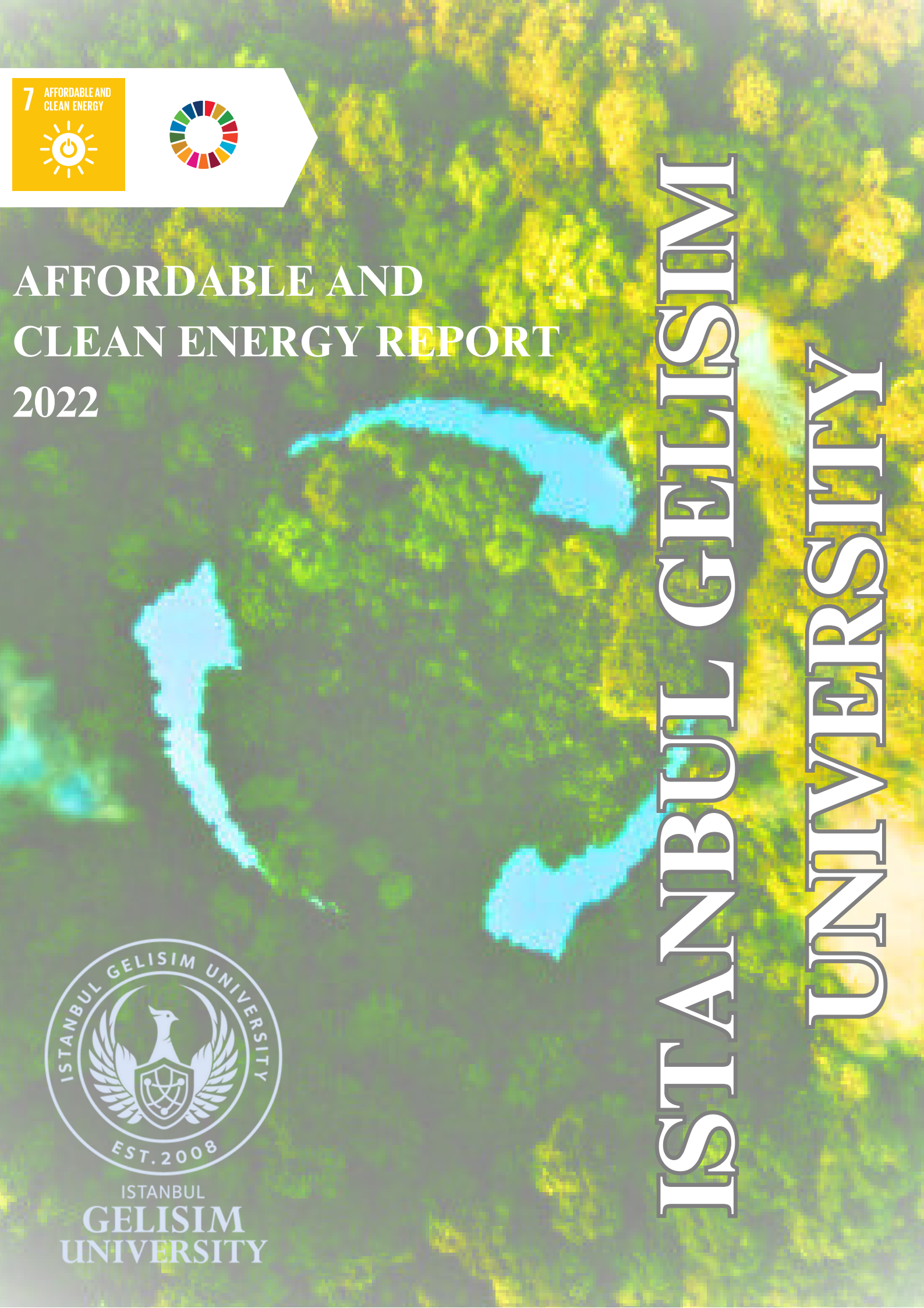

AFFORDABLE AND CLEAN ENERGY REPORT 2022

ISTANBUL GELISIM UNIVERSITY

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AFFORDABLE AND CLEAN ENERGY REPORT

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About The Report

The purpose of the Istanbul Gelisim University (IGU) Accessibility and Clean Energy Report is; in line with the goal of a sustainable future, to create continuity to ensure the effective use of energy within the scope of the United Nations Sustainability Goals, to ensure energy efficiency and to minimise the damage to the environment. In this context, IGU continues to work to improve energy performance in all administrative and social campus areas, to create areas that respect nature and the environment, to solve environmental problems and to ensure the sustainability of these areas.

Acknowledgments

We would like to thank the valuable academicians, administrative unit managers and staffs, internal and external stakeholders of the university who have contributed to the content of the Accessibility and Clean Energy Report with their studies and practices.
Istanbul Gelisim University

1. Scope of the Report

A total of 212,378 m² of indoor space, 8 separated buildings, and building blocks have been put into use to meet the social and educational needs of internal and external stakeholders. This report. This report covers the improvement works to be carried out in all our buildings in 2023 based on 2022 data.

2. Evaluation of Energy Use

2.1. Analysis of Consumed Energy

The consumption values of electrical energy, which is the most commonly used energy type among the energy types used in the university, are analyzed in Table 1 by months and university buildings/blocks. The total electricity consumption of the university was determined as 3,957,173 kWh. When the electrical energy consumption is analyzed according to the university buildings, it is seen that the buildings where the most energy is consumed are Block A and Block K. Block A is the building used as the Rectorate building and where most of the administrative work is carried out. Block K (tower) contains many laboratories and activity areas belonging to various faculties, especially the faculties of Engineering and Architecture and Applied Sciences, in addition, it is the building with the highest number of floors and usage area. Therefore, it is usual that energy use in these buildings is higher than in other buildings.

Table 1. Distribution of annual electrical energy consumption by buildings and months

Months	Block A	Block B	Block C	Block D-E	Block F	Block G	Block K	Total
Jan	-	11.327,96	14.379,22	22.503,30	12.036,38	33.981,12	197.835,08	292.063,06
Feb	-	10.068,79	15.046,77	16.166,16	10.043,61	32.592,15	228.693,57	312.611,05
Mar	-	12.333,52	18.417,16	12.857,88	12.348,10	37.347,98	208.060,88	301.365,52
Apr	-	13.566,87	20.258,88	14.143,67	13.582,91	41.082,78	228.866,97	331.502,08
May	54.778,41	6.107,11	3.623,57	4.182,37	4.609,89	21.336,06	101.934,56	196.571,97
Jun	64.793,08	7.572,24	11.305,20	8.561,64	8.994,80	26.473,23	213.344,55	341.044,74
Jul	57.832,70	3.435,20	9.831,56	6.601,14	7.356,80	21.981,33	260.473,28	367.512,01
Aug	78.196,32	5.148,83	13.150,28	6.671,40	10.657,40	23.672,52	248.627,70	386.124,45
Sep	62.034,80	4.867,08	9.719,92	7.331,28	8.436,30	25.063,56	179.655,30	297.108,24
Oct	58.189,77	11.172,55	13.945,35	10.902,55	9.932,02	36.600,71	198.916,65	339.659,60
Nov	68.366,93	13.445,10	16.049,64	12.857,58	12.825	38.725,56	215.481,83	377.751,64
Dec	78.057,63	13.266,40	18.087,96	13.748,64	13.672,10	40.927,01	236.099,03	413.858,77
Total	**522.249,64**	**112.311,65**	**163.815,51**	**136.527,61**	**124.495,31**	**379.784,01**	**2.517.989,40**	**3.957.173**

* The values are given in kWh.

The analysis of the natural gas consumption amounts used at the University by months is shown in Table 2. When the distribution of natural gas consumption in 2022 is examined, it is seen that the majority of the use is in the winter months. This is an expected result since it is used for heating purposes. In the months when the weather is warm, natural gas-based energy is not used. The total amount of natural gas consumption is 142.153 m^3.

Table 2. Analysis of total natural gas energy consumed in 2022

Months	Natural Gas Consumption (m^3)
January	19.814
February	29.424
March	24.615
April	22.280
May	6.733
June	365
July	33
August	21
September	15
October	217
November	778
December	37.858
Total	**142.153**

In 2022, the amount of energy consumed for all energy types used by the university is shown in Table 3. Accordingly, the total amount of petrol consumption is 2.049 L, diesel 13.905 L, natural gas 142.153 m^3 and electricity 3.957.173 kWh.

Table 3. Energy consumption by energy types in 2022

Type	Amount	Unit
Gasoline	2.049	Litres (L)
Diesel	13.905	Litres (L)
Natural Gas	142.153	m^3
Electricity	3.957.173	kWh

2.2. Evaluation of Consumed Energy

In 2022, considering the consumption amounts of energy sources used in the university calculated on the basis of gigajoule (Gj) energy type, it was seen that a great amount of the university's energy expenditure is composed of electrical energy obtained entirely from renewable energy sources (Figure 1). The share of energy consumption based on gasoline, diesel and natural gas has been set as a target to be further reduced in the following years.

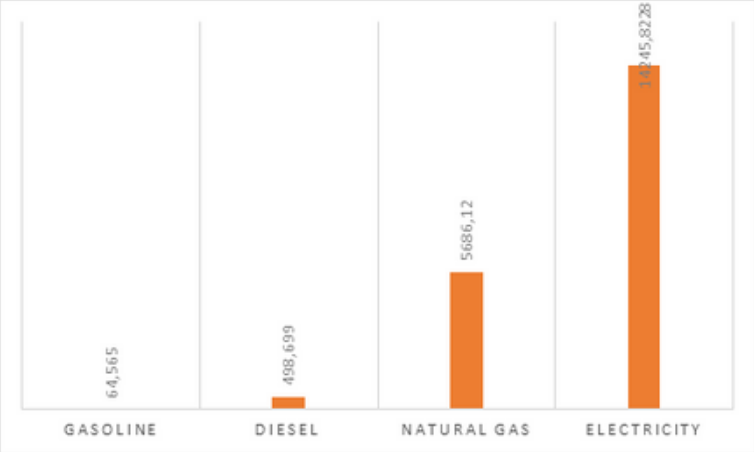

Figure 1. Amounts of energy consumed by type of energy (Gj)

3. Carbon Footprint

Purpose

The purpose of the calculation of carbon footprint is to determine the annual emission status of IGU by calculating the carbon footprint, to analyze the current situation according to past data, and to determine the priorities of the plans to be made to reduce emissions.

Scope

It is the calculation of only the primary carbon footprint values of the university using the data of all units of IGU. Carbon footprint has been calculated regularly since 2018.

Stages

Since 2018, for the carbon footprint values calculated; electricity and natural gas data consumed during the year are obtained from the Department of Construction and Technical Affairs, and annual petrol and diesel consumption are obtained from the Department of Support Services. Calculations are made with the collected data. New targets are set according to the result and the success of the former targets in achieving the result is revealed.

Carbon Footprint Calculation Method

The primary carbon footprint was calculated with the Intergovernmental Panel on Climate Change (IPCC) calculation method. Therefore, the University's carbon footprint resulting from electricity, transport and heating, which cause carbon emissions, has been calculated. Since carbon dioxide emission is related to the combustion of fuel, it is easy to calculate. Many criteria are required to calculate other greenhouse gases. IPCC calculation method consists of 3 different approaches. Tier 1 approach is used in this report. For this approach;

1. Gasoline, diesel, LPG, natural gas and electricity consumption amounts were taken from the university official records. The IPCC carbon dioxide emission factor of 0.584 tonnes/mWh, which is stated in the master's study prepared by Toröz (2015: 79), is used to calculate the emission from electricity consumption.
2. Energy content is calculated by multiplying the consumption values of fuels with the conversion values given in the IPCC guidelines. Conversion values are the values specified in the IPCC 2006 guidelines and included in the Communiqué on Monitoring and Reporting of Greenhouse Gas Emissions published in the Official Gazette dated 22.07.2014 and numbered 29068. These values are given in Table 4.

Table 4. Net Calorific Value of Fuels (Reference: ÇŞB, 2014:40)

Fuel Type	Net Calorific Value (Tj/Gg)
Gasoline	44.3
Diesel	43
Natural Gas	48

Energy Consumption (TJ) = Fuel Consumption (t)× Net Calorific Value (Tj/Gg)

3. For each fuel group, the carbon emission factors determined in the IPCC guidelines (average value) are selected and the total carbon content in the fuel is calculated using this value.

Carbon amount (t C) = Carbon Emission Factor (t C/TJ) × Energy Consumption (TJ)

Table 5. Emission Factor of Fuels (Reference: TÜİK, 2013:16)

Fuel Type	Net Calorific Value (Tj/Gg)
Gasoline	18.9
Diesel	20.2
Natural Gas	15.3

4. The amount of carbon that is not oxidised during combustion is found and the carbon value participating in complete combustion is calculated.

Carbon Emission (Gg C) = Carbon Content (Gg C) × Carbon Oxidation Rate

Table 6. Oxidation Rates of Fuels (Reference: ÇŞB, 2014:40)

Fuel Type	Net Calorific Value (Tj/Gg)
Gasoline	0.99
Diesel	0.99
Natural Gas	0.995

5. At this stage, the ratio of 44/12, which is the ratio of the molecular weight of CO_2 to the molecular weight of carbon, is multiplied by the value found in the previous step to find the CO_2 emission value resulting from the combustion of the fuel.

CO_2 Emission (Gg CO_2) = Carbon Emission (Gg C) × (44/12)

Carbon Footprint Calculation Result

The carbon footprint values calculated by using the electricity, gasoline, diesel, natural gas consumption data for 2022 obtained from the university and using the IPCC methodology Tier 1 approach are shown in Table 7. Accordingly, electricity energy is the energy type that contributes the most to the carbon footprint with 88.62%.

Table 7. Istanbul Gelisim University's Carbon Footprint Calculation (2022)

Energy Type	Amount of Consumption	Amount of Consumption (Ton)	Net Calorific Value (TJ/Gg)	Carbon Emission Factor (t C/TJ)	Carbon Oxidation Rate	Ton CO_2	Percentage (%)
Gasoline (L)	2.049	1.43	44.3	18.9	0.99	4.36	0.17
Diesel (L)	13.905	11.82	43	20.2	0.99	37.27	1.43
Natural Gas (m^3)	142.153	95.24	48	15.3	0.995	255.19	9.78
Electricity (kWh)	3.957.169					2310.99	88.62
Total						**2.607.80**	

Carbon Footprint by Year

Considering the calculations, despite the increase in the number of classrooms and active buildings, there was a decrease in the carbon footprint in 2021. However, there is an increase of approximately 10% in 2022 compared to the previous year. The reason for this can be explained by the increase in student density and application laboratories and the increase in energy sources (especially natural gas and electricity) used.

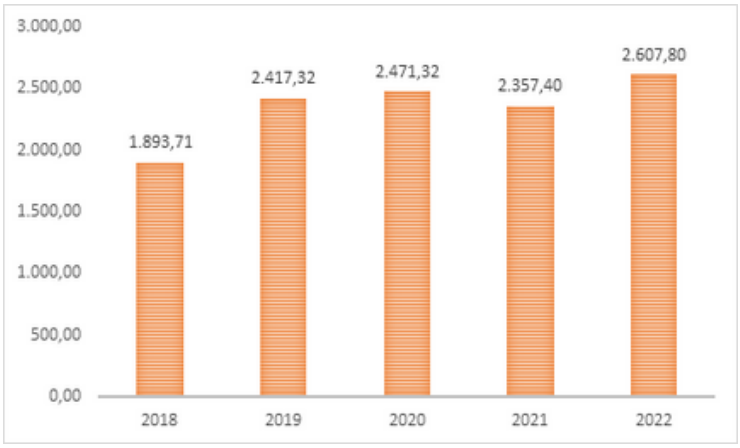

Figure 2. Carbon Footprint by Year (Ton CO_2)

4. Energy Use Density of University Buildings

The electrical energy intensity in 2022 in university buildings was calculated per building floor space (m^2). The values are shown in kWh and gigajoules (Gj) in Table 8.

Table 8. Electric energy consumed per floor area of the buildings

	Energy Use Density (kWh/m^2)	Energy Use Density (Gj/m^2)
Block A	13.35	0.05
Block B	9.55	0.03
Block C	15.68	0.06
Block D-E	6.73	0.02
F Block	14.39	0.05
Block G	12.38	0.05
Block K	22.07	0.08

The energy density consumed per floor area of the university is shown in Table 9. The total energy consumption amount was 20495.2068 Gj and the energy density per square metre is 0.0872 Gj/m^2.

Table 9. Energy Use per Square Metre

Energy Type	Consumption Amount (Gj)	Energy Density (Gj/m^2)
Gasoline	64.565	0.0003
Diesel	498.699	0.0021
Natural Gas	5686.12	0.0242
Electricity	14245.8228	0.0606
Total	20495.2068	0.0872

5. Publications

5.1. Publications Ranked in the Top 10%

In 2022, 21 of the publications on Accessible and Clean Energy were in the 10%.

5.2. Number of Citation for Publications

The number of citations of Accessible and Clean Energy studies published in Scopus in 2022 is given in Table 10. The total number of citations of published studies was 1303.

Table 10. Citation Numbers of Accessible and Clean Energy Studies

Title of Publication	Number of Citation
Mitigating Emissions in India: Accounting for the Role of Real Income, Renewable Energy Consumption and Investment in Energy	160
Symmetric and asymmetric impact of economic growth, capital formation, renewable and non-renewable energy consumption on environment in OECD countries	123
Accounting for the combined impacts of natural resources rent, income level, and energy consumption on environmental quality of G7 economies: a panel quantile regression approach	85
Does it take international integration of natural resources to ascend the ladder of environmental quality in the newly industrialized countries?	76
Effects of economic complexity, economic growth, and renewable energy technology budgets on ecological footprint: the role of democratic accountability	62
Do economic policy uncertainty and geopolitical risk surge CO2 emissions? New insights from panel quantile regression approach	57
Exploring the tourism-CO2 emissions-real income nexus in E7 countries: accounting for the role of institutional quality	56
Energy transition and environmental quality prospects in leading emerging economies: The role of environmental-related technological innovation	44
Synthesizing urbanization and carbon emissions in Africa: how viable is environmental sustainability amid the quest for economic growth in a globalized world?	41
Effects of domestic material consumption, renewable energy, and financial development on environmental sustainability in the EU-28: Evidence from a GMM panel-VAR	40
Can technological innovation, foreign direct investment and natural resources ease some burden for the BRICS economies within current industrial era?	33
Energy innovations and pathway to carbon neutrality in Finland	30
Energy transition and diversification: A pathway to achieve sustainable development goals (SDGs) in Brazil	29
Environmental Kuznets Curve hypothesis from lens of economic complexity index for BRICS: Evidence from second generation panel analysis	28
How do technological innovation and renewables shape environmental quality advancement in emerging economies: An exploration of the E7 bloc?	27
Renewable energy consumption a panacea for Sustainable economic growth: panel causality analysis for African blocs	23
Significance of Air Transport to Tourism-Induced Growth Hypothesis in E7 Economies: Exploring the Implications for Environmental Quality	23
Can Energy Efficiency Help in Achieving Carbon-Neutrality Pledges? A Developing Country Perspective Using Dynamic ARDL Simulations	21
A Privacy Enhanced Authentication Scheme for Securing Smart Grid Infrastructure	20
Tourism-induced pollution emission amidst energy mix: evidence from Nigeria	19
The role of economic freedom and clean energy in environmental sustainability: implication for the G-20 economies	18
Mitigating poor environmental quality with technology, renewable and entrepreneur policies: A symmetric and asymmetric approaches	18
Discerning the role of renewable energy and energy efficiency in finding the path to cleaner consumption and production patterns: New insights from developing economies	18
Determinants of renewable energy consumption in agrarian Sub-Sahara African economies	15
Examining the Interaction Effect of Control of Corruption and Income Level on Environmental Quality in Africa	14
Asymmetric inference of carbon neutrality and energy transition policy in Australia: The (de)merit of foreign direct investment	14
Moderating effect of institutional policies on energy and technology towards a better environment quality: A two dimensional approach to China's sustainable development	14
Performance and sustainability of environment under entrepreneurial activities, urbanization and renewable energy policies: A dual study of Malaysian climate goal	14

Table 10. Citation Numbers of Accessible and Clean Energy Studies (continue)

Title of Publication	Number of Citation
Investigating possibility of achieving sustainable development goals through renewable energy, technological innovation, and entrepreneur: a study of global best practice policies	13
Designing policy framework for sustainable development in Next-5 largest economies amidst energy consumption and key macroeconomic indicators	13
Tourism-induced emission in Sub-Saharan Africa: A Panel Study for Oil-Producing and Non-oil-Producing countries	12
Do bureaucratic policy and socioeconomic factors moderate energy utilization effect of net zero target in the EU?	12
Renewable energy, economic globalization and foreign direct investment linkage for sustainable development in the E7 economies: revisiting the pollution haven hypothesis	12
Environmental sustainability in Asian countries: Understanding the criticality of economic growth, industrialization, tourism import, and energy use	11
Responding to the environmental effects of remittances and trade liberalization in net-importing economies: the role of renewable energy in Sub-Saharan Africa	11
The nexus of renewable energy equity and agricultural commodities in the United States: Evidence of regime-switching and price bubbles	11
To what extent are pollutant emission intensified by international tourist arrivals? Starling evidence from G7 Countries	11
How does energy investment affect the energy utilization-growth-tourism nexus? Evidence from E7 Countries	9
The moderating role of environmental-related innovation and technologies in growth-energy utilization nexus in highest-performing eco-innovation economies	8
Analyzing transport demand and environmental degradation: the case of G-7 countries	8
Policy inference from technological innovation, renewable energy, and financial development for sustainable development goals (SDGs): insight from asymmetric and bootstrap Granger causality approaches	6
Policy insight from renewable energy, foreign direct investment (FDI), and urbanization towards climate goal: insight from Indonesia	6
Effect of light on growth of green microalgae Scenedesmus quadricauda: influence of light intensity, light wavelength and photoperiods	6
Environmental performance of Turkey amidst foreign direct investment and agriculture: A time series analysis	5
The contributory capacity of natural capital to energy transition in the European Union	5
Can information and communication technology and institutional quality help mitigate climate change in E7 economies? An environmental Kuznets curve extension	4
Modelling the Nexus between Financial Development, FDI, and CO2 Emission: Does Institutional Quality Matter?	3
Modeling the environmental implications of car ownership and energy consumption in the UK: Evidence from NARDL model	3
Unlocking the investment impact of biomass energy utilization on environmental degradation for an isolated island	3
Modeling and simulation of dye-sensitized solar cell: Model verification for different semiconductors and dyes	3
Sustainable Energy Supply, Finance, and Domestic Investment Nexus in West Africa	2
Optimization analysis of sustainable solar power system for mobile communication systems	2
Carbon dioxide-assisted Torrefaction of Maize Cobs by Thermogravimetry: Product Yield and Energy Recovery Potentials	1
Sustainable development amidst technological innovation and tourism activities in sub-Saharan Africa	1
Greenhouse gas emissions in the food system: Current and alternative dietary scenarios	0
An Analysis of the Relationship Between Sustainable Fuel Management and Competitive Strategy in the Aviation Industry	0
Resiliency-Sensitive Decision Making Mechanism for a Residential Community Enhanced with Bi-Directional Operation of Fuel Cell Electric Vehicles	0

5.3. Number of Scopus Publications

The number of Scopus publications on accessible and clean energy, energy and energy efficiency was 57 in 2022.

6. Education

In the 2022-2023 academic year, "UTI430 Energy Economics and Sustainability", "MKP225 Renewable and Alternative Energy Systems", "MKP224 Energy Management" courses are within the scope of Affordable and Clean Energy, and a total of 13 courses specialised in sustainability are included in the curriculum.

In addition, academic personnel prioritise studies involving the United Nations Sustainable Development Goals in the term project/thesis courses of students in undergraduate departments. In addition, a thesis published in 2022 at IGU Institute of Graduate Studies is within the scope of Accessible and Clean Energy.

Table 11. Affordable and Clean Energy Related Thesis

Department	Thesis Type	Thesis Name
International Relations	Master	Current dynamics of energy security in the Eastern Mediterranean

7. Energy and the Community

7.1. Local Public Information Programmes

"Sustainable Volunteering Day" was organized by IGU Alumni and Alumni Coordinatorship and Career Development Centre on 26 October 2022. In this context, managers, students and alumni who volunteer in civil society organizations were brought together. During the event, the activities and trainings carried out within IGU were mentioned and a call for volunteering was made.

Sustainable Volunteering Day

7.2. Incentivising Renewable Energy

In the "Coffee Talks" series organized by IGU every week, the talk on 8 December 2022 was devoted to the topic of "Electric vehicles and carbon footprint". Under İzzet Yavuz, lecturer in IGU Vocational School Electricity Programme, interviews and discussions were held on topics such as the development of electric vehicles and current developments, carbon footprint, fossil fuels and renewable energy sources.

Coffee Talks - Electric Vehicles and Carbon Footprint

In the Sustainable Future Exhibition, which was organized under İrem Fulya Özkan, one of the lecturers of IGU Faculty of Fine Arts, Department of Graphic Design, and compiled from the works of nearly 70 students, attention was drawn to the issues under the title of “Sustainability”. The issues addressed were visualized with the Assemblage Technique. In the works in the exhibition, it was aimed to raise awareness in the fields of "Responsible Consumption and Production", "Zero Hunger", "Quality Education", "Climate Action", "Life on Land", " Sustainable Cities and Communities", " Affordable and Clean Energy", "Life Below Water" and "Reducing Inequalities" within the scope of the United Nations Sustainable Development Goals.

Sustainable Future Exhibition

"Service, Maintenance and Technical Support in Electric Vehicles" talk event was carried out at IGU on 22 December 2022. Students were informed by speakers Canberk Gedikoğlu and Murat Belen about issues such as maintenance, service and technical support of electric vehicles, which have become an important part of clean and renewable technology due to their sustainable, environmentally friendly and low emission.

A trip to Atatürk Arboretum was organized on 26 November 2022. Within the scope of the trip, practical trainings on nature photography and photo shoots were carried out by the students. At the same time, it was aimed to give students environmental awareness and to adopt the idea of protecting nature.

Ataturk Arboretum-Nature Photography Trip

"Zero Waste and Climate Change Conference" was held at Istanbul Gelisim University on 29 December 2022. Awareness training was provided to students on zero waste and climate change.

A technical trip was organized to Istanbul Enerji AŞ within the scope of the "Renewable and Alternative Energy Systems" course coordinated by IGU Vocational School, Department of Mechanical and Metal Technologies, Machinery Programme Lecturer Hasan İlker Çeliker and with the support of Programme Head Lecturer Yasemen Karaman on 20 December 2022. Students' questions about the Renewable Energy field of study were answered by the employees.

Technical Trip - Renewable and Alternative Energy Systems

Between 19 October and 23 December, the Social Responsibility Project "Development in Nature" was carried out. In the first stage of the project, an interview titled "Environmental Sustainability and Environmental Awareness" was held with the participation of Songül Çağışlar, TEMA Foundation Avcılar District Officer. In the second stage, the photographs were taken by the students of the Faculty of Fine Arts during the "Nezahat Gökyiğit Botanical Garden Guided Tour" and were exhibited at IGU Mehmet Akif Ersoy Foyer between 12-23 December. The project was aimed to raise "environmental sustainability and environmental awareness" on issues such as global warming, climate change, sustainable living, and endangered plant species, and to contribute to the development of an understanding of sustainability in daily life.

"Development in Nature" Photo Exhibition

7.3. Relationship of the University with Local Industry

One of the core values and goals of IGU's "Sustainability Education Policy" is "Supporting industries within the scope of sustainable infrastructure, sustainable technology, and energy efficiency". Within the scope of this goal, IGU designs interactive and student-centered sustainability education programs to support industries to achieve sustainable infrastructure transformation within responsible production, reduce their ecological footprint by developing sustainable energy and waste policies, and provide social benefits to society by designing corporate responsibility projects in line with the goals.

Within the scope of IGU's "Environmental Policy", IGU cooperates with the local industry to reduce and prevent waste, make investments to improve environmental performance, and carry out activities to reduce its environmental footprint.

IGU ensures the procurement of environmentally friendly goods and services through versatile, effective, and sustainable supplier cooperation within the scope of IGU's "Sustainable Procurement and Supplier Policy". While maintaining the waste strategy carried out within the scope of the "Eco-campus Policy" and "Campus Waste Management Plan" at all university sites, the waste hierarchy is applied to minimize, reuse and recycle the waste produced.

As part of IGU's "Sustainability Research Policy", IGU focuses on the concept of sustainability, especially in the social, economic and environmental context, and encourages its researchers to design and conduct their research in this context. Furthermore, IGU supports its researchers in establishing local and international collaborations.
Under IGU's "Waste Management and Reduction of Environmentally Harmful Products Policy", IGU aims to reduce waste generation, reduce the use of natural resources through reuse, recycling, and recovery of waste, and ensure waste management. If required, it conducts the removal of wastes and environmentally harmful products in cooperation with the local industry. In this context, there are "Medical Waste Contract", "Non-Hazardous Waste Contract", and "Dental Hospital Waste Contract" with the local industry.
IGU regularly takes responsibility for conducting studies, programs, and projects on issues such as economic analysis of water use and raising awareness on water issues within the scope of its "Water Management Policy" and supports these activities. In this context, IGU cooperates with all local and global stakeholders.

7.4. Policies for Informing the Government

By initiating compliance processes with the legislation created for the actions within the scope of the Ministry of Energy and Natural Resources Energy Efficiency Action Plan (2017-2023), the clean and renewable energy programs of the government are supported.
Law No. 5627 on Energy Efficiency, which entered into force after being published in the Official Gazette No. 26510 dated 2 May 2007, and Regulation No. 27035 dated 25 October 2008 on "Increasing Efficiency in the Use of Energy Resources and Energy" require the appointment of an energy manager in commercial buildings with a total construction area of at least 20,000 m2 or an annual energy consumption of 500 tonnes of oil equivalent (TOE) and in public buildings with a total construction area of at least 10,000 m2 or annual total energy consumption of 250 TOE or more. Accordingly, an agreement has been made with the authorized institution for the energy management of the IGU Tower building.
In addition, IGU holds a Renewable Energy Certificate (YEK-G), which is supported by the Ministry of Energy and Natural Resources and is entirely voluntary.

7.5. Initiatives Supporting Low Carbon Economy/Technology

Information on the projects at IGU, which are based on sustainability, primarily for the purpose of promoting a low-carbon economy, is presented in Table 12. One of the projects was a graduation thesis and the main objectives of all projects were to reduce the carbon footprint.

Table 12. Project Informations

Title	Type of Project	Total Number of Academic Personnel	Total Number of Students	Social Responsibility Project	Stakeholder Public Institution	Stakeholder Industrial organization	International Cooperation
Geri dönüştürülmüş kaynaklardan elde edilen ve bitki ve deniz yosunu proteinlerini kullanan iklim dostu yenilikçi gıdalar (Innovative climate-friendly foods derived from recycled resources and using plant and seaweed proteins)	Other	1	0	Yes	No	No	Yes
Design Optimization of a Hybrid Vibration Control System for Buildings Structures	Internationally Supported Scientific Research Project	5	1	No	No	No	Yes
The Role of Artificial Intelligence in Climate Change	Graduation Thesis	1	1	Yes	No	No	No

8. Operations

8.1. Energy Efficiency Standard for Buildings

In accordance with the "Energy Efficiency Law" numbered 5627, which entered into force after being published in the Official Gazette dated 2 May 2007 and numbered 26510, and the "Regulation on Increasing Efficiency in the Use of Energy Resources and Energy" dated 25 October 2008 and numbered 27035, it is obligatory to appoint an energy manager in public buildings with a total construction area of at least 20,000 m² or annual energy consumption of 500 TOE and in public buildings with a total construction area of at least 10,000 m² or annual total energy consumption of 250 TOE and above. For IGU Tower campus, which meets these conditions, an authorised institution agreement was made after effective planning and negotiations.

8.2. Process For Carbon Management And Reducing Carbon Dioxide Emissions

IGU's primary goal is to save energy and reduce carbon emissions that harm the environment. Energy consumption is indirectly reduced by using automation and LED lighting. Additionally, IGU organizes seminars to raise the awareness of its students and staff on carbon emissions. In order to reduce the carbon footprint, efforts are being made to save water, electricity, heating and transportation, and environmentally friendly, energy-saving, low-carbon emission devices are preferred in the procurement processes.

By producing projects for the reuse of rainwater and grey water, operations are conducted for the purpose of water saving and awareness. One of these rainwater studies was implemented on the campus of the Faculty of Fine Arts. By applying exterior Wall sheathing to the buildings, heat losses have been prevented and natural gas consumption has decreased. Additionally, engine oil, engine filter, air filter and oil filter are changed every 6 months in order to reduce carbon emissions by reducing fuel consumption of generators. Apart from this maintenance, regular checks are carried out every month. These maintenance will reduce the fuel to be spent during the outage and thus carbon emission.

The studies carried out in this context are listed below:

1. Fluorescent lamps used in the campuses are reduced year by year. These fluorescent lamps are being replaced with longer lasting and less energy consuming LED lighting. This will provide a higher level of illumination at a lower cost by reducing the number as well as the consumption, in other words, it will increase efficiency. In 2022, 336 fluorescent lights were replaced with 254 LED lights in the spaces in use in line with this plan. With this work, the total number of lighting has decreased and the LED lighting ratio, which was 45%, has been improved to 46.5% (Table 13).

Example of Solar Energy Panel

Example of Wind and Solar Energy Panel Lighting

Table 13. Changes in Total Lighting and LED Lighting Numbers by Years

	Total Lighting	LED Lighting	LED/Total Lighting
2018	17337	5548	%32
2019	18153	6669	%36.7
2020	19153	7769	%40.5
2021	19542	8794	%45
2022	19460	9048	%46.5

2. It is planned to change the automation in our tower campus, which is one of the university buildings. With this change, electricity consumption will be significantly reduced and heating-cooling systems will work more efficiently.
3. In order to manage carbon and reduce carbon dioxide emissions, IGU aims to use renewable energy systems and generate energy from first-hand sources. In this context, action has been taken to convert environmental lighting to solar LED projectors. In 2021, 30 solar environmental lighting units were installed in the Rectorate (block A) building, resulting in a reduction in consumption of 3000 Wh. This work was not continued in 2022 due to insufficient efficiency. It is aimed to plan studies on alternative methods to use solar energy more efficiently.
4. IGU has YEK-G and The International Rec Standard certificates. Through these two supplier companies, the use of renewable energy in university campuses and buildings can be monitored. In order to reduce investments from carbon-intensive energy industries, especially coal and oil, all of the electricity consumed by IGU since 2021 has been obtained from renewable energy from Akköy Hydroelectric Plant, Ambarlık I-II Hydroelectric Plant and Öner Hydroelectric Plant. Thus, it is aimed to include clean and sustainable energy in all studies and general consumption within the university.
5. Sensors have been placed according to the traffic situation during the day, since frequent malfunctions occur at points with heavy traffic in common use areas such as corridors, toilets, etc. on the campuses. Thus, it is planned to prevent unnecessary electricity consumption.
6. Policies on the use of renewable energy (wind and solar energy) have been increased.
7. Heating/cooling systems have been centralized and controlled by Direct Digital Control (DDC) systems in order to save energy. When the system started to be implemented, approximately 40% savings were achieved compared to the traditional system. This system remained active in 2022.

8. Studies were planned to reduce the use of room-type air conditioners in indoor areas of the campuses. The planned actions have been implemented. After the work on heating systems, the number of 300 air conditioners used decreased to 270 and a 10% reduction was achieved. It is planned to improve this number in the coming years.
9. IGU, which is on the way to becoming a university that produces its own needs, has started to work to establish a "Solar Energy System" for electricity generation. For electricity generation, preparations are continuing to establish a solar power plant with an installed capacity of 4000 kWh. The search for a suitable site continues.
10. With the cascade boiler system used in the new building, the boiler is activated gradually by outdoor temperature. The heating system is more efficient and consumes less energy with this system.
11. Before the optimisation, there were a large number of electric heaters other than central heating in the offices, resulting in significant electricity consumption. By ensuring efficient use of heating systems, the use of heaters was reduced by 90%. The efforts are being continued with the same consistency. These heating/cooling systems can be controlled by DDC systems.
12. In order to reduce the carbon footprint, it is planned to carry out regular sapling planting and afforestation activities every year. Thus, the use of region-specific and drought-resistant plant species has been ensured in the use of ornamental plants on the campus.
13. In the procurement processes of new devices to be used in the campuses, the procurement specifications have been updated to ensure that energy saving is at the top of the selection criteria. In this context, equipment, devices and instruments are procured from environmentally friendly manufacturers and sellers throughout the university.
14. The maintenance of the compensation panels used to prevent losses affecting the total energy consumption has been carried out regularly. It is regularly monitored.
15. The use of electrical devices such as tea, coffee makers, etc. in staff offices increases energy use. In order to reduce energy use, it is planned to create common kitchen areas in the campuses. In this direction, 2 areas were established in F and G blocks. It is aimed to increase this number in the coming years.
16. All personnel are trained on energy efficiency within the framework of a certain periodic calendar throughout the year.
17. It is planned to take measures to raise awareness about reducing consumption by using warning signs and posters.
18. Additionally, with the vegetable waste oil collection contract, IGU contributes to sustainability by ensuring that waste oils are collected by the relevant environmentally licensed recycling facilities and vegetable waste oil storage facilities.

8.3. Policies for Reducing Energy Consumption

The IGU's "Sustainability Education Policy" is based on the core value of "Creating Responsible Production and Consumption Awareness". Within the scope of the Environmental Policy and Sustainability Education Policy goals, interactive and student-centred sustainability education programmes are designed to ensure energy efficiency.
Within the scope of the "Water Management Policy", IGU takes responsibility for conducting studies, programmes and projects on issues such as conducting regular economic analysis of water use and raising awareness of water problems, and supports these activities.
Within the scope of the “Waste Management and Reduction of Environmentally Hazardous Products Policy” continue to develop and implement strategies that include short and long-term programmes and policies to ensure waste management in an environmentally friendly manner.
Within the scope of the "Environmental Policy", IGU carries out activities to reduce and prevent waste, make investments to improve environmental efficiency
As part of the "Sustainable Procurement and Supplier Policy", IGU carries out the procurement of environmentally friendly goods and services through multifaceted, effective and sustainable supplier cooperation. IGU implements a waste hierarchy to minimise, reuse and recycle the wastes generated while maintaining the waste strategy carried out within the scope of the "Eco-campus Policy" and "Campus Waste Management Plan" at all university sites.

8.4. Energy Efficiency Reporting

Annual energy consumption and carbon footprint have been calculated since 2018 to determine the situation and measures to be taken to ensure energy efficiency. In line with these calculations, programmes that need to be updated, areas of activities that need to be included, practices that need to be improved are determined and plans are made in order to determine the areas with the highest energy waste and to take necessary measures.

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SUSTAINABLE DEVELOPMENT GOALS

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