya, Turkey	X		X												X	X		X	10852
5	Sakarya University, School of Business	Sakarya, Turkey	X		X												X	X		X	12896
6	Sakarya University, Faculty of Engineering	Sakarya, Turkey	X		X												X	X		X	15042
7	Sakarya University, Continuing Education Center	Sakarya, Turkey	X		X												X	X		X	10485
8	Student Dining Hall	Sakarya, Turkey	X		X	X	X		X		X		X				X	X	X	X	12564
9	Cafeteria	Sakarya, Turkey	X		X	X	X		X		X		X				X	X	X	X	12252
		Total	**8**		**8**	**4**	**2**		**4**				**2**				**8**	**8**	**2**	**8**	**108674**

Smart building implementation
Total Building Area: 205,078 m²

$$\frac{108674}{211078} \times 100 = 51{,}48\%$$

Faculty of Theology

Faculty of Computer and Information Sciences

Congress Center

Library Building

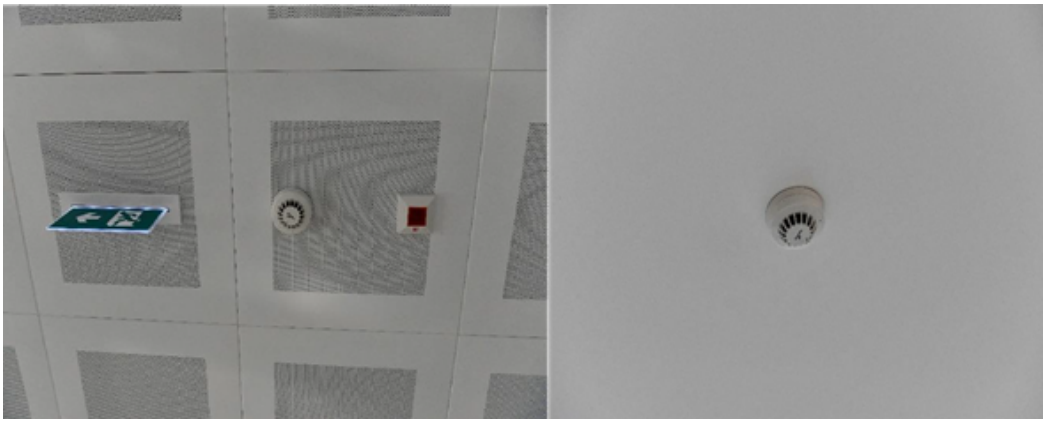
Faculty of Engineering

Continuing Education Center

Figure 19: Smart Building Implementations

Fire Alarm Control Center

Automatic doors and sensors



Automatic Fire Alarm Sensor

Lighting Sensor

Figure 20: Smart Building Tools

2.5. Renewable Energy Sources in Campus

1. On roofs of administration building, library, laboratory building, school factories and other teaching buildings and dormitories, solar PV power station of total 175000 KWH is installed.

Wind turbine power is 7600 KWH in Energy Technologies Laboratory.

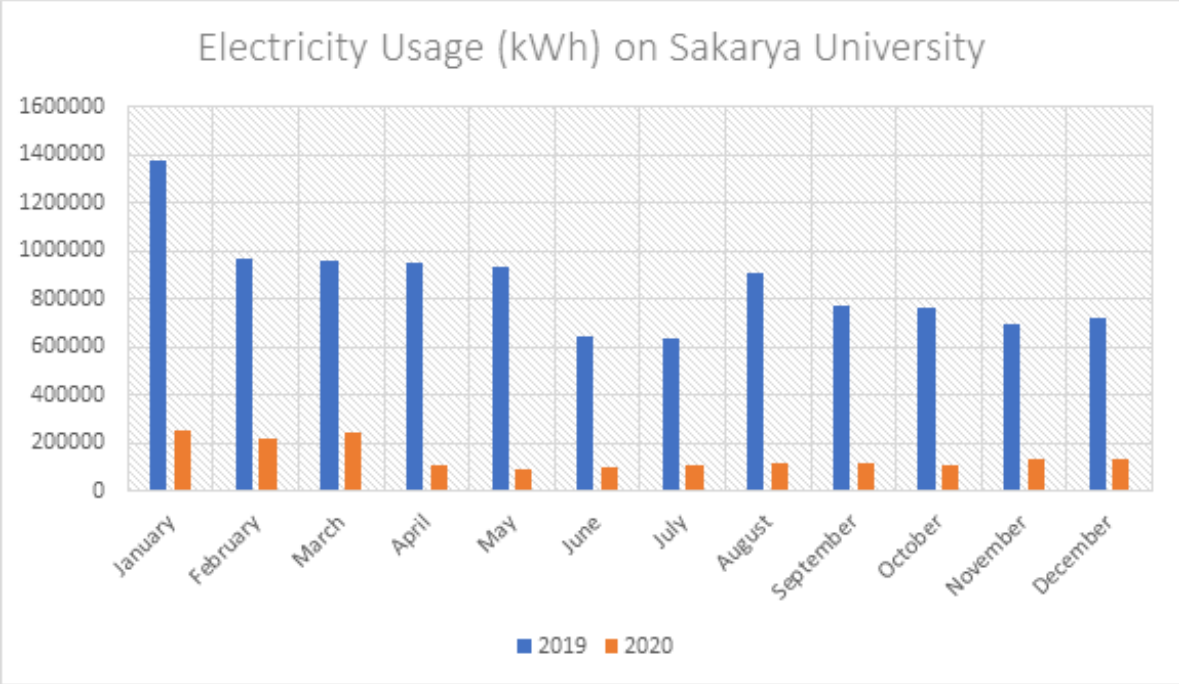
Figure 21: Roof Solar Panels

Figure 22: Wind Turbine

2.6. Electricity Usage per Year (in Kilowatt-hour)

The total electricity usage of Sakara University in 2020 is 1740571,4 kWh. On the all buildings and campuses of Sakarya University electricity is used for lighting, cooling, heating and laboratory appliances. Due to the Covid-19 pandemic in 2020, all schools across the country were closed and students were not on campus. The campus population decreased from approximately 45 thousand to 3750. In this way, energy consumption has been reduced as normal.
In addition, we used energy efficient lighting on the campus during this condition. Energy consumption has decreased in line with both the low campus population and the work we have done. During the pandemic, we tried to use the empty campus as an opportunity and built buildings suitable for efficient daylight. In this way, we consume less energy compared to previous years.
The comparison of years shows that use of energy efficient appliances enabled a significant decrease in the electricity usage per month and also the grand total has been decreased according to 2019.

Table 5: Electricity Usage



Electricity Usage (kWh) on Sakarya University

2.8. ratio of renewable energy production divided by total energy usage per year

No	Renewable Energy	Production (in kWh)
1	Solar panel	175000
2	Windmill	7600
	Total	182600

182600/ 1740571(Electricity usage) = 10,4 %

Additional link
https://sustain.sakarya.edu.tr/tr/icerik/18797/98672/affordable-and-clean-energy

2.9. Green Building Implementations

Sakarya University campus renewal is made in terms of reaching smarter and greener buildings. For now, 80% of the buildings are designed for taking advantage of natural day lighting. 85% of the buildings have energy management centers and related staff for controlling and monitoring.

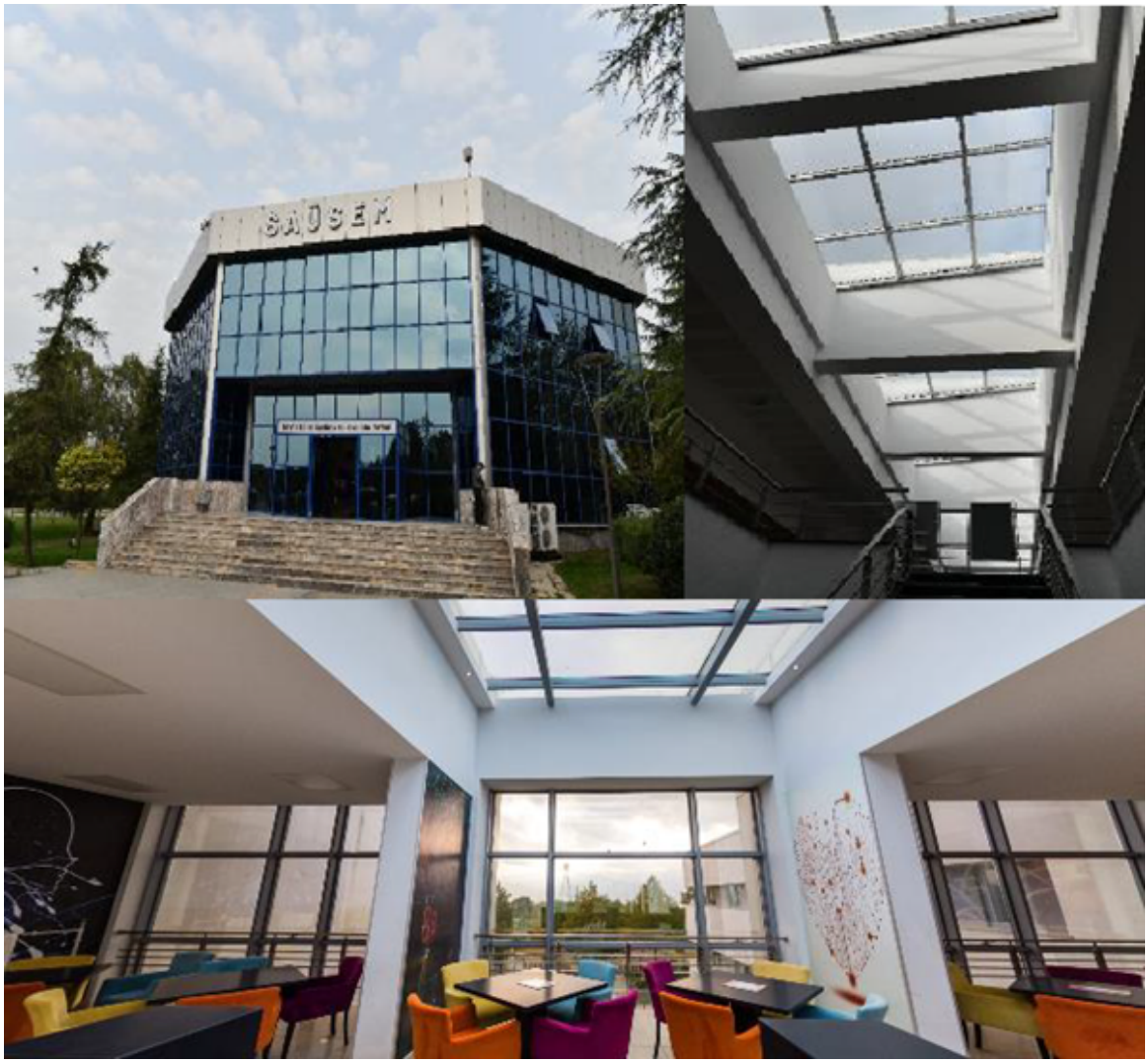


Figure 23: Natural Day Lighting Implementations

Figure 24: Energy Management Tools

2.10. Greenhouse gas emission reduction program

There are solar energy panels on the roofs of many faculties at Sakarya University. In this way, we reduce emissions by making use of renewable energy sources.

Sakarya University is making many applications to reduce the number of vehicles. For example, electric vehicles are used to transport materials between departments within the campus. These vehicles are charged at the end of the day with electricity obtained from solar panels. Apart from this, electric scooters can be parked at every point in the campus in order to reduce vehicle entrances. In this way, vehicle usage is reduced.

Sakarya University also has some vending machines on campus to get pet foods for campus animals. And this machine's energy powered by the solar energy.

Additional link
https://sustain.sakarya.edu.tr/tr/icerik/18797/98672/affordable-and-clean-energy

Electricity vehicles to distribute materials


Solar Energy Panels


BinBin' electricity scooters for rent

2.11. Total Carbon Footprint

Total Carbon footprint in 2020 is measured as 1.559,99 metrictons according to the recommended calculation

Calculation method recommended by UI GreenMetric

CO_2 (electricity)

$$= \frac{electricity\ usage\ per\ year\ (kWh)}{1000} \times 0{,}84$$

$$= \frac{1.740.571 kWh}{1000} \times 0{,}84$$

$$= 1462{,}07 \text{ metric tons}$$

CO_2 (bus)*

$$= \frac{number\ of\ shuttle\ bus\ in\ your\ university \times total\ trips\ for\ shuttle\ bus\ service\ each\ day \times approximate\ travel\ distance\ of\ vehicle\ each\ day\ inside\ campus\ on}{100}$$

$$\times 0{,}01$$

$$= \frac{10 \times 3 \times 4 \times 240}{100} \times 0{,}01$$

$$= 2{,}88 \text{ metric tons}$$

* **Contains both bus and minibüs**

CO_2 (cars)

$$= \frac{number\ of\ cars\ entering\ your\ university \times 2 \times approximate\ travel\ distance\ of\ vehicle\ each\ day\ inside\ campus\ only\ (KM) \times 240}{100} \times 0{,}02$$

$$= \frac{240 \times 2 \times 4 \times 240}{100} \times 0{,}02$$

$$= 92{,}16 \text{ metric tons}$$

CO_2 (motorcycle)

$$= \frac{number\ of\ motorcycle\ entering\ your\ university \times 2 \times approximate\ travel\ distance\ of\ vehicle\ each\ day\ inside\ campus\ only\ (KM) \times 240}{100} \times 0{,}01$$

$$= \frac{15 \times 2 \times 4 \times 240}{100} \times 0{,}01$$

$$= 2{,}88 \text{ metric tons}$$

CO_2 (total)

$$= 1462{,}07 + 2{,}88 + 92{,}16 + 2{,}88$$

$$= 1.559{,}99$$

Carbon footprint in 2020 = 1559,99 metric tons

Carbon footprint in 2020 = 1.559,99 metric tons

2.13. Number of innovative program(s) during Covid-19 pandemic

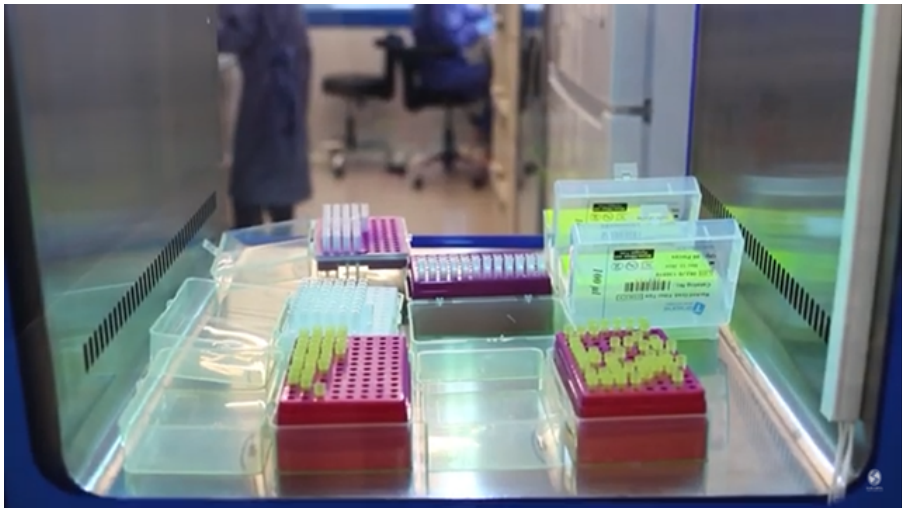
1- Sakarya University developed and produced washable and reusable masks with its own effort. This Mask provides over 95 percent protection even when washed.
Sakarya Üniversitesi yıkanabilir ve filtreli maske üretti

2- Sakarya University produced a Covid-19 diagnostic kit, which gave results with samples taken from the nose and throat as a result of R & D. Sakarya University was the first institution to achieve this in Turkey.
https://haber.sakarya.edu.tr/sau-turkiyede-ilk-olarak-covid-19-test-seti-uretti-h97749.htmlSAÜ Türkiye'de İlk Olarak Covid-19 Test Seti Üretti

3- An application is used in Turkey, where people's information about the Covid-19 disease and the "HES"('Hayat Eve Sığar (Life Fits Home)') code are included. In this way, it can understand which people are in the risk group and which people are safe. Sakarya University also decided to use turnstiles that can query the HES code at the entrances to the campus within the scope of Covid-19 measures.

4- Due to Covid-19 Sakarya University decided to use air purifiers in buildings on campus. Thanks to these devices the air will be able to be refreshed and it provides a healthy environment.

1.Washable and reusable face mask



2.COVID-19 Test Kits which have been developed at Sakarya University

3.Technological turnstiles that can control the HES code

4.Air purifier which called as ‘Soft Air’

2.14. Impactful university program(s) on climate change

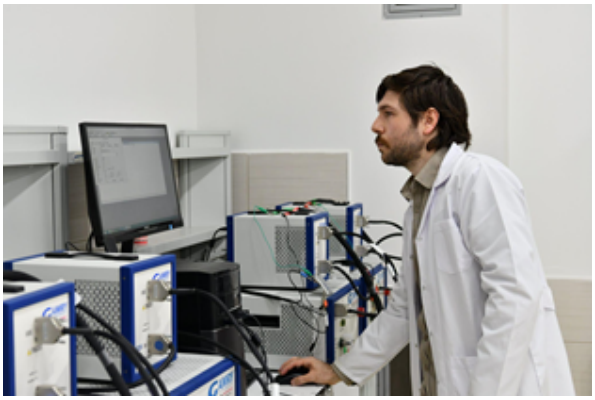
Sakarya University is very careful about climate change. Accordingly, the roof of the kameriyes where the students sit on the campus is equipped with solar energy panels. With the energy stored here, students can charge their phones and computers at the sockets in the kameriye.

Solar Energy kameriyes

Charge sockets on the kameriyes

SAITEM electricity cars

Sakarya University Advanced Technologies Application Community developed autonomous vehicles. And Sakarya University supports these activities with all possibilities.
http://www.saitem.org/tr/
SAITEM//SAGUAR-e//Kenan Sofuoğlu Pisti//Test Sürüşü
http://www.saitem.org/tr/4887-saitem-dunya-3-su.saitem
http://www.saitem.org/tr/4892-avrupaafrika-2-ligi-saitemin.saitem




Lithium-Ion Research Laboratory

Sakarya University will produce batteries that can be used in many areas such as unmanned aerial vehicles and electric cars with domestic and national resources. Now Everything is ready for this and our researchers and scientists are working for this.

https://haber.sakarya.edu.tr/sau-2030larin-batarya-teknolojisini-gelistirecek-h98072.html#:~:text=Sakarya%20%C3%9Cniversitesi%2C%20insans%C4%B1z%20hava%20ara%C3%A7lar%C4%B1,yerli%20ve%20milli%20olanaklarla%20%C3%BCretecek.
SAÜ 2030'ların Batarya Teknolojisini Geliştirecek!

Sakarya University shows the importance it attaches to the issue of climate change in every field. This includes participating in climate change projects. In this regard, he participated in the Sakarya University Climate Change Adaptation Project.
https://sesam.sakarya.edu.tr/tr/duyuru/goster/98044/sesam-iklim-degisikligine-uyum-projesinde-yer-ini-aldi

3. WASTE

3.1. Recycling Program for University Waste

Sakarya University employs a local recycling service served by the metropolitan municipality, which implements environment-friendly recycling systems and waste disposal. Our faculty and students have been informed about determining what they can and cannot recycle. Additionally, a fashion show has been prepared to create awareness about the potential of recycling wastes. Sakarya University also promotes recycling glass, plastic, metal, battery, and electronic waste and ink-cartridges from printers. E-waste items should not be disposed of in the normal trash due to their high concentrations of toxic chemicals and heavy metals. Besides, toxic waste storage has been built on the main campus.

Figure 25: Creating Awareness for Recycling Program for University Waste

Figure 26: Flyer for Recycling Program

Figure 27: Digital Waste Gathering

Figure 28: Gathering Units for Recycling Awareness Program

Figure 29: Waste bins for paper, plastic, metal, glass, contaminated, and medical waste

3.2. Program to Reduce the Use of Paper and Plastic on Campus

Four programs are implemented in order to reduce the use of paper and plastic by Sakarya University.

The first of these is the Electronic Document Management System, which enables all official correspondence to be made completely electronically without printing. This program ensures that correspondence, which holds thousands of pages per year, is stored electronically safely and efficiently and accessed when necessary

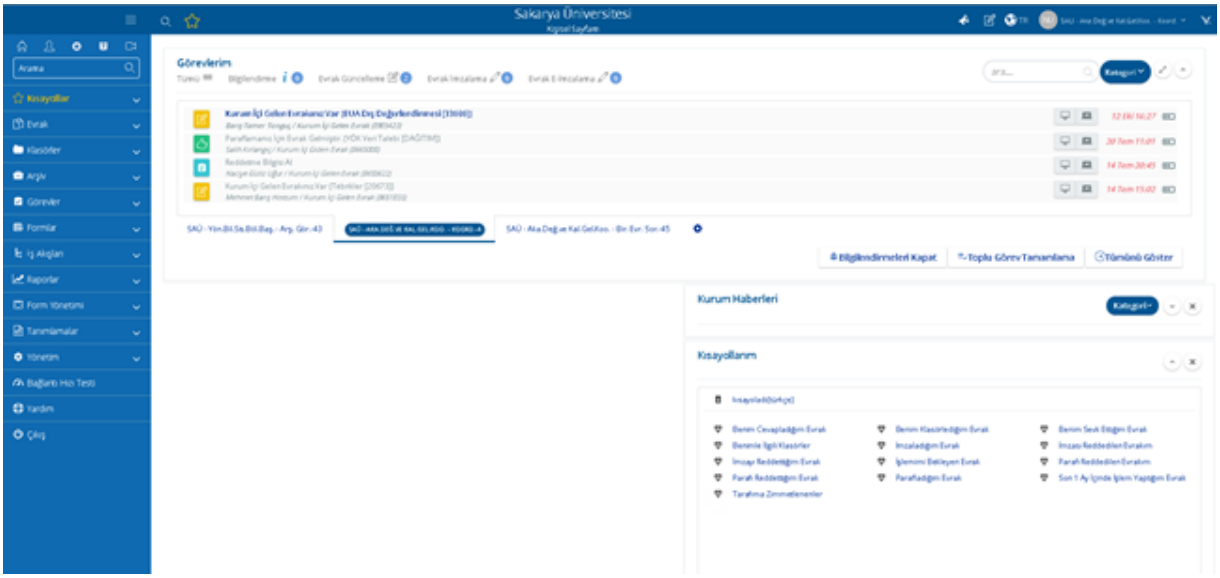


Figure 30: Electronic Document Management System

The second application is a two-way printing policy. All academic and administrative staff are encouraged to make two-way printouts, aiming to save 50% paper.

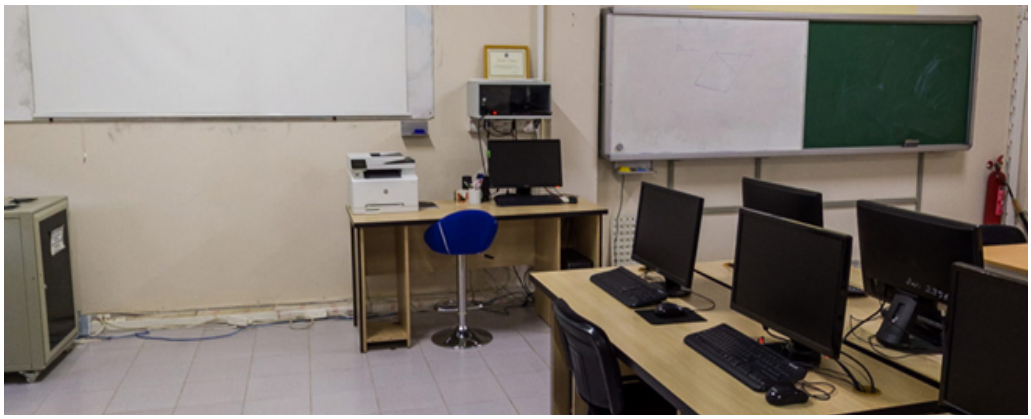


Figure 31: Implementations to Reduce the Use of Paper

The third program is to reduce the number of printers and direct those who need it to a common printer to print out only when necessary. Also, output quota is applied for all administrative and academic staff, and statistics are monitored by senior management.

Figure 32: Implementations to Reduce the Use of Plastic

Finally, Sakarya University aims to reduce the use of disposable products. For this purpose, glass cups and porcelain plates are served in all catering centers of the university, thus preventing paper and plastic cups.

3.3. Organic Waste Treatment

In Sakarya University, the only structures that produce organic waste are dining halls, canteens and cafes, which manage in complete autonomy this kind of waste. The wastes in the dining hall pass through the oil filter and go to the sewer. The dining halls, canteens and the cafes manage the organic waste trough contracts with Sakarya Metropolitan Municipality Environmental Services Unit. The Municipality staff collect the organic waste and deliver them at Sakarya Metropolitan Municipality waste treatment plant that processes the material through anaerobic digestion.
Bough shredder are used in our university. In this way, waste boughs are ground and turned into fertilizer. These fertilizers are used to fertilize the plants in the campus.

Figure 33: Organic Waste Treatment

Bough shredder

3.4. Inorganic Waste Treatment

Inorganic Waste treatment in Sakarya University aims to gather plastic, glass, metal, paper, digital, and medical waste and deliver them to waste treatment areas for recycling and classify valuable materials for reuse.
Sakarya University works with Sakarya Metropolitan Municipality. The staff gathers the waste from the campus regularly. The faculty may also call the environmental services office to gather the batteries or the digital waste when enough waste is collected.
Several programs are implemented to create awareness for classifying and delivering the waste for recycling; these are referred under the heading for recycling programs.

Figure 34: Inorganic Waste Treatment

Figure 35: Digital Waste Treatment

3.5. Toxic Waste Treatment

Toxic and hazardous wastes of Sakarya University are stored in a special collection area, given to IZAYDAŞ at regular intervals, thus ensuring that they are disposed of without harming the environment. All toxic wastes of the university are necessarily disposed of in this way. Also, hazardous waste such as batteries and printer cartridges are collected and recycled.

Figure 36: Toxic Waste Storage

Figure 37: Printer Cartridge and Battery Gathering

3.6. Sewage Disposal

All sewage wastes of Sakarya University are processed in the wastewater treatment facility of Sakarya Metropolitan Municipality. It is ensured that no untreated sewage waste is discharged into the sea. The treated wastewater is discharged back to the natural environment.

Figure 38: Sewage Disposal

Additional link:
https://www.sakarya-saski.gov.tr/media/gallery/62ec9344-c604-435d-95e6- e216fb9857f2.pdf
https://www.sakarya.bel.tr/tr/Haber/sehre-3-yeni-atiksu-aritma-tesisi/7233

4. WATER

4.1. Water Conservation Program Implementation

All buildings of Sakarya University have a separate sewerage system, for wastewater and for clean water (rainwater). Rainwater is thus collected from the roofs of the buildings and is then discharged into the water channels around the buildings.

Figure 39: Water Conservation – Rainwater Collection

The water arrives at water tanks placed underground and it is used for several purposes as irrigation or cleaning.
We have implemented our extended rainwater collection project. Several academic papers have been published by the experience gained through the implementation processes. This project reveals the potential of rainwater collected from the building roofs for irrigation of green areas located within the campus of Sakarya University. For this purpose, due to large area and location difference of the buildings, campus area is divided into 8 regions. In each zone, building roof area was calculated and amounts of rainwater are collected from each building. Also the area of greenland and amount of required rainwater was calculated in each region to direct the water for irrigation.

Additional Link:
https://www.isites.info/PastConferences/ISITES2016/ISITES2016/papers/A18-ISITES2016ID66.pdf

Figure 40: Eight regions of Sakarya University - Feasibility Studies

4.2. Water Recycling Program Implementation

In Sakarya University, as a result of the rainwater harvest, the water bowls for street animals are automatically filled.
The water recycling program is at the development stage, so the feasibility processes continue to enhance natural watering capabilities.

Figure 41: Water Recycling Programs

4.3. Water Efficient Appliances Usage

At Sakarya University, a comprehensive water-saving program is implemented. In many buildings, water-saving is achieved by widespread equipment such as photocell faucets, photocell flushers, and urinals. Also, water-efficient spray filters are used at the ends of the taps. For efficient waste of water, flush controls for urinals, waterless urinals, low flush WC's, low flow taps, and automatic taps are used in most buildings.

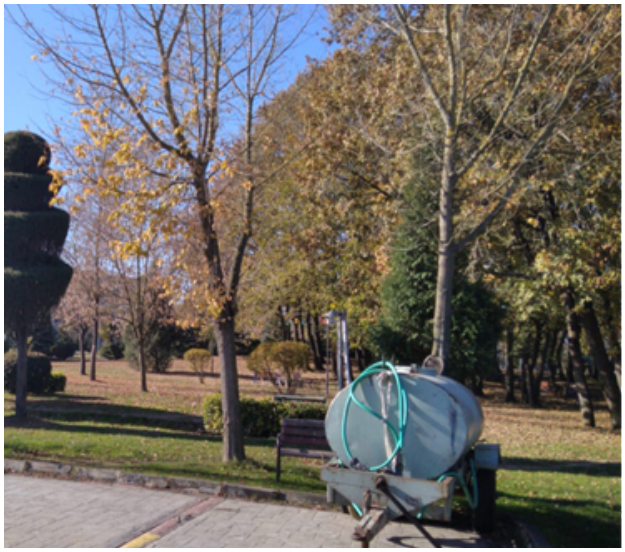
Table 6: Water Efficient Appliances Usage

Appliance	Total Number	Total number water Efficient appliances	Percentage
Faucet	1350	430	30%
Flush	550	250	45%
Spray taps	120	120	100%
		Average Percentage	**58%**

Figure 42: Water Efficient Appliances Usag

4.4. Consumption of treated water

Sakarya University also carries out studies on the storage of rain water. Rain water is stored in storage vehicles and this water is used in cafeterias, watering flowers, feeding stray animals or, if necessary, for the needs of students and employees. In this way, we protect the water by ensuring the circulation of water.



Additional link
https://sustain.sakarya.edu.tr/tr/icerik/18796/98670/clean-water-and-sanitation

4.5. Percentage of additional handwashing and sanitation facilities during Covid-19 pandemic

Sakarya University attaches importance to its hygiene due to the Covid-19 pandemic on its campus. Sakarya University added 9120 facilities, including disinfectant and hand washing facilities.

Disinfectant chamber

Handwashing Facilities

Facilities	Number of Facilities
Disinfectant chamber	2703
Handwashing Facilities	6417
Disinfectant cleaning detergents	1200

$$\frac{9120}{108} = 95{,}55$$

5.TRANSPORTATION

5.5. Shuttle Services

Sakarya University is served by local buses and minibusses run by the Sakarya Metropolitan Municipality. These busses serve as a shuttle in the campus area. They do not take any charge from the individuals; they are free for the people who get into the bus after the bus enters the campus area. This is also the same for the minibusses. There is no need for shuttle services instead.

Figure 43: Shuttle Services

Figure 44: Ring Road Signs

5.9. Zero-Emission Vehicles (ZEV) Policy on Campus

Sakarya University Supports zero emission on campus as well. For this reason we have many vehicles like bicycles for free to rent.
There are many electric scooters called “BinBin” in Sakarya University Campus. People on campus can use these scooters to reach any part of campus. In addition, there are more than 50 electric vehicles in Sakarya University Campus to distribute some necessary materials to departments and offices.
For our ZEV policy please visit:

Additional link:
https://policies.sakarya.edu.tr/tr/icerik/20499/106504/zero-emission-vehicles-zev-policy

Figure 45: Campus Bikes

Figure 46: Bike Parking Areas

Electricity Scooter on Campus

Electricity Vehicle to Distribute Materials

5.13. The ratio of Parking Area to Total Campus Area

Table 7: Total Parking Area

CAMPUSES	TOTAL AREA (in m²)	PARKING AREA (in m²)
MAIN CAMPUS	1600000	15.865,14
DENTISTRY	21.587,54	215,13
KORUCUK	390.584,24	801,97
HENDEK	11.067,58	307,44
HEALTH SERVICES	13.721,42	375,34
GRAND TOTAL	**2.036.960,78**	**17.565,02**

Ratio = 0.008 %

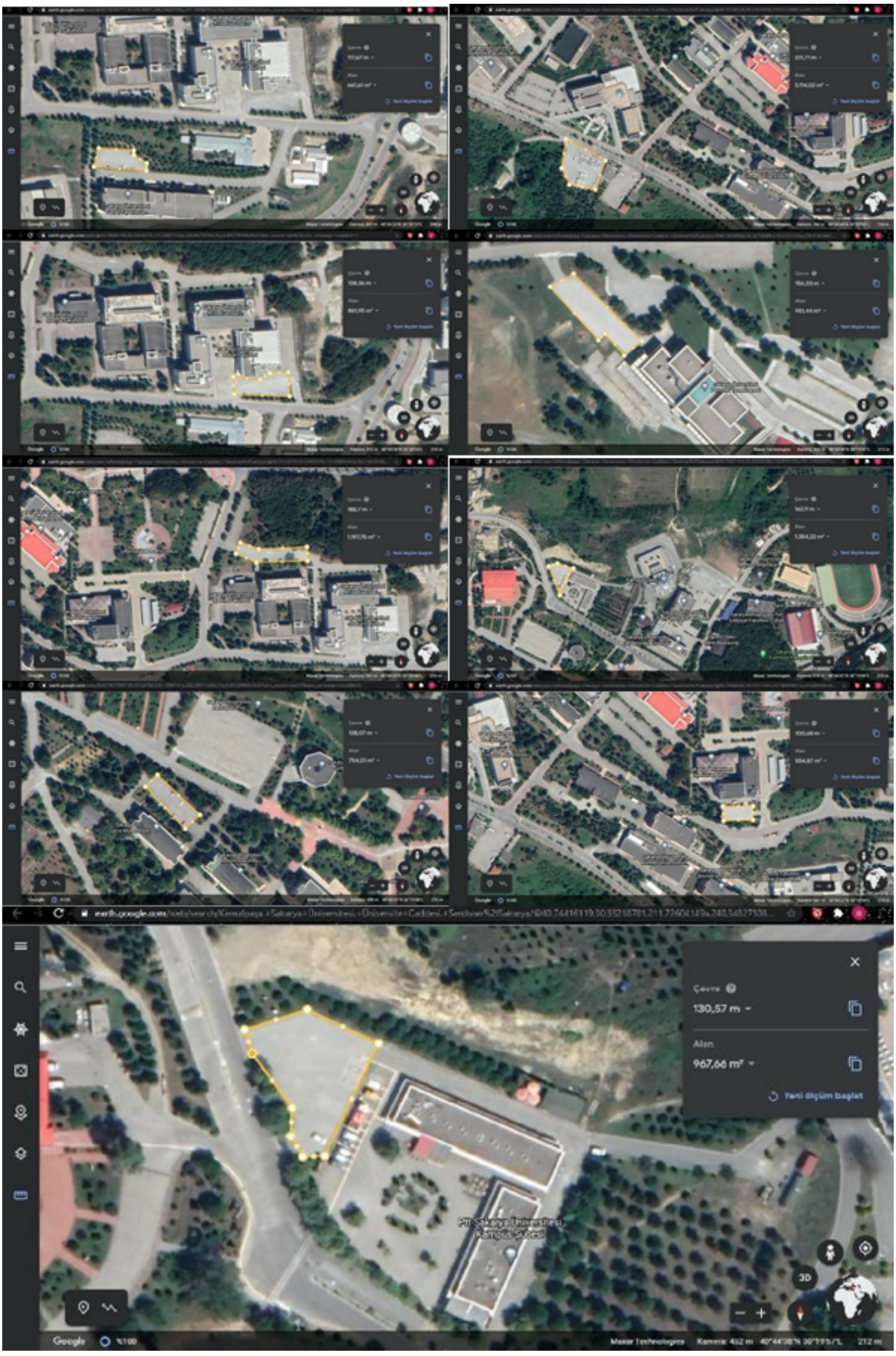


Figure 47: Parking Areas - Main Campus

Figure 48: Parking Area - Health Services Campus

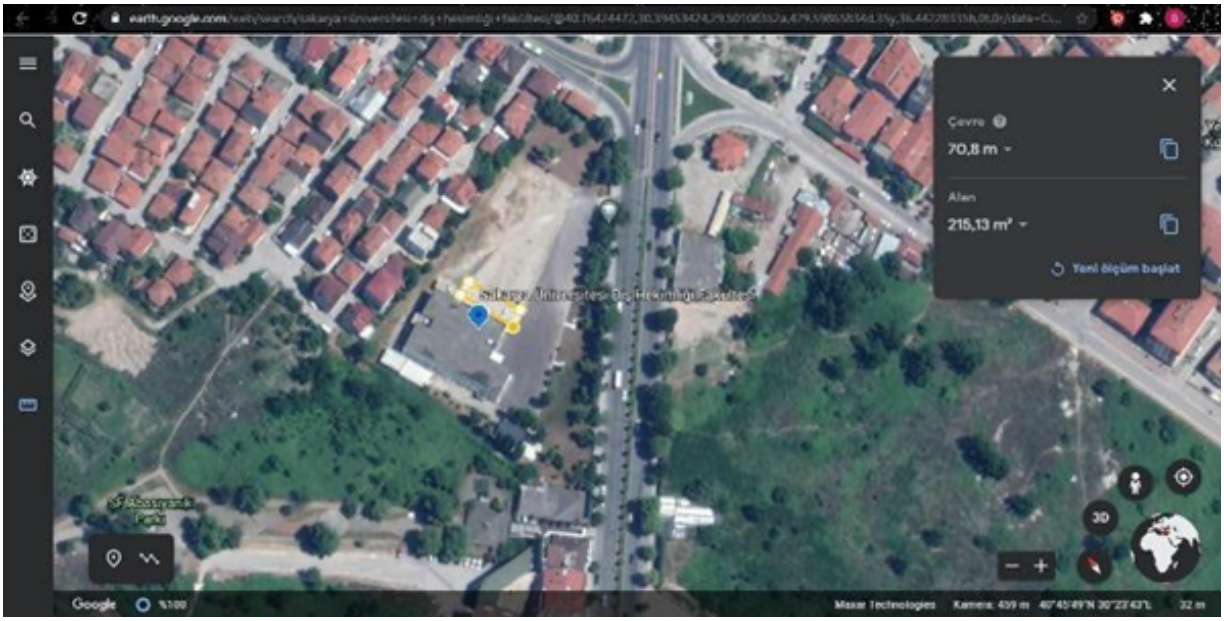


Figure 49: Parking Area - Dentistry Campus

Figure 50: Parking Area - Hendek Campus

Figure 51: Parking Area - Korucuk Campus

5.15. Number of Transportation Initiatives to Decrease Private Vehicles on Campus

There are four different transportation initiatives to decrease private vehicles on campus. The first one is busses which are serving as shuttles inside the campus.

Figure 52: Shuttle Bus inside Campus

Instead of busses, people may use minibusses which are serving as shuttles inside the campus.

Figure 53: Shuttle Minibus inside Campus

People may rent bicycles for free for transportation inside the campus.

Figure 54: Bikes for Rent

The last initiative charges high banderole fees for vehicles and an extra expensive banderole fee for the same person's second vehicle.

Figure 55: Banderole System

Additional link:
http://guvenlik.sakarya.edu.tr/tr/duyuru/goster/95582/bandrol

Electricity Scooter on Campus

Electricity Vehicle to Distribute Materials

5.16. Pedestrian Path Policy on Campus

There are separators between road for vehicle and pedestrian paths on campus.

Figure 56: Pedestrian Path - Road

Also, there is a pedestrian path for walking through the green area.

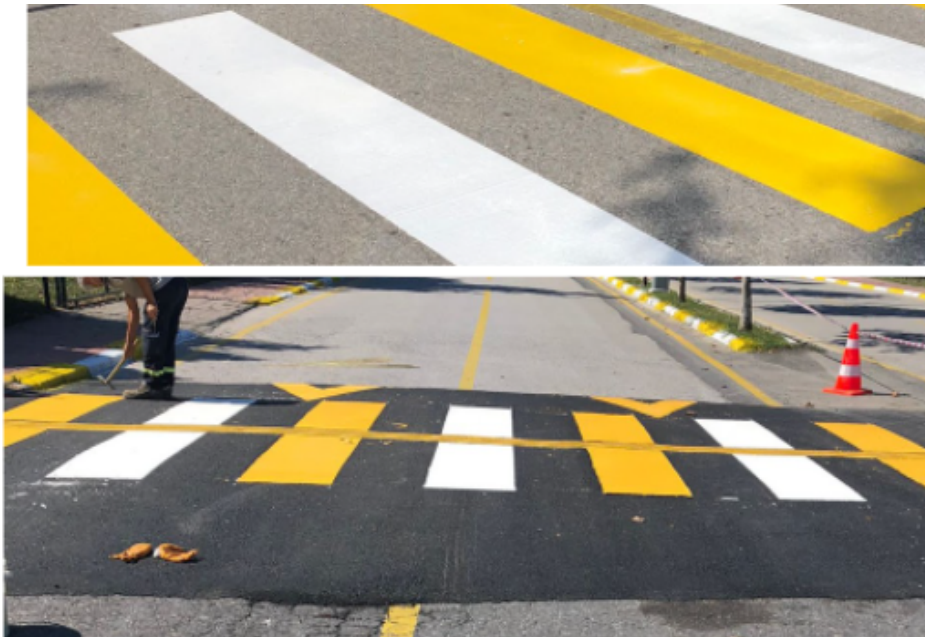
Figure 57: Pedestrian Path – Forest

There are ramps and guiding blocks which have suitable design for pedestrian having physical disabilities.

Figure 58: Path for Disabled Pedestrians

Figure 59: Solar Street Lamps

There are street lamps along the pedestrian paths. Solar street lamps control the solar street lights automatically through the intensity of light.



6. EDUCATION & RESEARCH

6.1. Number of Courses/Subjects Related to Sustainability Offered

Below is a list of the courses offered to embed sustainability into curriculum content.

Total number of courses with sustainability embedded for courses running in 2020/21: 582

Table 8: Courses Related to Sustainability

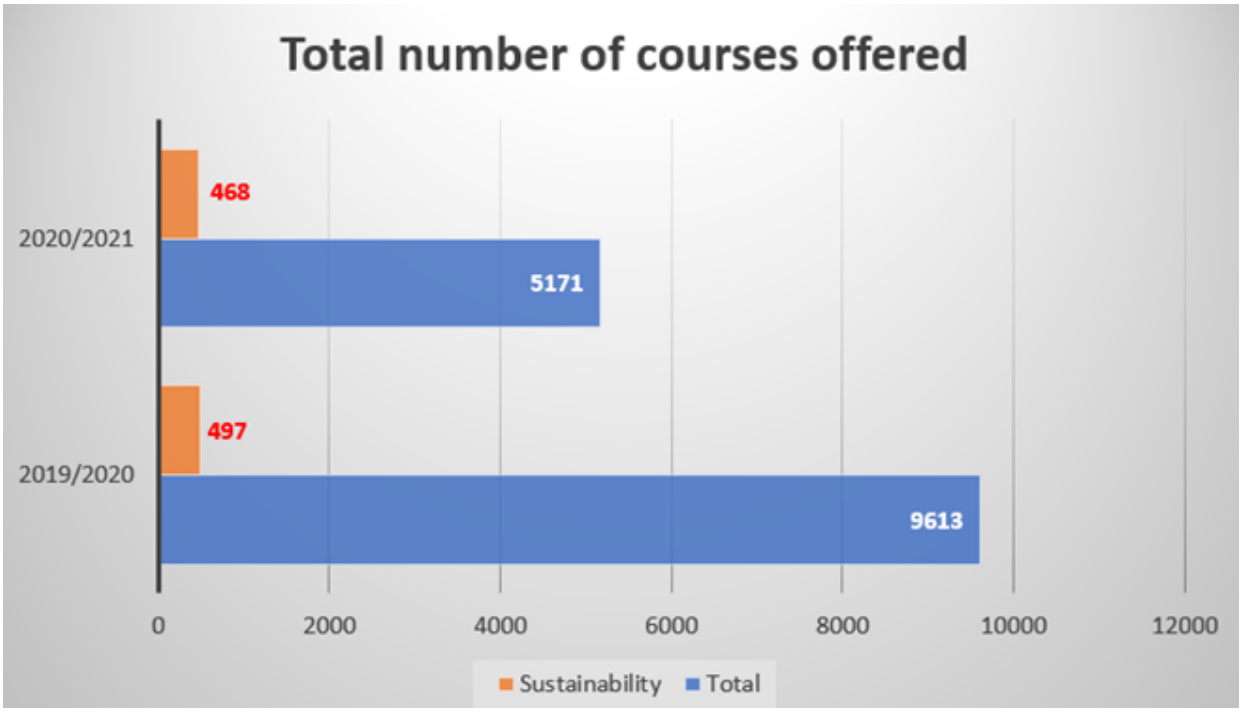
LessonID	CourseName	UnitName	Contents
44010	(BEFORE ISLAM) TURKISH ART	TRADITIONAL TURKISH ARTS PR. (MA) (THESIS)	Spreading the Art of Nomadic Turkish Societies to the Environment: The spread of the Art of the Nomadic Turkish Society to the environment is explained.
83177	SOCIAL DIALOGUE IN THE EU	DEPARTMENT OF LABOR ECONOMY AND INDUSTRIAL RELATIONS	Social dialogue in Turkey: Environmental conditions 1
77945	EMERGENCY RESCUE STUDIES III	FIRST AND EMERGENCY AID	Environmental emergencies 1 (Suffocation, frostbite, heat stroke), Environmental emergencies 2 (Insect bites)
85713	INTRODUCTION TO DISASTER SCIENCE AND FIRE	FIRE AND FIRE SAFETY (MASTER) (THESIS)	Environmental hazard as a concept, what are the terms of danger and risk, environmental hazards.
87665	INTRODUCTION TO DISASTER SCIENCE AND FIRE	FIRE AND FIRE SAFETY (MA) (non-thesis) (E.L.)	Environmental hazard as a concept, what are the terms of danger and risk, environmental hazards.

Note: The keywords used in the search; environment, ecology, sustainable, renewable, recycling

6.2. Total Number of Courses/Subjects Offered

Total number of courses offered in 2020/2021 = 5171 courses

Ratio: 11%



6.4. Total Research Funds Dedicated to Sustainability Research

Total research fund dedicated to sustainability research in 2018= 1615800 US Dollars
Total research fund dedicated to sustainability research in 2019 = 1725806 US Dollars
Total research fund dedicated to sustainability research in 2020 = 3683735 US Dollars
The averaged annum last 3 years of research fund dedicated to sustainability research = 2341780 US Dollars

6.5. Total Research Funds

Total research fund in 2018 = 3405899 US Dollars
Total research fund in 2019 = 3264100 US Dollars
Total research fund in 2020 = 4911720 US Dollars
The averaged annum last 3 years of research fund = 3860573 US Dollars

6.8. Number of Events Related to Sustainability

The total number of sustainability/environment-related events in:
2017/2018: 15
2018/2019: 32
2019/2020: 94
The average per annum: 47 events (e.g., conferences, workshops, awareness raising, practical training, etc.).
Sakarya University Faculty of Engineering students produced an electric vehicle for two people that can reach 80 kilometers per hour with the engine they developed using only composite materials.
Sakarya University Energy Technologies Community (SETT) students have produced an environmentally friendly electric vehicle called “Generation V3”. To reduce the effects of various gases and wastes emitted to nature as a result of the combustion of petroleum and petroleum-derived fuels on the ecosystem, the trend towards alternative energy sources has gained great momentum in recent years.

Seminar series on environmental legislation were held at Sakarya University. Also, student communities prepare shows, hiking, trekking activities, seminars, and conferences by inviting industry experts to create sustainability awareness. Seminars on waste classification and disposal and waste gathering initiatives are held continuously by several student communities and faculties during the year.

Figure 60: Events Related to Sustainability