

İZMİR INSTITUTE OF TECHNOLOGY

CLIMATE ACTION PLAN

2024-2028



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OUR COMMITMENT

Our campus location is unique, boasting a variety of natural, environmental, and historical assets. We take pride in having a campus enriched with natural, historical, and social treasures. As İYTE members, we are committed to upholding these ideals and making our campus more sustainable, livable, and pleasant. We are also devoted to developing and implementing effective strategies that actively involve our students, colleagues, and stakeholders in sustainability discussions, leading to meaningful changes and improvements on both local and global scales. Our efforts to safeguard and enrich these resources are continuous.



OUR CAMPUS

Our university is located in the Urla Region, within the borders of Izmir province, located in the western part of Türkiye, Turkey. Our campus area is one of the largest in the country, covering a total area of 35.000.000 m². The landscape primarily consists of gently sloping terrains and plains, hosting Mediterranean pine forests, maquis (Mediterranean shrub) areas with rich biodiversity, wetlands, as well as small, fertile plains. The region experiences a typical Mediterranean climate, characterized by hot and dry summers and mild, rainy winters.



Our campus enjoys a unique microclimate with sunshine and gentle breezes throughout all four seasons. It offers an exceptional sea view and extends to the coast. Additionally, the campus features a small waterfall, a stream with a high flow rate during the winter months, and an alluvial plain. Approximately 28.000.000 m² of this large and beautiful campus is used for campus settlement. Within this area, there are 52 buildings that meet sustainability standards, along with spacious open areas promoting social interaction and suited to the climate, sports fields, permeable-surface roads, and parking lots. Moreover, we are committed to preserving the natural vegetation by cultivating climate-appropriate plants in landscaped spaces.

OUR UNIVERSITY

IZTECH is an English-medium university that comprises three faculties: Science, Architecture, and Engineering. Our university provides education to 7343 students with a total of 1228 academic and administrative staff in undergraduate, master's and doctoral programs.

As a leading national research institute, IZTECH offers a unique research ecosystem in İzmir. The campus area encompasses a Technology Development Zone, Technopark İZMİR, Innovation Center, Technology Transfer Office, and numerous Research Centers.

SUSTAINABLE GREEN CAMPUS COORDINATION

The IZTECH Sustainable Green Campus Coordinatorship was established in 2014. A search conference for a sustainable living campus, themed “happy campus,” was held with the collective participation of campus stakeholders. However, a formal Framework on Sustainable Campus was only defined in December 2019.

IZTECH committed to the UI GreenMetric as a tool for essential self-assessment and growth in sustainability in 2020, continuing this practice in 2021 and 2022. Guided by the motto “happy campus, happy peninsula, happy İzmir,” the IZTECH Sustainable Green Campus Coordination team was formed, comprising 12 members, including our rector, field-expert academicians, and young, enthusiastic teaching assistants. Significantly, our Coordinatorship remains active today due to the support of Eco Motion and numerous other student groups, enabling us to secure campus sustainability through a bottom-up development approach.

<https://sdgs.un.org/goals>



OUR SUSTAINABILITY THEMES

THREE PILLARS of SUSTAINABILITY: In the areas of education, research, and societal benefit, IZTECH embraces economic, social, and ecological sustainability as its guiding principle, aiming to maintain all campus assets within a sustainable environment.

SUSTAINABLE DEVELOPMENT: IZTECH considers it as a responsibility to contribute to developing individuals who are mindful of the planet’s sustainable future and aware of the threats to society and the environment, starting with its own campus and surrounding areas, and to foster awareness on this critical issue.

USE of RESOURCES: IZTECH monitors and records resource utilization values, regularly shares them with campus stakeholders and the public, and undertakes necessary actions for continuous improvement.

EDUCATION and RESEARCH: IZTECH redefines its campus as a sustainable, vibrant, and nature-friendly 'education-research ecosystem' focused on the long-term preservation of natural and cultural assets. It operates on the principle that all elements within this ecosystem hold equal value.

GOVERNANCE: IZTECH is dedicated to enhancing its corporate governance, culture, and organizational capacity through a participatory framework, while also ensuring a high quality of life on campus.

VISION: IZTECH pursues a globally sustainable future by expanding its institutional and cooperative framework both nationally and internationally, through its campus, local surroundings, and the city of İzmir.

OUR 2024 PROGRESS in SUSTAINABILITY

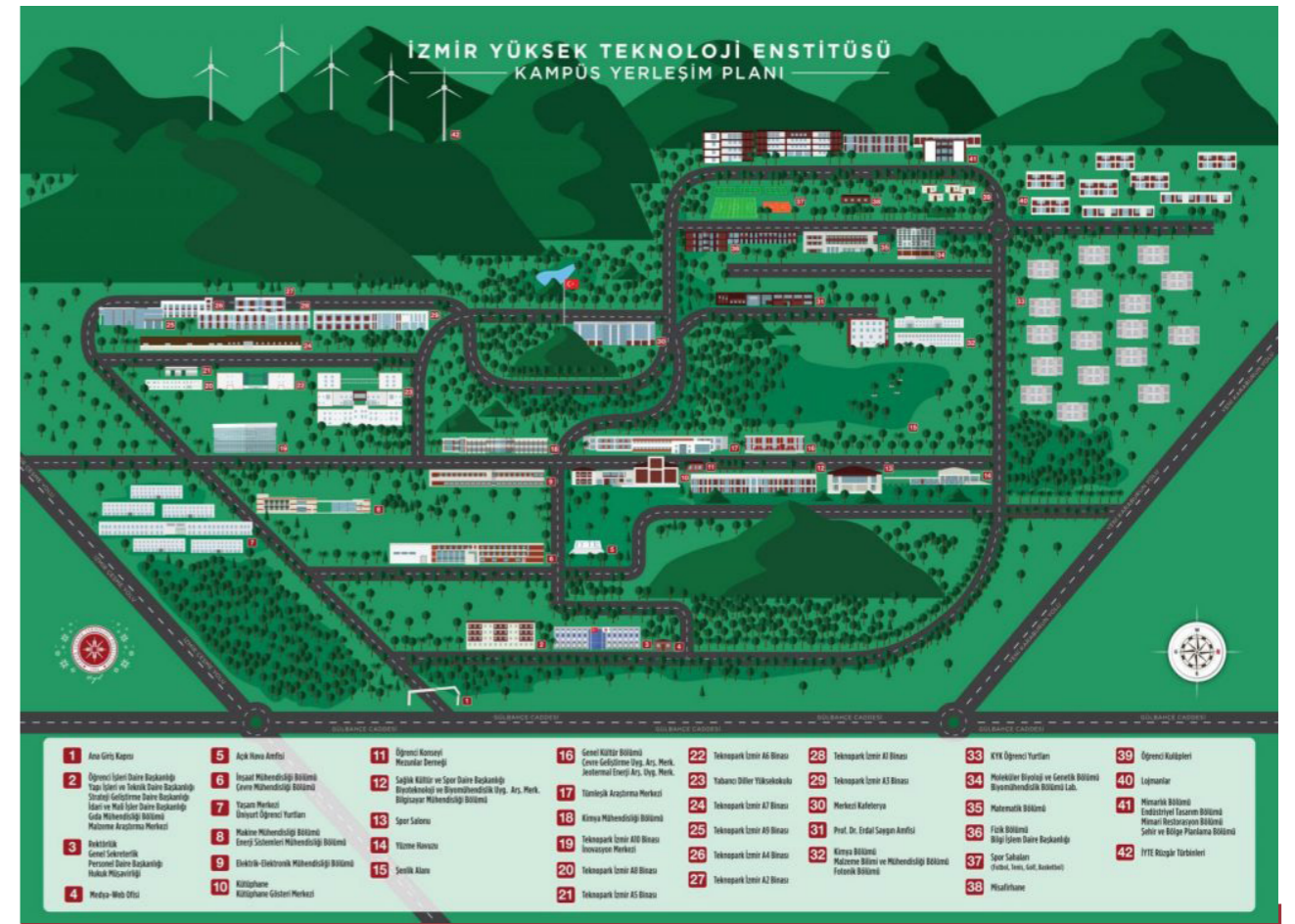
In 2024, İYTE has continued its mission to serve society and science by strengthening our commitment to sustainability and environmental responsibility. Our campus development initiatives have expanded across infrastructure, energy, waste, water, transportation, education, and research, pushing us closer to becoming a model of sustainable development.





Recent infrastructure enhancements focused on green space and healthcare have significantly improved campus life. Thanks to ongoing projects, İYTE has nearly doubled its planted vegetation area in the last two years, reaching 5,856,320 m². In addition, the campus now hosts a fully operational ambulance and ambulance center to ensure rapid response during emergencies. With marked gathering zones and highly trained staff supported by advanced security systems, our emergency response time remains under ten minutes, providing a safe and resilient environment. Our campus remains a positive-energy institution through new installations of photovoltaic (PV) panels on the engineering faculty rooftops, adding 280,000 kWh annually to our energy output. Outdated heating systems have been replaced with electric alternatives, and we completed insulation improvements on rooftops, reducing energy consumption and enhancing comfort. These initiatives complement our extensive wind power generation, making İYTE a leader in green energy production.

The “Waste Management Plan”, officially approved in 2024, marked a new era in İYTE’s waste management. A dedicated Waste Unit now manages our waste operations, utilizing compost and shredder machines to process organic and other waste from campus facilities. Collaborating with municipal and licensed waste agencies, İYTE has introduced new waste containers, enhancing collection efficiency and demonstrating its role as a pioneer in sustainable waste management among academic institutions.



Our commitment to water sustainability is reflected in the recent 13.2% decrease in campus-wide water consumption, down to 297,453 m³. Recycled wastewater now accounts for 51.3% of our water needs, supplied by a treatment plant with a capacity of 1,500 m³ per day. Additionally, rainwater harvesting efforts resulted in 5.4 m³ collected, supporting natural greenery around the harvesting zones and reducing dependence on freshwater resources. Transportation remains a vital aspect of our sustainability strategy. A new agreement expanded the transit bus service frequency, significantly reducing private car entries by 28%. For the first time, two electric bicycles have been provided to students with physical disabilities, supporting campus equity and accessibility. All pedestrian infrastructure has been maintained and upgraded to ensure safe and efficient movement for everyone on campus.

Our academic focus on sustainability has grown with an increase in sustainability-related courses from 1,110 to 1,148. The campus has also seen an annual rise in publications, from 365 to 390, covering essential sustainability topics. Furthermore, sustainability events and student-led initiatives have diversified, emphasizing İYTE's role in advancing knowledge and practices that align with global Sustainable Development Goals. With the addition of a data collection system, İYTE has increased engagement on sustainability across campus, encouraging organizers to align their activities with our strategic axes of Research, Teaching, Leading by Action, and Public Engagement. We look forward to another successful year of growth and collaboration to make İYTE a leading example in sustainable campus development.





1- Setting & Infrastructure

IZTECH aims to strive for improvement in the first category, "Setting and Infrastructure". In the recent years, the efforts in this aspect have been considerably enhanced, particularly in certain areas such as the amount of planted vegetation, sustainability of maintenance activities, supplying new healthcare facilities and equipment (i.e. a fully equipped and operated ambulance and an ambulance center building) through various projects and investments. Our institute owns 35.000.000 m² of land and approximately 28.140.000 m² of which is currently dedicated to education and research for 7296 regular students and 1053 academic and administrative staff. According to the data provided by the directorate of construction and technical works of IZTECH, IZTECH owns a total campus ground floor area of buildings of 97.861 m², where a total campus building area of 245.579 m². Amongst total area, total forest area corresponds to 22.185.819 m², whereas total planted vegetation area is 5.856.320 m² with a percentage of 20.8% with respect to the total campus area. With the recent dense efforts, which have been continuously spent for the last two years, IZTECH significantly increased planted vegetation area and approximately multiplied twice due to the activities particularly held in the last two years. Some examples of recent activities towards this aim is shown in Figure xx.



Fig. xx Some views from the planting activities

On the other hand, IZTECH gives extra attention on the water absorption. It is common in IZTECH to see green roofs, parks, sidewalks, etc with water absorption ability. Moreover, IZTECH separates considerable amount of its budget to the activities related to sustainability including:

- staff services for mass transportation to reduce the CO₂ emission and to reduce private vehicles in the campus
- the fuel and maintenance of these service buses
- daily meal expenses of the students and the staff
- better accessibility for disabled people
- continuous dormitory construction because of which there is no undergraduate student in IZTECH who has demanded a dormitory accommodation, and we couldn't provide
- extension of significant number of study rooms which are mostly open till midnight, where most of the labs are also modified in terms of involving study rooms for the students
- IZTECH buildings are continuously improved for a better heat isolation and, significant amount of budget is reserved for the assessment of seismic behaviour of the existing campus buildings, and if necessary to retrofit them, as well as routine building maintenance activities. There is no campus building which has not taken any sort of these services.

IZTECH had an aim to fully implement all facilities within the campus for disabled and maternity care. We carefully identified the deficiencies we observed in previous years in this context and allocated a significant budget to address them within this year. We can proudly say that there is no building within our campus that poses challenges in terms of disabled, special needs, and/or maternity care.

- Tactile warning surfaces and non-slip tape installations were carried out inside and outside of all buildings in the campus
- All buildings in the campus have accessible ramps
- Protective curbs were added to the edges of the ramps
- Directional signage was installed inside and outside, and Braille was added to door nameplates, positioned at the height compliant with TS 9111, for all buildings
- An audible floor information system was installed for the existing accessible elevators, providing audible information inside and outside
- Directions were provided to accessible toilets and the elevators
- The interior stair handrails were revised to comply with the standards
- The undersides of the stairs were closed to provide a minimum height of 220 cm
- Accessible toilets were arranged to comply with the standards
- Braille alphabet information and warning signs were applied to the elevators
- An induction loop system was installed in the elevators
- Pull cord and presence sensor systems were added to the accessible toilets
- Installation of voice evacuation system devices for emergency exits was carried out

Security infrastructure is fully available and operational in our campus. Our campus has 3 entrances and each of them are controlled by the security and camera systems.

Students enter the campus by using their student cards. Entrance of each building in the campus as well as critical parts of the campus are recorded by the security cameras. We have our own Fire Engine which is fully equipped always ready for intervention. Every building has a smart fire alarm system, several fire extinguishers in every floor, an integrated fire hose through the walls as well as a large fire hydrant outside the buildings. A fully equipped ambulance and an ambulance station building has been supplied in the early 2024. In an emergency, 7 places are marked on the map as seen in Fig. Xx for gathering people. With well-educated security staff and fully operational modern security systems, its own fire engine and its own ambulance station 7/24 located in the campus, the security responding time for accident, crime, fire, and natural disaster is considerably less than 10 minutes in IZTECH campus.



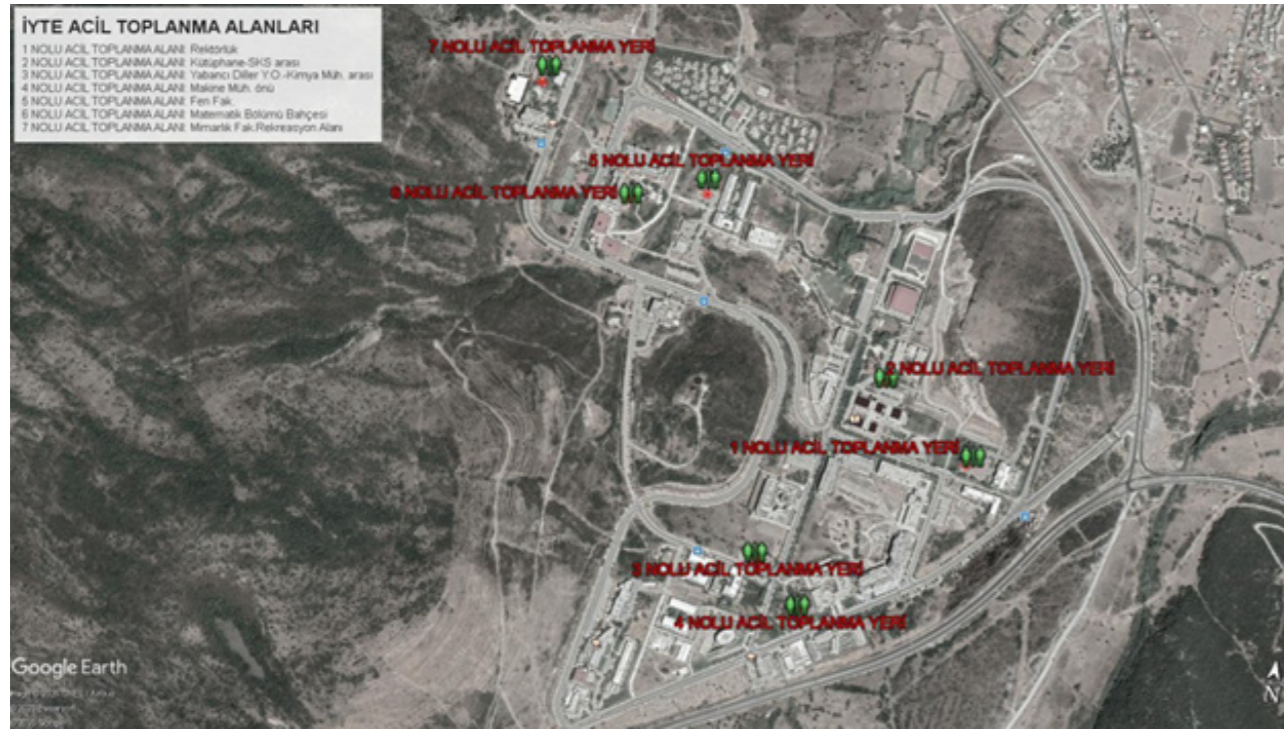


Figure xx: Views from precautions on security and safety in IZTECH

In IZTECH, we have a clinic in the campus with capability of providing first aid, emergency room, and certified health personnel including nurses and medical doctors. The clinic has capability to perform dental examination and treatment, vaccination, emergency service and laboratory.

We also care about conservation of plant, animal, and wildlife, genetic resources for food and agriculture and we secure them in conservation facilities. We have two greenhouses on campus, which are used for plant science research activities and ornamental plant propagation for campus landscape gardening. The research activities are conducted by the Izmir Institute of Technology Plant Science Application and Research Center. The main scope of interest for that center is conducting research related to plant genetics and biotechnology. The Izmir Institute of Technology Plant Science Application and Research Center currently conducts several research projects in relation to the conservation of local

agriculturally significant plants in Türkiye, including fig and salep orchids. In addition, biodiversity in the forests of our campus is being investigated for academic purposes. Some examples related to the fully implemented conservation plan of IZTECH have been presented in the photos visually below.



Figure xx: Some views from fully implemented conservation program of IZTECH

2- Energy & Climate

IZTECH works for the improvement in energy efficiency, production of renewable energy and energy consumption reduction thus decreasing greenhouse gas emissions. At the IZTECH campus, energy efficient appliances are used in most of the buildings. LED light bulbs, light bulbs with motion sensor, energy efficient air conditioner systems are some of the approaches to reduce the consumption. Most of the buildings have natural lighting and ventilation. LED light bulbs, light bulbs with motion sensor, energy efficient air conditioner



Figure 1. Examples of natural lighting in our buildings.

systems are some of the approaches to reduce the consumption. Most of the buildings have natural lighting and natural ventilation. Solar panels and wind turbines are actively working at the campus. Electricity is being generated by solar panels on roofs of some buildings as well as the swimming pool is being heated by the solar power. Wind turbines with 13.5 MW capacity located in our campus generates about 5 times more electricity than used at the campus. The generated electricity is given to the city hub. IZTECH has reached a positive value on the impact with the last improvements in renewable energy approaches.



Figure 2. Renewable energy sources at our campus.

The Gulbahce region experiences a significant amount of sunshine throughout the year and is also rich in geothermal resources. Efforts to reduce greenhouse gas emissions are being considered across various areas, including electric vehicles operated by the university, bicycles on campus, waste sorting bins for metals, plastics, paper, glass, batteries, and general waste, as well as wastewater treatment and reuse. Additionally, renewable energy sources such as wind and solar power are being utilized, along with lab-scale setup for producing hydrogen energy using electricity generated from wind turbines.

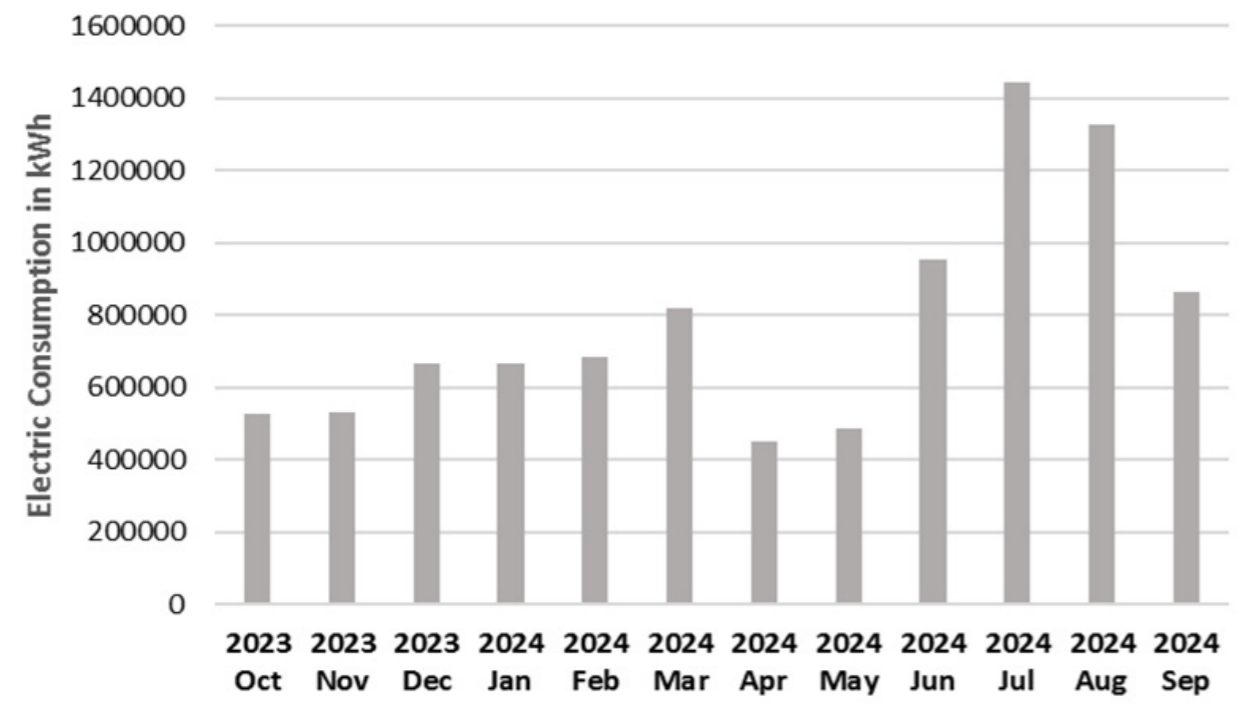


Figure 3. Electricity consumption of IZTECH campus in last 12 months

IZTECH conducts several activities to contribute the technology and innovation. Some of the activities are as follows:

IZTECH is a part of project called Development of Advanced Composite Pressure Vessels for Hy-drogen Storage including on-site testing of new hydrogen storage unit. Efficient storage of hy-drogen is crucial for the success of emerging hydrogen energy markets & is strongly connected to the performance & safety of the components of the supply chain. Currently, hydrogen is stored & transported in a compressed form to satisfy the safety & weight regulations for high pressure gases. Alternatively, composite storage vessels offering high strength & low weight addresses this largely unmet problem with a multi-disciplinary team that aims at developing cost-competitive lightweight composite cylinders with improved mechanical & barrier proper-ties for hydrogen storage using the additive manufacturing technology. Such 3D printed liners with barrier coatings make them impermeable to gases. Further, novel chemo-chromic materi-al-based sensors will be developed

& integrated into these structures for real-time monitoring of the diffusion of gas. The 3D printed hydrogen storage vessels will be integrated to the wind hybrid system (wind turbine, PV unit, battery system) and will be tested on the site to evaluate their performance. IZTECH is a part of project titled Green Hydrogen Generation Energized with Innovative Small Scale Wind Turbine which is a part of the Green and Blue Transformation Program, with assistance from the İzmir development agency.

This project aims to domestically produce the electrolyzer, one of the most important components of green hydrogen production, which has an increasing demand both domestically and abroad. Within the scope of this project, a 2 kW level module will be created, which has not yet been produced locally in our country. Design parameters that will maximize operating efficiency will be tested in both single-cell and multi-cell structures. These parameters include many components such as precious metal loading rate for the anode and cathode separately, catalyst material type, array design, dimensions, operating voltage, squeezing pressure, feed water purity and temperature, cooling load.

On the other hand, the production of hydrogen produced with an electrolyzer powered by renewable energy sources, based on domestic and national technologies, is also very important in terms of the green hydrogen concept. This project will allow the production of hydrogen, one of the strategic energy carriers of the future, through an electrolyzer developed with national engineering, energized by a vertical axis wind turbine developed with national technologies.





Figure 4: The vertical axis wind turbine used in the project

3- Waste

1. Introduction

The İzmir Institute of Technology (IZTECH) has developed an integrated and comprehensive waste management system designed to minimize environmental impact, optimize resource use, and ensure compliance with national and institutional standards. Central to these efforts is the implementation of the official Waste Management Directive of IZTECH (Appendix-1), which establishes a clear framework for waste segregation, treatment, and disposal. This directive is a cornerstone of the university's sustainability efforts, setting guidelines for handling all waste types—organic, inorganic, and toxic—generated on campus.

Table-1 summarizes the framework of this directive.

Waste Management Directive of IZTECH	
Purpose	To establish a comprehensive framework for handling, collecting, storing, recycling, and disposing of all types of waste generated within the university, ensuring environmental sustainability and compliance with national and international regulations.
Key Components	Includes waste minimization, segregation, collection, temporary storage in well-ventilated areas, documentation through official systems, and collaboration with licensed waste processing firms. Focuses on reducing environmental impact and promoting recycling.
Roles and Responsibilities	Defines the roles of the Waste Management Unit, Unit Waste Supervisors, and the Waste Management Coordinator. Ensures proper waste handling, reporting, and communication between departments and licensed firms.
Monitoring	Regular audits and inspections conducted by the Waste Management Unit. Maintenance of a waste database for compliance checks and annual reports to monitor and improve waste management performance.
Training and Awareness	Mandates regular training sessions, workshops, and awareness campaigns to educate the campus community. Distributes informational materials to reinforce proper waste disposal practices and promote a culture of sustainability.

This executive report highlights the various aspects of IZTECH's waste management program, with a focus on the innovations introduced in recent years.

2. Organic Waste Management: Enhancements and New Equipment

The management of organic waste at IZTECH is a crucial component of the university's sustainability strategy. In 2024, the university acquired advanced equipment, including a compost machine and a shredder machine, to handle organic waste more efficiently. These investments have significantly enhanced the capability to treat organic material on campus and reduce landfill dependency. Organic waste is primarily sourced from the cafeteria, landscaping activities, and other green spaces. The compost machine, which is now a central part of the campus's organic waste treatment strategy, processes food waste into nutrient-rich compost. This compost is used for landscaping across the campus, supporting a closed-loop system that minimizes the need for chemical fertilizers. Additionally, the shredder machine processes garden waste—such as leaves, branches, and grass clippings—into smaller particles suitable for composting. These machines enable the university to convert what would have been landfill-bound waste into valuable resources, demonstrating a commitment to circular economy principles.



Figure 3.1. Organic Waste Treatment at IZTECH, Turkey

3. New Waste Containers and Collection Systems

An essential aspect of the enhanced waste management program at IZTECH is the introduction of new, more efficient waste containers. These containers are a visual representation of the university's commitment to sustainability. The new containers, strategically placed across the campus, support a dual collection system outside of the buildings that distinguishes between recyclable and non-recyclable waste. This system is particularly notable because it has enabled IZTECH to be recognized as a pilot institution by the Ministry of Environment, Urbanization, and Climate Change for its proactive waste management efforts. The containers are designed to be aesthetically pleasing, leak-proof, and color-coded according to waste types, making them user-friendly and effective for waste segregation. By facilitating the separate collection of recyclables and non-recyclables, the new waste containers help minimize contamination and improve the efficiency of recycling processes. This initiative has led to a noticeable increase in recycling rates and has made waste management more visible and accessible to all campus members.



Figure 3.2 Recycling Program for IZTECH, Turkey

4. Inorganic Waste Management: A Structured Approach

Inorganic waste management at IZTECH is conducted through a well-defined system that emphasizes segregation, monitoring, and proper disposal. The university generates significant volumes of inorganic waste, including aluminum cans, soft plastics, hard plastics, and paper/cardboard. In the past year alone, 261 tons of inorganic waste were managed, with a detailed breakdown revealing 16 tons of aluminum cans, 139 tons of soft plastic, 25 tons of hard plastic, and 82 tons of paper/cardboard. This data is critical for developing targeted recycling strategies aimed at reducing the volume of waste directed to landfills. A comprehensive waste characterization study conducted by the Environmental Engineering Department laid the foundation for effective inorganic waste management. This study, which analyzed the composition of mixed waste, has informed waste management policies and led to the placement of specialized waste bins for different waste categories, including dedicated bins for glass. These glass bins are strategically located to facilitate the proper disposal of glass items, reducing contamination and supporting efficient recycling. The waste collection process is also supported by municipal services. Specific vehicles, such as those dedicated to general inorganic waste and paper/cardboard recyclables, ensure that waste is collected and transported according to the highest standards. This collaboration between IZTECH and the Izmir Metropolitan Municipality guarantees that all waste is handled in compliance with national regulations, reinforcing the institution's commitment to responsible waste management.



Figure 3.3 Inorganic Waste Treatment at IZTECH, Turkey.

5. Toxic Waste Management: Safety and Compliance

The handling of toxic waste at IZTECH is a priority, requiring careful attention to safety and environmental standards. The campus generates a variety of toxic waste, including batteries, laboratory chemicals, and electronic waste. In total, 6.54 tons of toxic waste were processed over the past year, with each category requiring specialized treatment.

The university's toxic waste management system includes the collection, storage, and transfer of hazardous materials to licensed facilities. These facilities are accredited by the Ministry of Environment, ensuring that they operate under strict guidelines for the safe disposal of hazardous substances. Toxic waste is stored in well-ventilated rooms, as seen in the campus's specialized storage facilities, to prevent the buildup of dangerous gases. This storage practice is complemented by meticulous documentation through the Ministry's Mo-TAT system, which tracks the movement of hazardous waste from the point of collection to final disposal. This system ensures transparency and compliance, contributing to IZTECH's adherence to both national and international waste management standards (Figure 4.7).



Images from the toxic waste collection day

Figure 3.4. Toxic waste management at IZTECH, Türkiye.



Refrigerated interim toxic waste storage at IZTECH

6. Reduction of Paper and Plastic Use on Campus

In addition to managing waste, IZTECH has made a concerted effort to reduce the generation of waste, particularly paper and plastic. A notable initiative is the adoption of the Electronic Document Management System, which has significantly decreased paper consumption in administrative processes. This system, mandated by government decree, aligns IZTECH with the broader national objective of modernizing administrative workflows while reducing environmental impact. To further decrease the use of single-use plastics, IZTECH has installed drinking water fountains across the campus, providing free access to clean drinking water for students, staff, and visitors. This initiative has not only reduced plastic bottle consumption but also promoted a culture of sustainability. Additionally, the university has distributed reusable glass water bottles to incoming students, encouraging a shift away from single-use plastics. These efforts are complemented by a campus-wide policy of charging a nominal fee for plastic bags, emphasizing the environmental cost of disposable items and supporting broader waste reduction goals.

7. Recycling and Educational InitiativesThe university's recycling program is underpinned by a strong educational component, aimed at fostering a culture of sustainability among students, staff, and faculty. The Waste Management Directive provides clear guidelines on what materials can be recycled and how to manage different waste streams. Throughout the campus, informational campaigns and signage help raise awareness about proper recycling practices. Moreover, the Waste Commission of IZTECH is proactive in managing specialized waste categories, such as electronic waste, batteries, and printer ink cartridges. These items are collected separately from general waste to prevent contamination and ensure proper recycling. The university's commitment to recycling is further demonstrated by the receipt of the Zero Waste Certificate, awarded in 2022 by the Ministry of Environment, Urbanization, and Climate Change, recognizing IZTECH's dedication to waste minimization and resource recovery.



Figure 3.5 Waste Characterization Study at IZTECH Campus

8. Waste Tracking and Documentation Systems at IZTECH

As part of its commitment to sustainable waste management, the İzmir Institute of Technology (IZTECH) has integrated sophisticated tracking and documentation systems into its waste management strategy. These systems, including the nationally recognized MoTAT (National Waste Tracking System) and the institution's own Zero Waste Tracking System (currently under construction), are instrumental in ensuring compliance, transparency, and efficiency across all waste-related activities on campus.

MoTAT: National Waste Tracking System The National Waste Tracking System (MoTAT) is a centralized digital platform mandated by the Ministry of Environment, Urbanization, and Climate Change in Türkiye. This platform allows institutions to systematically track, document, and manage the movement and disposal of waste, especially hazardous materials. At IZTECH, MoTAT enables real-time documentation of waste collection, transportation, and disposal, ensuring strict adherence to national standards for waste management. The use of MoTAT fulfills legal and regulatory requirements while providing IZTECH with a detailed, organized record of its waste handling activities, which supports internal compliance audits and environmental assessments.

Zero Waste Tracking System of IZTECH
To further enhance waste management on campus, IZTECH has developed the Zero Waste Tracking System, an internal software tool launched within the framework of its zero waste initiative in 2024. This platform is currently under construction, yet its intended functionality represents a substantial advancement in IZTECH's waste management capabilities.

The Zero Waste Tracking System, accessible at <https://sifiratiktakip.iyte.edu.tr/doku.php?id=start>, is structured to capture data at each phase of the waste lifecycle—from waste generation and collection to recycling and disposal. This system is designed to offer detailed insights into the types, quantities, and sources of waste generated on campus, allowing the Waste Management Unit to optimize processes and enhance waste segregation efforts. Moreover, the platform supports the tracking of specific metrics essential for sustainable operations, including energy production and raw material savings. By integrating these functionalities, IZTECH's Zero Waste Tracking System aims to minimize the environmental impact of waste and contribute to resource conservation on campus.

Impact and Future Directions The combined use of MoTAT and the Zero Waste Tracking System represents a robust framework for managing waste at IZTECH. MoTAT's compliance-focused functionality, paired with the Zero Waste Tracking System's campus-specific capabilities, allows the university to meet regulatory requirements while also advancing sustainability efforts.

9. Conclusion

IZTECH's comprehensive waste management program demonstrates the university's strong commitment to environmental stewardship and sustainability. In 2024, the creation of the Waste Management Plan and the establishment of the Waste Unit, formally approved by the University Senate, marked a significant milestone in the effective management of campus waste. This structured plan provides a solid foundation for responsible waste handling, supported by modern equipment such as the compost machine and shredder machine. The compost machine plays a crucial role in processing all organic waste generated by the campus, particularly from the cafeteria and canteen. This ensures that organic waste is utilized efficiently, contributing to a sustainable cycle and reducing the campus's overall environmental footprint. The addition of new waste containers has further improved waste collection efficiency, positioning IZTECH as a pilot institution in sustainable waste management. Through continuous improvement, collaboration with municipal and licensed entities, and a commitment to education, IZTECH is leading the way in sustainable campus management, setting an example for other institutions to follow.

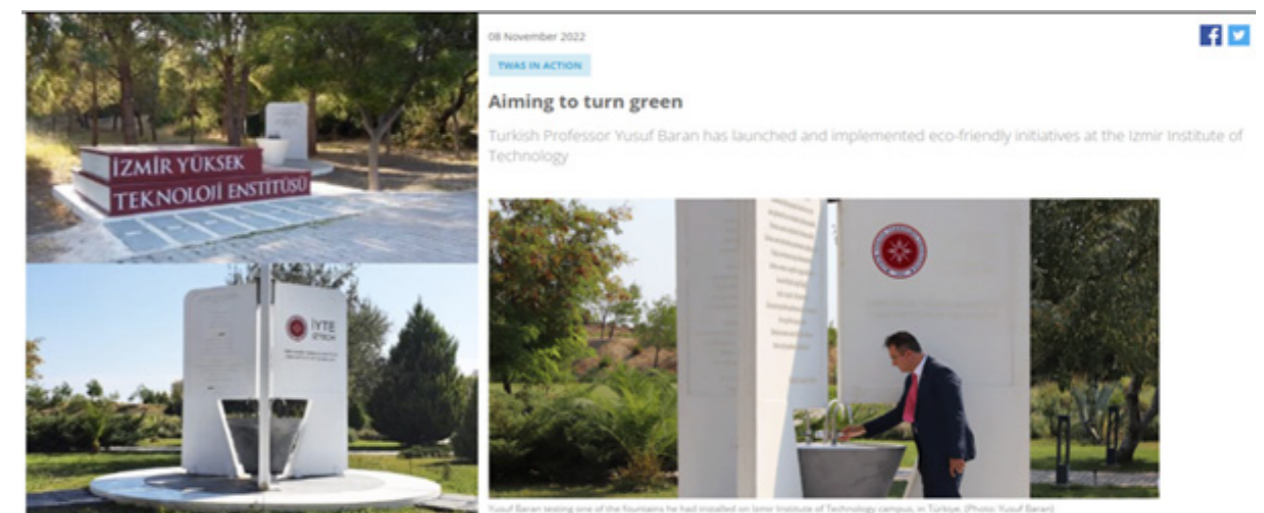


Figure 3.6. Several drinking water fountains were built throughout the campus in order to reduce single-use plastic bottle consumption.

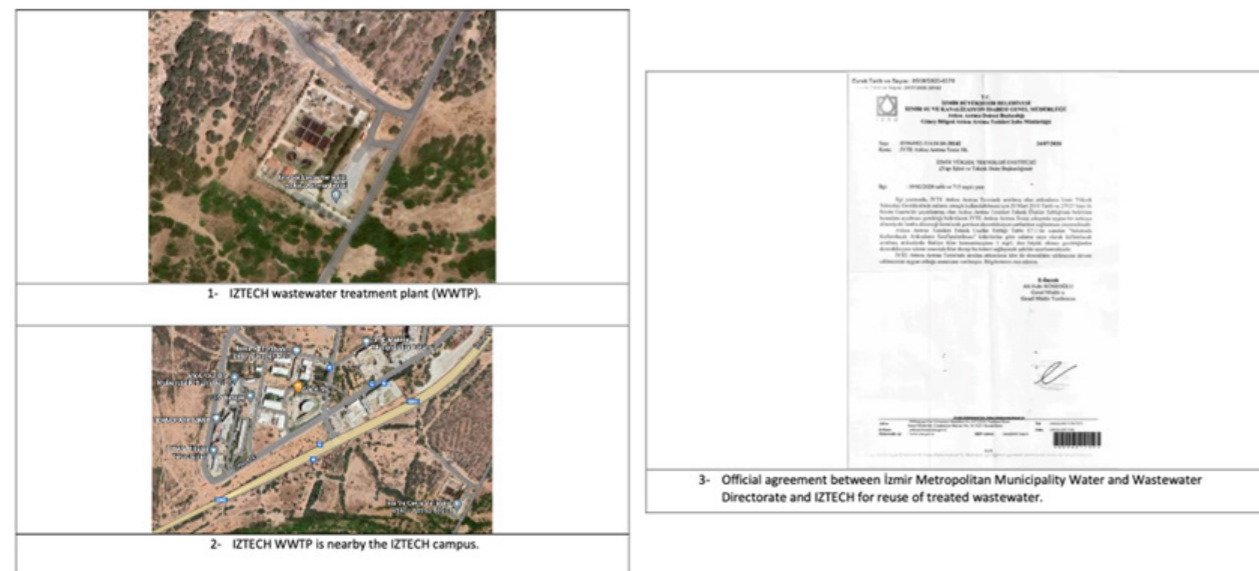


Figure 3.7. Sewage treatment and reuse at IZTECH, Turkey.

4- Water

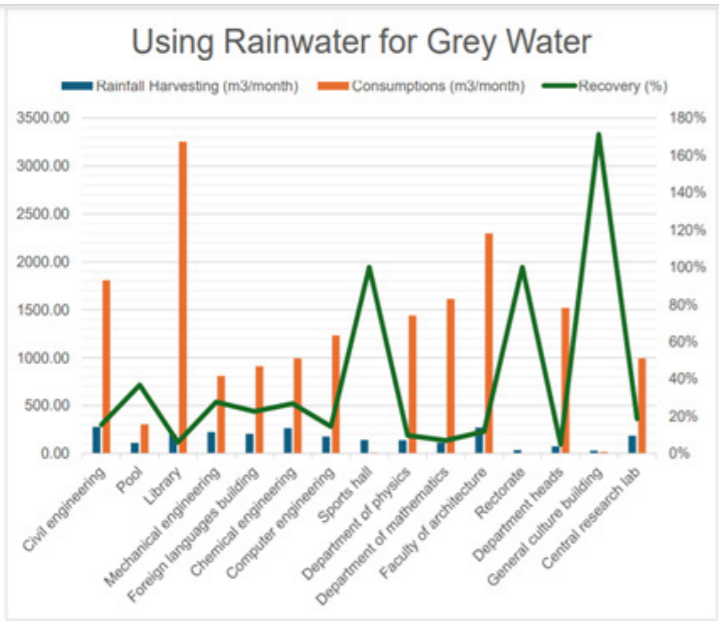
IZTECH has launched several projects in the water conservation field in recent years. The aim of conserving 70% of water on the campus grounds was achieved with a collective effort by different stakeholders in the campus with the leadership of the IZTECH Rectorate. IZTECH has implemented a variety of sustainable water conservation projects that have significantly impacted campus water usage. Key initiatives include:

1.1. Water Conservation Program:

Rainwater Harvesting Project

- IZTECH has achieved a 70% water conservation target through collaborative campus-wide efforts.
- Rainwater is collected from rooftops and funneled into water tanks for specific uses, such as toilet flushing. This system, involving 27 buildings, is supported by hydrophores to efficiently use the stored rainwater, thus addressing the campus's grey water needs.





Building	Roof Area(m ²)	Rainfall Harvested(m ³ /year)
Civil Engineering	5569.0	3343.2
Pool	2241.8	1345.8
MBG	4722.2	2834.9
Food Engineering	3468.2	2082.1
Electrical Engineering	3510.7	2107.6
Library	3931.5	2360.2
Mechanical Engineering	4477.8	2688.2
Foreign Languages Administrative Building	1331.6	799.4
Foreign Languages Building A-B	841.4	505.1
Foreign Languages Building C	969.5	582.0
Foreign Languages Building D	966.0	579.9
Chemical Engineering	5310.1	3187.9
Cafeteria	1664.3	999.2
Computer Engineering	3550.1	2131.3
Sports Hall	2820.2	1693.1
Department of Physics	2798.9	1680.3
Department of Mathematics	2250.9	1351.3
Erdal Saygun	1890.4	1134.9
Faculty of Science A-B-C	4175.4	2506.7
Faculty of Architecture A-B-C-D-E	5442.7	3267.4
Electrical Engineering Lab	254.4	152.7
Civil Engineering Lab	993.5	596.4
Central Mechanical Workshops	994.4	596.9
Rectorate	729.0	437.7
Department Heads	1501.3	901.3
General Culture Building	616.3	370.0
Central Research Lab	3701.8	2222.3
TOTAL		42457.8

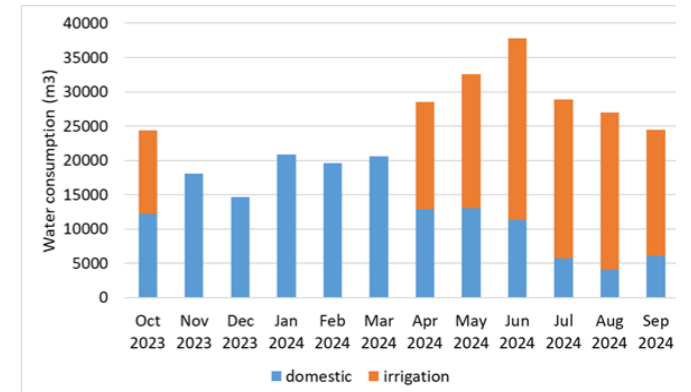
Bioswale Project

To safely direct rainwater that is coming from a parking lot, a bioswale was constructed. Bioswales are built to collect polluted stormwater runoff and while allowing its infiltration into the soil, they conduct filtration. The project prevented uncontrolled flow and flooding of the IZTECH Recreational Area in the year 2024.



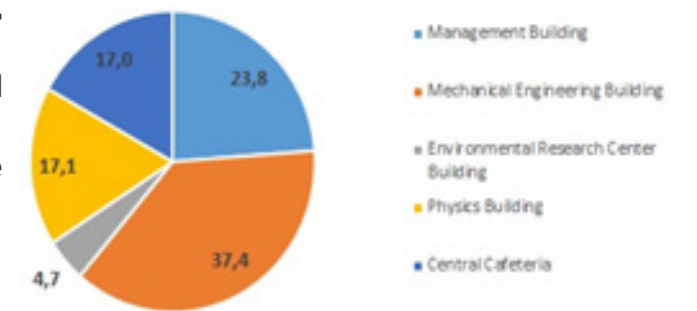
1.2. Water Recycling Program:

- The campus recycles 100% of its wastewater, facilitated by an on-site treatment plant that handles 1,500 m³/day.
- Water consumption from October 2023 to October 2024 reached 297,453 m³, reflecting a 13.2% decrease from the previous year.
- Recycled wastewater fulfills 51.3% of IZTECH's water demand, significantly reducing freshwater withdrawals. Water footprint calculations guide further reduction initiatives.



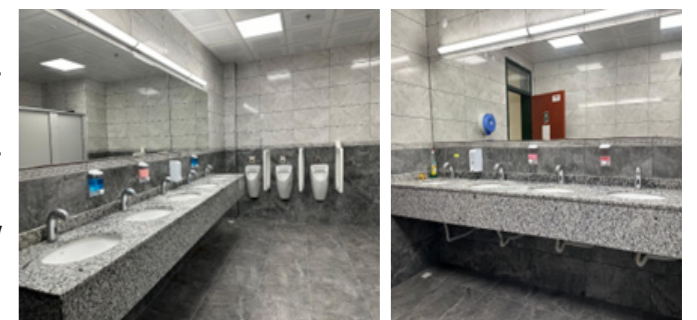
- Water consumption and footprint analysis identified high-demand buildings, with Mechanical Engineering (37%) and Management (24%) buildings using the most water.

Average Annual Water Consumption (%)



1.3. Water Efficient Appliances:

- Motion-activated taps were installed to reduce unnecessary water use, replacing older models in existing and new buildings alike.



1.4. Consumption of Treated Water:

- Two parks, "Tebessüm Parkı" and "Ümit Parkı," were established, each designed with drip irrigation to minimize water usage.



- A lavender garden was also created, enhancing the soil's water retention while utilizing a plant that thrives on minimal water.



İzmir Yüksek Teknoloji Enstitüsü Rektörlüğü
Tümleşik Araştırma Merkezleri Direktörlüğü (İYTE TAM)
Çevre Geliştirme Uygulama ve Araştırma Merkezi

Analizi talep eden kişi/kurum: Hatice Eser ÖKTEN – İYTE Çevre Mühendisliği Bölümü
 Analizi talep edilen cihazlar: İC, İCP-MS, Potansiyometrik Titratör
 Numune adı: Çeşme suyu (1 adet)
 Analizi yapan kişi / uzman: Sanem Ezgi KINALI (Öğretim Görevlisi) - Yunus YILMAZ (Teknisyen) - Seher EĞİLUT DENİZ (Tekniker)
 Analizin yapıldığı tarih: 23/10/2024

	KATYON C ppm (mg/L)							ANYON C ppm (mg/L)					
	Lityum	Sodyum	Amonyum	Potasyum	Magnezyum	Kalsiyum	Flor	Klor	Nitrit	Brom	Nitrat	Sülfat	Fosfat
Çeşme Suyu	0,03	199,60	<0.125*	4,48	22,51	214,01	0,09	456,38	N.D.	1,29	8,50	75,09	N.D.

*Kalibrasyon alt limiti 0.125ppm dir.

Örnek Adı	pH	İletkenlik (µS/cm)	TDS mg/L	Potansiyometrik Titratör Cihazı ile						
				Toplam Alkalinite mg/L CaCO ₃ eşdeğeri	CO ₃ ²⁻ mg/L	CO ₃ ²⁻ mg/L CaCO ₃ eşdeğeri	HCO ₃ ⁻ mg/L	HCO ₃ ⁻ mg/L CaCO ₃ eşdeğeri	OH ⁻ mg/L	OH ⁻ mg/L CaCO ₃ eşdeğeri
Çeşme Suyu	7,10	1869	1200	280,19	-	-	341,83	280,19	-	-

İCP-MS Cihazı ile	
Örnek Adı	As µg/L (ppb)
Çeşme Suyu	2,492

Doç. Dr. Hüseyin Hale DEMİREPE
Merkez Müdürü

İzmir Yüksek Teknoloji Enstitüsü Çevre Geliştirme Uygulama ve Araştırma Merkezi
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1.5. Water Pollution Control in Campus Area

These initiatives, coupled with IZTECH's compliance with national wastewater discharge policies, underscore the institution's commitment to a sustainable and green campus environment. Policy and programs for water pollution control on IZTECH campus are fully implemented and monitored regularly.

IZTECH regularly checks for contamination from wastewater streams to its water sources.

5- Transportation

The Izmir Institute of Technology (Iztech) campus provides a natural, calm, and sustainable life to the staff and students throughout the year. Regarding transportation, the sustainability concept attracts attention for several reasons. For instance, most of the common buildings of the Iztech are accessible from different parts of the campus as they are located in the heart of the settlement to provide efficient transportation during the year. The central library, integrated research centre, festival area, sports centre, performance centre, swimming pool and technopark are located on the main axis of the campus. Therefore, staff and students can easily access this main axis from various other common buildings such as dormitories, faculties, and central cafeteria. The other reason is that Iztech continues to develop new policies on sustainable transportation while providing several alternatives to access the campus from close and far locations of the Izmir Metropolitan Area using public buses, ring services, e-scooters, e-vehicles and bikes. The current situation and strategies are explained in different topics of sustainable transportation.

ehicle use: The Izmir Institute of Technology (Iztech) operates fourteen (14) cars (passenger vehicles, vans, minibuses, and buses) for staff mobility and education & research activities. In addition to those cars, the Iztech manages seven (7) vehicles for various purposes, such as sewage disposal, fire, and first-aid. Each three (3) gates of the Iztech campus, which are located on the east (main gate), south (secondary gate), and north (Gülbahçe Village gate), is equipped with a Licence-Plate Recognition System (LPRS).

For those who would like to pass through LPRS via personal vehicles, registration of the plate and documents is required as a campus policy. Thanks to the LPRS system, the entrance of the registered cars to the Iztech campus area is monitored automatically. For those who are not the occupants of the campus (visitors), the security of the Iztech administers the car of each visitor, one by one.



Figure 1. License-Plate Recognition Systems (LPRS) located at each gate

Shuttle services: The Izmir Institute of Technology (Iztech) provides a free shuttle service, which covers specific (published on the website) routes involving hop-on hop-off in the campus, and from the dormitory and Gülbahçe Village. The shuttle takes up to 50 passengers, whereas 27 can be seated. The campus shuttle service is free of charge for everyone on the campus including staff, students, and visitors. The existing bus stops on the campus are used as hop-on locations. The route of the shuttle service is given in Figure 2, and timetables are given in Figure 3. The route of the shuttle service is also extended to the nearest settlement, called Gülbahçe Village, where most of the undergraduate and graduate

students reside. Thanks to the extended schedule, the students can use the shuttle service in the late evening between the central library of Iztech to the dormitories and village. Besides, public buses run by the Izmir Metropolitan Municipality also circulate on the campus and around the village.



Figure 3: Timetables of Shuttle Services (Left: regular; Right: late services for library) (Iztech, TR) <https://ulasim.iyte.edu.tr/ring/Index>

Policies on zero emission vehicles: The campus life of Iztech encourages students and staff to use bicycles for campus transportation. The entire road network on the Iztech campus is shared with bicycles and the shared roads have a strict vehicle speed limit of 30 km/h. The elevated crosswalks, evenly distributed on mostly occupied roads by vehicles and bicycles, provide safe pedestrian access and serve as speed ramps for motor vehicles on the campus. Moreover, there are separated bikeways and pedestrian ways (pathways) between main buildings where human traffic is high. All these individual pathways are lighted up for security. Besides, each faculty settlement on the campus provides a secure bicycle parking area near the buildings.

Regarding the use of bicycles on the Iztech campus, an occupancy rate study was conducted considering the bicycles requested from the parking lots and bike trips completed. The results showed that approximately 90-110 private bicycle trips were completed per/day. The Ministry of Health of Türkiye donated 59 bicycles to Iztech. The Cycling Community of Iztech manages these bicycles to let the use of occupants of the Iztech campus free of charge. Moreover, Unibike, which is a bike-sharing system provides 50 bikes to be used on the campus with a very little amount of charge. Starting with the new academic year, all Unibikes are maintained and ready to be used in the Iztech campus. Besides, a private company of Izmir Karşıyaka Municipality, known as Kumru Scooter, provides 40 e-scooters that can be rented via mobile phone application in the campus. Regarding electric vehicles, two minivans, which are actively used for routine freight transportation on the campus, are donated to the Iztech by a private cargo company. In addition, Iztech owns two e-bikes, which are administered by the Faculty of Engineering for agricultural and civil engineering purposes. The Iztech is planning to purchase an electric minibus in the upcoming years to provide a more sustainable shuttle service on the campus while decreasing the CO2 emissions of the campus area. Thanks to the mutual agreement between Iztech and İzmir Metropolitan Municipality, electric public buses have started to serve from the city center to the campus location, regularly. The electric buses and their schedule can be checked from the link given below. With the same agreement, İzmir Metropolitan Municipality provides at least four bus runs with a bicycle carrier in all public bus lines serving the campus.



Figure 4. Bicycle usage in IZTECH



Figure 5. Bikeways and parking facilities in IZTECH

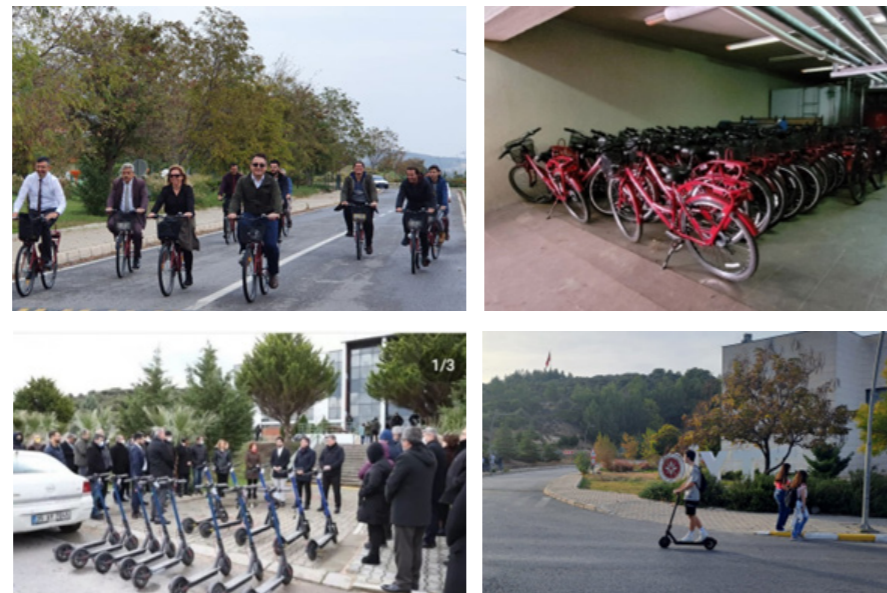


Figure 6. Free/charged shared bikes and scooters in IZTECH



Figure 7. Electric vehicles owned by IZTECH



Figure 8. Public bus services (Electric vehicle on the left) and busses with bicycle carrier in IZTECH

Policies on decreasing parking area: The campus of the Izmir Institute of Technology (Iztech) is located on the western side of the Izmir metropolitan area. The total campus area is 28,140,000 m², whereas the total parking area is 27,396 m², as shown in Figure 9. According to these values: The ratio of parking area divided by total campus area is 0.1%. The Iztech regularly uses shuttles to transport the administrative and academic staff from 12 locations of the Izmir Metropolitan Area, as well as 24 busses having different routes to access the Iztech campus for staff and students as of 2023-2024 fall semester. Every year a protocol is signed between a transportation company and Iztech to provide access to the campus for occupants from different locations of the Izmir Metropolitan Area. Signed protocols belonging to the last three years between the responsible company(s) and Iztech.

With these bus services, an approximately 30% reduction in the use of private cars was provided. In case additional work hours are required, there are several night bus services (20:00 Bus Service) for the staff and students after 5:00 pm. The bus is operated by the rectorate of Iztech and one can take the bus by online daily registration free of charge. Besides public vehicle services, Iztech owns 59 bicycles, which are donated by the Ministry of Health of Türkiye. These bicycles are free of charge for the university members and Iztech Cycling Community manages the maintenance and administration issues. Additionally, there is also a bike-sharing system called Unibike within the campus and 50 bikes serve the users with very little charge. Moreover, a private company of a local municipality also provides 40 e-scooters for the campus, which can be rented through a mobile phone application. Finally, the public transport to the campus from the Izmir Metropolitan Area and surrounding Gülbahçe Village is strongly supported by the Izmir Metropolitan Municipality.



Figure 9: Parking areas in the Campus

Policies on pedestrian paths: Izmir Institute of Technology continues to increase pedestrian paths available on the campus. The roads of the Iztech provide safe and comfortable transportation for pedestrians (students, staff, and visitors). There are separate bikeways and pedestrian pathways between main buildings where human traffic is available. All these individual pathways are lighted up and covered with signs for security.

To keep consistent security and outdoor comfort, Iztech regularly maintains and repairs the sidewalks and pedestrian paths. Elevated crosswalks serve as speed ramps on campus streets to not only keep the speed limit on the campus but also provide easy access for physically disabled users. Besides crosswalks, all sidewalks are designed as accessible for physically disabled users to increase accessibility all around the Iztech campus. To provide safe and secure transportation for pedestrians, all sidewalks are lighted and separated from the roads by elevation. All crosswalks are marked with pavement markings and traffic signs. The Iztech also initiated several pedestrian paths having shades of trees for comfortable access during the day times in the hot summer season.



Figure 10: At IZTECH, all sidewalks are lightened and separated from the roads by elevation. The sidewalks are designed as accessible for physically disabled persons. All crosswalks are marked with pavement markings and traffic signs. The elevated crosswalks are used as speed ramps for speed limit enforcement especially where the pedestrian traffic is high.

6- Education & Research

As a leading national research and higher education institution, IZTECH integrates principles of sustainability into its research and education. In IZTECH, in 2023-2024 Fall and Spring Semester, the total number of courses offered, including graduate and undergraduate degrees, is 4434. Among them, 1141 courses are related to sustainability. These courses are offered in Faculty of Engineering, Faculty of Natural Sciences, and Faculty of Architecture. A high percentage of the courses in the Departments of Environmental Engineering, Material Science and Engineering, Energy Systems of Engineering, City and Regional Planning, Architecture and Molecular Biology and Genetics and International Water Resources are sustainability related. They cover a variety of aspects in sustainability and aims to satisfy sustainability development goals with their curriculum and educational program targets. In recent years, there have been efforts to offer sustainability related courses common to whole students in IZTECH.

For example, the course of "Global Sustainable Development" offered by the department of Chemical Engineering for the last three years is open to all students. It covers the topics/issues about sustainable production and development. The aim of the course is to present negative effects of production processes on the environment and society and to inform about what should be done to reduce this.

As another example, the courses mostly in the Department of Bioengineering aims to train students and give them the necessary knowledge to produce high value technologies, products and information using innovative bioengineering approaches to solve problems in national and international priority areas such as health and pharmaceutical industry, and environmental and energy industry. They basically target SDGs of "3-good health and well being", "9-industry, innovation and infrastructure". The course of "Economy and Design of Engineering" at Chemical Engineering Department aims to provide students with an understanding of entrepreneurship, innovation, and sustainable development, and knowledge of professional life, including project management, risk management, and change management. The course of "Introduction of Bioenergy" in Energy Systems Engineering follows sustainability related topics, such as, biomass energy and types of biomass; heat and power generation from biomass; methods and technologies for biofuels production in solid, liquid and gaseous forms; utilization of organic municipal waste using biomass conversion technologies. The below table gives examples of sustainability related courses given at IZTECH.

Table 1. Selected Sustainability Related Courses at IZTECH in 2023-2024 Fall and Spring Semesters

Course Code	Course Name	Programme / Department	Link to / Relationship with Sustainability and Related Themes (Ecology, Environment, Energy, Water Resources, Society, Economy, etc.)
AR281	Introduction to Energy and Heat Transfer	Architecture	In the course, energy and sustainability related issues are covered. Energy and energy efficiency are considered by using "Energy Performance Regulations in Buildings"; and heat and moisture transfer in buildings are investigated based on "Heat Insulation Regulations in Buildings". The course name is later changed into "Introduction to Energy and Heat Transfer".
AR482	Building Performance Simulation for Sustainable Design	Architecture	By using dynamic simulations models (DSMs), a designer has a possibility to compare different design options in terms building performance. Besides, DSMs are pedagogical tools offering to bring easily the subjects of building physics into architectural design. In this course, the use of building performance simulation tools are taught as a support to architectural design process. It demonstrates how the design can be evolved any using d tested to give optimum performance in terms of energy .

AR595	Rural Transformation and Built Environment	Masters in Architecture	Concepts and definitions in relations to rural, urban and rural relations, rural architecture, new spatial organisations in rural areas as well as sustainability related issues are covered.
CE101	Introduction to Civil Engineering and Sustainability	Civil Engineering	The course aims to introduce the civil engineering profession including ability to design a complex system, process, device or product to meet needs under realistic constraints such as economic, environmental, health, safety, manufacturability and sustainability.
CE471	Water Resources Engineering	Civil Engineering	The course covers technical issues in order to provide students with the ability to design a complex system, process, device or product to meet needs under realistic constraints such as economic, environmental, health, safety, manufacturability and sustainability.
CE480	Design of Coastal Structures	Civil Engineering	The course covers the following themes: Wave Climate, design wave, wave forces on vertical walls, rubble mounds and circular cylinders, design of harbour structures; quays, piers, gravity and floating breakwaters. design of breakwater layout and harbour tranquillity. Design of seawalls, revetments and groins. design of concrete block quaywalls, sheet pile walls and piled quay walls. Seismic design.
CE511	Coastal Engineering	Masters in Civil Engineering	An introduction to coastal engineering with emphasis on the interaction between oceanic dynamic processes (waves, currents, and tides) and coastal regions (beaches, harbors, structures, and estuaries) and on the engineering approaches necessary to prevent adverse effects caused by this interaction.
CE524	Urban Traffic Management Control	Masters in Civil Engineering	Nature of urban vehicular traffic congestion. Roadway capacity. Intersection design and traffic signal operations. Freeway operations and management. Corridor control. Traffic stream models. Traffic delay models. Traffic forecasting.
CE538	Water Resources System Engineering	Masters in Civil Engineering	Planning, design and management of water resources systems. Application of deterministic and stochastic optimization techniques. Water allocation, capacity expansion, and design and operation of reservoir systems. Surface water and groundwater management.
CE578	Sea Renewable Engineering	Masters in Civil Engineering	The course focuses on the following topics: Marine renewable energy, wave energy, wave energy converters, power take off systems, tidal energy, offshore wind energy, Combined systems.
CHE542	Water and Waste Treatment	Masters in Chemical Engineering	Following topics are covered: Characteristics of water and airborne wastes treatment processes and kinetics; treatment system design: Process interactions, optimal design, treatment needs related to water supply.
CP111	Urbanization and City Planning	City and Regional Planning	The course covers the following topics that are related to social and environmental sustainability: Urbanization. Types of urban settlements. Urban economy. Urban land. Urban morphology. Urbanization and natural environment. Urban land use, infrastructure and transportation. Urban planning. Planning problems of Turkey. Urban design and planning process. Development plans, renewal and conservation issues. Administrative and legal aspects of city planning.
CP335	Environmental Issues and Planning	City and Regional Planning	The course explores the fundamental concepts of ecology the interactions between natural environment and urbanization and the environmental problems created by the current trends in urban processes. Then it elaborates on the policy options and planning tools for creating sustainable urban environments and solving the environmental problems such as urban and industrial pollution chemical toxins, water scarcity, degradation in ecosystems, etc. The course also covers the methods for analysing and evaluating the adverse impacts of current trends of industrialization and urbanization on the natural environment.
CP345	Urban Geography	City and Regional Planning	This course covers theories of the origin, growth and development of cities and then studies their contemporary economic functions, spatial structure and socio-cultural characteristics. It also involves sustainability related topics in its framework.

CP355	Urban Transportation Planning	City and Regional Planning	The course involves topics such as urban travel characteristics and trends, historical evolution of transport systems, demand market estimation and integration of sustainability principles.
CP492	Regional Economic Development and Planning	City and Regional Planning	This course is designed to provide background knowledge on the concept economic development, theories of regional economic development and the evolution of planning practice with reference to the EU and Turkey, involving sustainability related topics too.
CP555	Environmental Ethics	Masters in City and Regional Planning	This course provides a comprehensive coverage of issues related with environmental ethics including alternative ethical frameworks for environmental planning (utilitarian biocentric and ecocentric ethics) Responsibilities to future generations duties to the natural world and animals as well as distributive equity and environmental justice. The applications of these to environmental ethics will be discussed.
ENE501	Fundamentals Of Energy Engineering	Masters in Energy Engineering	The content of the course will include Wind, solar, Geothermal, Biomass, Wave Energy, Energy Efficiency, networks/grids and energy policies. Students will choose a subject after the mid-term as a project topic and work in groups to prepare a scientific report and presentation. The course will also be supported with site visits.
ENE510	Fundamentals of Wind Energy Systems	Masters in Energy Engineering	This course includes the history and near future of wind energy, the status of wind energy in turkey and around the globe, basic information about sub-topics of wind energy (i) meteorology (ii) aerodynamics and (iii) control. The content is supported with a site visit. The course gives knowledge and understanding on wind turbine peripherals/sections such as blades, rotor, gearbox, generator, brakes, nacelle, tower, grid connection and wind measurements.
ENV315	Water Supply	Environmental Engineering	This course is one of the compulsory and fundamental courses of the Department of Environmental Engineering, whose aim is to protect health of human beings and the environment by assessing exposures and associated risks to determine mitigation needs, by developing better monitoring and sampling techniques, better treatment processes, and environmental standards. Environmental sustainability is a core issue.
ENV317	Atmospheric Chemistry and Air Pollution	Environmental Engineering	This course is one of the compulsory and fundamental courses of the Department of Environmental Engineering, whose aim is to protect and the environment focusing on air pollution by assessing exposures and associated risks to determine mitigation needs, by developing better monitoring and sampling techniques, better treatment processes, and environmental standards. Environmental sustainability is a core issue.
ENV321	Water Quality	Environmental Engineering	This course is one of the compulsory and fundamental courses of the Department of Environmental Engineering, whose aim is to protect health of human beings and the water resources by assessing exposures and associated risks to determine mitigation needs, by developing better monitoring and sampling techniques, better treatment processes, and environmental standards. Environmental sustainability is a core issue.
ENV413	Solid Waste Engineering	Environmental Engineering	This course provides students with the knowledge to create a design for a solid waste treatment facility, improve how recycling programs function, make arrangements for the proper disposal of trash and garbage containers, and create sanitation plans to ensure healthy working conditions.
ENV440	Industrial Water Treatment	Environmental Engineering	The course aims to give knowledge on processes like removal of heavy metals, adsorption, ion exchange, membrane process, and advanced oxidation processes.
ENV511	Micropollutants in the Environment	Masters in Environmental Engineering	Once micropollutants, formed as a result of human activities, are released to the environment, they are distributed within environmental compartments via various transport and transformation processes depending on their physico-chemical properties and environmental conditions, and may pose a risk to the environment and human health. Within the scope of this course, various micropollutant groups will be introduced together with their physico-chemical properties, the transformation processes that play an important role in the fate of these pollutants will be examined in detail by using the knowledge on fundamentals of mass transport, and modeling applications will be explained.

ENV519	Hazardous Waste Management	Masters in Environmental Engineering	This course covers management, planning, regulatory, and engineering aspects of hazardous waste handling, treatment, and disposal. The course will evaluate engineering process design and the analysis of important unit operations and processes in different treatment technologies for hazardous wastes. It will also familiarize students with issues, problems, and processes involved in hazardous waste management and treatment systems.
FE541	Food and Environmental Virology	Masters in Food Engineering	Introduction to Food and Environmental Virology, Molecular Virology of Human and Animal Viruses in Food, Viruses with Potential for Food-borne Transmission, Conventional and Molecular Methods of Virus Detection in Foods, Survival and Transport of Enteric Viruses in the Environment, bacteriophages in Food Virology, Epidemiology of Viral Food-borne Outbreaks, Prevention and Control Strategies Against Food-borne Viruses
HUM260	Introduction to Management	General Culture Courses Department	Following issues are covered: Key issues and debates related to the theory and application of disaster risk reduction; the concepts of risk, hazard and disaster, vulnerability; various types of natural and human induced hazards, principles and processes of disaster risk management. Resilience and vulnerability; multi-hazard risk management.
HUM261	Global Sustainability	General Culture Courses Dep.	This course exploresat global sustainability, planetary and societal resilience, climate change, and solutions for societal transformations at global scale.
ME427	Introduction to Renewable Energy Resources	Mechanical Engineering	Introduction to renewable energies. Principles of renewable energies. Basic laws of heat transfer and fluid mechanics. Uses of renewable energies: solar, wind, geothermal, bio, tidal, wave, etc. Storage of energy and its distribution.
AR447	Rural Built Environment	Architecture	Introduction to Rural Built Environment, Basic Definitions of Rural Settlements, Elements of Built Environment, Dwelling and Settlements Relationship, Spatial Organisation in Dwelling, Spatial Elements of Rural Dwellings, Structural and Construction Systems of Rural Dwellings.
CE532	Groundwater Hydrology and Pollutant Transport	Masters in Civil Engineering	The course covers fundamental concepts in groundwater hydrology and the occurrence of pollution in groundwater sources. Topics include groundwater flow through different types of aquifers, the use of flow nets, and principles of well hydraulics. It also examines the chemical properties of groundwater and the impacts of contamination. Additionally, the course introduces numerical modeling techniques for simulating groundwater flow and chemical pollutant transport.

IZTECH has a research ecosystem that is unique for Izmir as the campus area also includes a planned technology development zone, Technopark IZMİR, Innovation Center, Technology Transfer Office, and Research Centers. A new research center established in 2022, named “Wind Energy Meteorology and Environmental Application and Research Center” serves strongly for sustainability related research and activities as a whole (<https://ruzmer.iyte.edu.tr/en/>). This center provides connections and coordinations between IZTECH, Izmir Development Agency (İZKA) and the Republic of Türkiye Ministry of Industry and Technology.

Geothermal Energy Research and Application Center (GEOCEN) is another and a former one continuing its activities at the Integrated Research Center (IRC). It serves in 3 laboratories: Modeling, Energy and Hydrogeology laboratories. (<https://geocen.iyte.edu.tr/en/>) . Individual researchers as faculty members also conduct research and work with master and doctorate candidates. Sustainability research in IZTECH gets fund from EU projects, The Scientific and Technological Research Council of Turkey (TUBİTAK) projects and IZTECH's Scientific Research Program. A variety of departments including Civil Engineering, Food Engineering, Architecture, Material Science and Engineering, Bioengineering and City Planning and Environmental Engineering have become partners of EU projects, and have received funding from other institutions. Sustainability research projects follow the UN Sustainable Development Goals (SDG) in general. The following graphic shows the breakdown of projects in the period from October 2023 to October 2024.

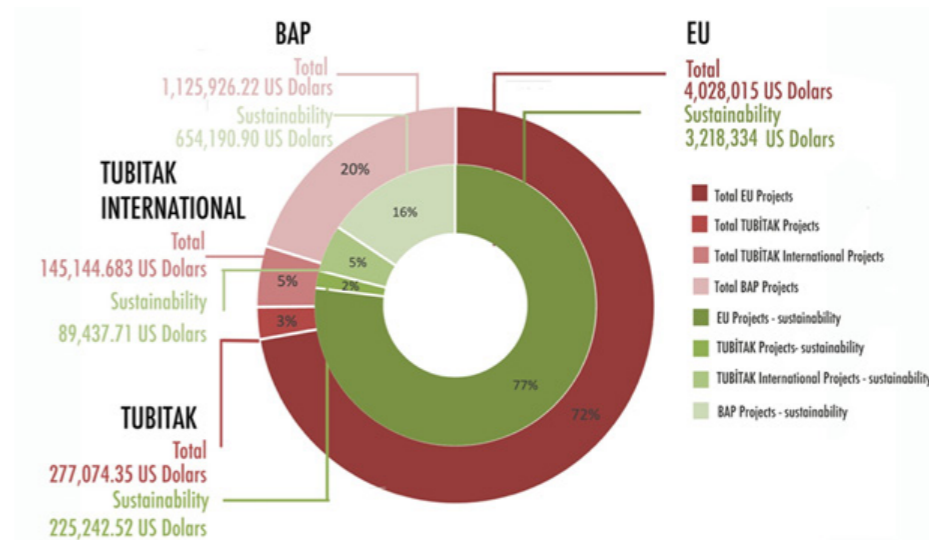


Figure 1. Breakdown of research funds in IZTECH by Funding Institution and by Amount of Funding

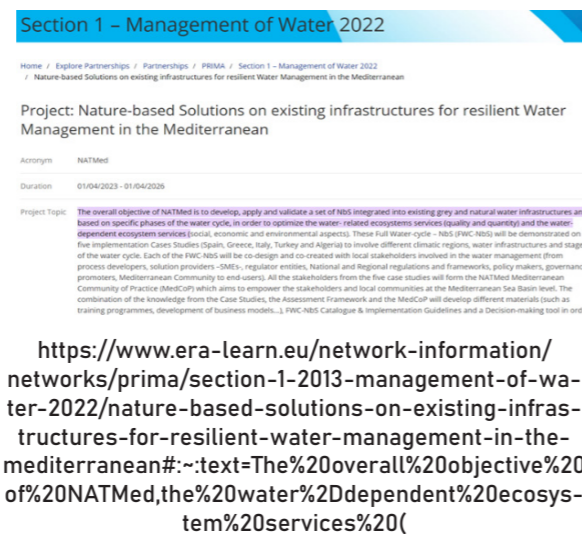
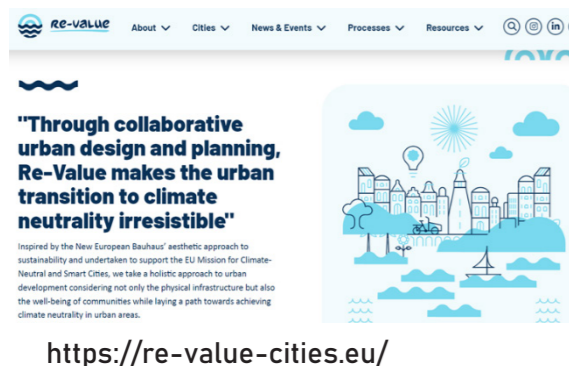


Figure 2. Samples of EU projects funded in between October 2023 - October 2024

IZTECH research ecosystem has a powerful research GCRIS Database, which includes academic publications/any outputs and research items (awards, projects, equipment, report, organizations); associates these outputs with researchers, providing advanced metrics/statistics. So, every researcher's contribution to SDG's are counted and presented in this database. That makes a strong impact on the visibility of our research activities and transforms every aspect of our research on the international basis (<https://gcris.iyte.edu.tr/?locale=en>). According to google scholar records and our GCRIS Database (with keywords of green and sustainability), in the last three years (2022-2024), a total of 1170 publications are present on the issues of sustainability which makes average of 390 publications per annum. Additionally, the research ecosystem supports applications of patents in sustainability areas. For example, a patent by Civil Engineering, names as "autonomous coanda type water intake structure" and Technology, Design and Innovation Management, names as "environmentally compatible recycling box with light indicator system that tracks fullness and waste management" (<https://surdurulebilir.iyte.edu.tr/patents/>)



Figure 3. Publication Metrics at IZTECH

With regards to sustainability related events, Department of Health, Culture and Sports, student organizations, faculties and individuals (academic people and students) take part in organizing a variety of activities in IZTECH Campus and in the city of IZMİR as well. All these cultural, academic and social related activities existing in the campus explain social dimension of sustainability in IZTECH. The aim of the Department of health, culture and sports is to provide support for students' physical and mental wellness and health, to improve their personal abilities and personalities (<https://sks.iyte.edu.tr/en/about-us/>). So that makes this department a key link for achieving sustainable development goals. The total number of events related to environment and sustainability issues which were hosted or organized by different departments, units, and members of the University in the 2021-2023 period is 155. These events include conferences, workshops, awareness raising and practical trainings. While this number is 29 in 2021, it is 47 in 2022 and 79 in 2023 respectively with an increasing trend line after the pandemic period. This increase is partly related to increased attention towards sustainability issues because of the pandemic. Additionally, student initiatives focusing on sustainability and environmental issues also exist within the campus. The number of student organizations at IZTECH campus dealing with sustainability in different areas are around 40. Some examples are Permaculture and Ecological Living Community, Environment and Young TEMA Community, ECO-Motion Community, Natural Research Community, Women in Business, etc. (<https://sks.iyte.edu.tr/en/culture/student-societies/>).

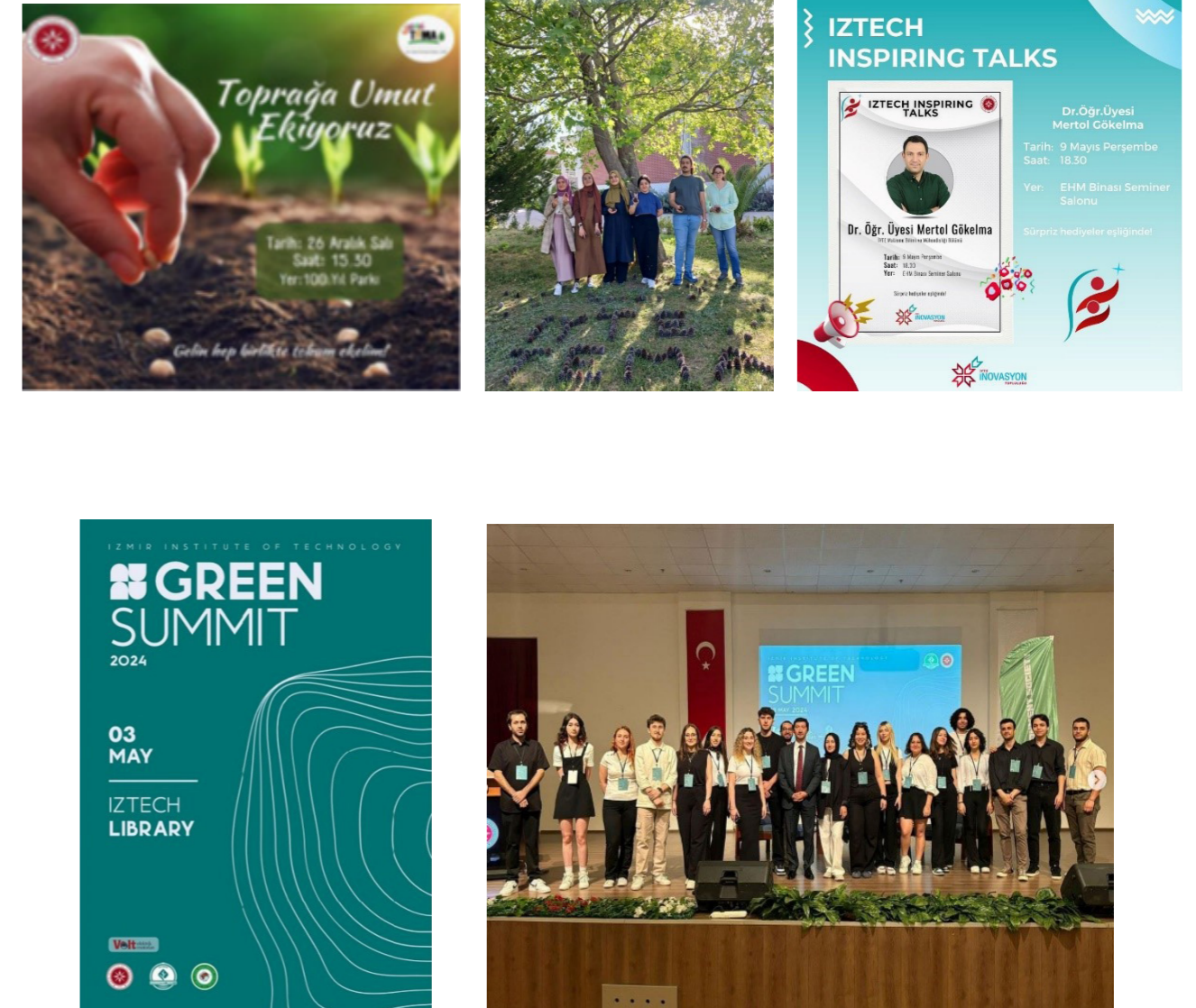


Figure 4. A collection of cultural activities and students' organization events in IZTECH.

In 2021, the Sustainable Green Campus Coordinatorship was established with the following objectives:

- To raise awareness and understanding of sustainability among our university community and beyond.
- To support and coordinate initiatives that align with sustainability across our university's departments, faculties, institutes, centers, and units.
- To monitor and report on our university's progress towards sustainability using relevant indicators and benchmarks.
- To foster collaboration and partnership with other universities, organizations, institutions, and stakeholders that are working towards sustainability.
- To showcase and celebrate our university's achievements and best practices related to sustainability.

The web site "Sustainable Green Campus" of the Coordinatorship (<https://surdurulebilir.iyte.edu.tr/en/>) is regularly updated and designed to include announcements of sustainability related events, projects, student organizations and news. Also, the website is connected to collection of publication and these related to sustainability under IZTECH Library Catalogue.

IZTECH gets the 3rd rank among the state universities in Türkiye that was found successful in transition to distant education. Trainings were given to both students and faculty members to ease the transition process to distant and online learning systems. Microsoft Teams that offer classrooms and meeting spaces was adopted. An online classroom was established to be used by faculty members to record their lectures.

More than 1000 lectures were recorded by using Microsoft Teams and Adobe Connect.

Tablet computers were distributed to support faculty members and students to continue education by online means. Apart from that, sanitation related measures (i.e. signs and mask/disinfection stands) were adopted all around the campus.

IZTECH has 38 sustainability-related startups. The number is expected to increase in the coming years. To initiate this, IZTECH has become a part of scheme that funds innovative start-ups. The call for this year supports startups that are in line with Green Growth approach. Some of them work on material technologies, clean energy, renewable energy (solar and wind), and recycling; while some others focus on developing innovative, water treatment solutions or optical systems, LED lighting, and the use of microalgae as a raw material in biodiesel production, from CO2 disposal to production in domestic waste water. (<https://teknoparkizmir.com.tr/en/>)



Figure 5. View from theTeknopark Buildings and Innovation Center in the IZTECH Campus.

CLIMATE ACTION TARGETS

ENERGY

The goal is to cut carbon emissions by 75% through initiatives like renewable energy investments, transitioning to electric vehicles, and reducing waste by the end of 2028, with a target to make the entire campus climate-neutral by 2030. Given IZTECH campus's potential to act as a net carbon sink, it will continue efforts to lower on-campus emissions while building a broad climate action strategy that emphasizes carbon offsetting and collaboration with partners to support region's climate goals. By 2030, IZTECH aims for "zero carbon" in its emissions and those of its stakeholders, suppliers, and related partners. By 2050, the objective is to reach zero emissions across all operations, involving all direct and indirect partners.



WASTE MANAGEMENT

Izmir Institute of Technology has set goals to increase waste recovery and minimize waste production in alignment with its "zero waste" framework. The strategic plan includes specific actions and metrics to reduce emissions from waste. A key focus is on minimizing all waste, particularly plastic and organic waste. The university aims to achieve a "platinum zero waste" certification and cut organic waste by 50% by 2028. Additionally, measures are planned to prevent plastic waste, with a target of reducing it by 30% by 2028. By 2030, IZTECH aims for a total waste recovery rate of 100%, and by 2050, the university's entire processes and supply chains are expected to operate within the "zero waste" context.



Figure 5. View from the Teknopark Buildings and Innovation Center in the IZTECH Campus.

WATER MANAGEMENT

To mitigate the effects of climate change on the region and to counteract the natural outcomes of prolonged drought seasons, Izmir Institute of Technology (IZTECH) plans not only to implement sustainable water management practices for the entire campus but also facilitate change for its stakeholders, promoting viability of water resources. By 2025, IZTECH will establish smart systems for water use and monitoring across its buildings and campuses. By 2028, IZTECH will recycle 70% of its wastewater in order to reduce the strain on water resources. Looking toward 2030, IZTECH envisions itself as a climate-adaptive, self-sustaining university that safeguards natural resources and serves as a regional model through its research, development initiatives, and partnerships. By 2050, IZTECH aims to achieve carbon-negative status, actively reducing resource consumption and strengthening stakeholder engagement through collaborations.

