THE GLOBAL GOALS
For Sustainable Development

ISTANBUL GELISIM UNIVERSITY

AFFORDABLE AND CLEAN ENERGY REPORT

IGU for **"Ecological, Social and Economic Sustainablity"**

www.gelisim.edu.tr

İSTANBUL GELİŞİM ÜNİVERSİTESİ

Energy Management Report

2019

CONTENTS

Preface

Global warming is one of the most important environmental problems that threaten basic living resources such as food, water and environment, which are essential to all creatures over the world. The cycle of population growth, industrialization, rising in energy demand and rising in resource usage detects the devastating consequences of global warming. Contributing to their welfare and development goals, countries that aim to gain power in global competition are triggering the release of harmful gases such as carbon dioxide and methane into the atmosphere while making their industrialization investments. Energy is the most important resource for a person to survive. Yet, the main point in energy supply policies should be to remove the environmental threat. In this way, the vision of global targets is a developing guide over the world.

To make provision for the environmental effects of energy usage, supporting a sustainable economy with a policy that constantly supports and encourages renewable energy resources, plays a key role in reducing the ecological damages of global warming. With the effects of global warming, it has become inevitable that the striking ecological and environmental damages of climate change, which are difficult to reverse, are about to come to the fore. After international measures are taken, climate scientists predict that the struggle will only happen when everyone takes responsibility. Istanbul Gelişim University commits to fulfill its responsibility by continuing the scope of its work with international and national stakeholders day by day in order to minimize the damage to the environment with the effective and efficient use of energy in line with the United Nations Sustainable Development Goals, with the vision of producing more permanent solutions on climate and energy. .

Assistant Professor Aslıhan Güzin SELÇUK, FHEA

Community Service Unit Coordinator

Sustainable Environment and Society Application and Research Center Manager

1. INTRODUCTION

Because of the world population and developing technologies' inescapable growth, global energy consumption is increasing rapidly. This situation has reached dimensions that threaten the future of the world and humanity. That's why every energy source over-consumed today will cause future generations difficulties. In this context, turning to environmentally friendly renewable energy sources not only increases the quality of life experienced today but also it is important to build a sustainable future. Irresponsible use of energy and, in particular, energy sources that cause the release of greenhouse gases and toxic gases clearly endangers the future of our world. In order not to consume the energy resources of future generations from today, it is a significant duty and responsibility to start using environmentally friendly edible energy sources and to minimize energy consumption.

The purpose of the Istanbul Gelisim University (IGU) Energy Management Report plot a route for a sustainable future within the framework of the United Nations sustainability goals; such as effective use of energy, ensuring energy efficiency, and minimizing environmental damage. In this context, the priority of IGU is to improve energy performance in all administrative and social campus areas, as well as to create areas that respect nature and the environment that solve environmental problems, and to ensure the sustainability of these areas.

1.1. Scope of the Plan

This report aims to demonstrate the development works for 8 building/building blocks within Istanbul Gelisim University to be carried out in 2020, based on 2019 data. The information about these structures are showed in Table 1.

Table 1. The Information about Buildings

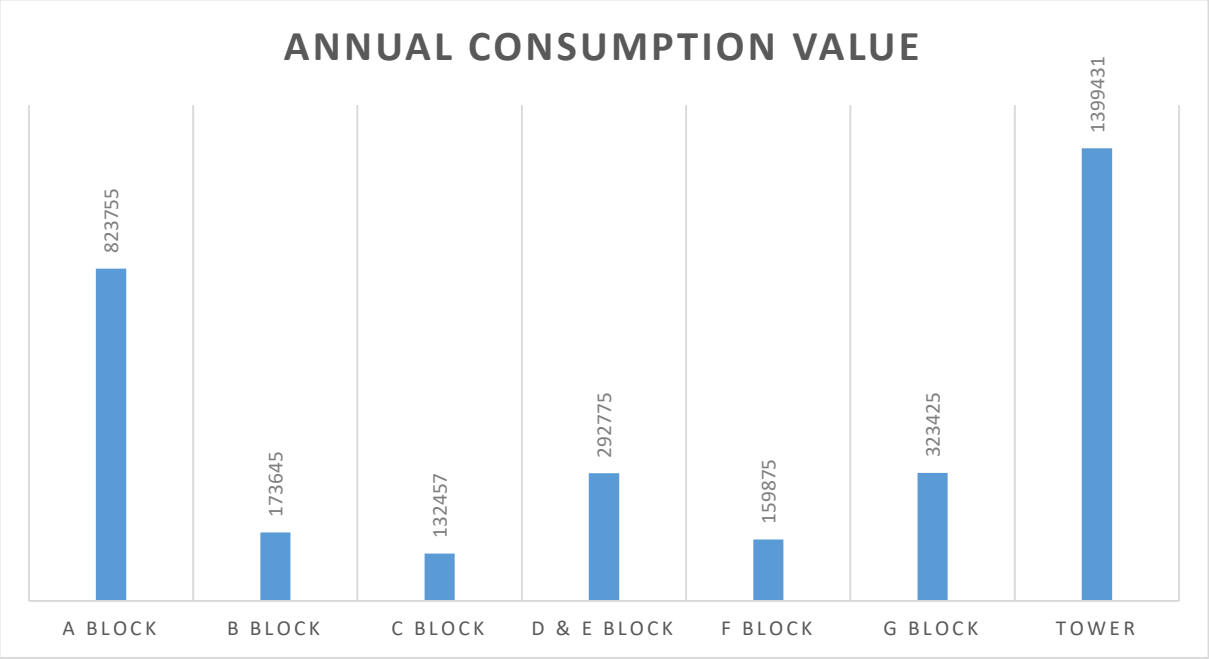
Campus Name	Structure Name	Closed Area (m2)	Year of Built	Former Usage Type Before Being an Educational Organization	Opening Date As an Educational Organization
BLOCK A	RECTORATE	39114	1997	Place of Business	2012
BLOCK B	SBYO	11755	1996	Place of Business	2012
BLOCK C	SHMYO	10445	1996	Place of Business	2012
BLOCK D	MMF	12353	1991	Place of Business	2013
BLOCK E	GSF	9836	1991	Place of Business	2013
BLOCK F	YD	8285	1995	Place of Business	2011
BLOCK G	MYO	29536	1998	Place of Business	2015
TOWER		91054	1999	Place of Business	2018

2. ASSESSMENT OF ENERGY USAGE

2.1 Energy Consumption

The data to be used in the plan were obtained from the data between 01.01.2019-31.12.2019. This period will be a summary of the energy consumption situation in 2019 and determine the measures to be taken for 2020 and help draw a road map. The main goal of Istanbul Gelisim University is to gradually reduce energy consumption rates for 2020 in a stable manner compared to the previous years. Details of the energy conservation measures planned to be taken are mentioned under Section 4.

Table 2. Consumption Data for the Year 2019



The total electricity consumption value of our university which has 8 buildings/building blocks with 212.378m^2 closed areas consisting of 11 blocks, for 2019 is 3.305.363 kWh. Electricity **(Table 2)** and natural gas **(Table 7)** consumption increases according to 2018 consumption. One of the reasons for this increase is that our indoor area, which we consume, is 121,324 m^2 in the first 9-month period of 2018, and 212,378m^2 in the last 3-month period with the activation of the tower; our indoor area, which we consume in the whole year 2019, is 212,378 m^2. From this point of view, our electricity consumption has decreased in proportion compared to last year. The reason for the increase in natural gas consumption is that in 2019, 3 boilers were added in our tower; the area we were trying to heat grew and increased the consumption due to the size of the area. By increasing the efficiency of boilers, our consumption values will be reduced.

2.2. Importance of Energy Consumption Analysis

To achieve accurate results, consumption values should be examined together with the factors that cause overconsumption. For example, as shown in Table 2, the consumption of our tower campus is more than Block A. However, in the examination of this as the consumption value per m^2, we see a greater value of consumption in Block A in Table 3. These consumption values are examined since most of our offices carrying out administrative affairs are in this rectorate building.

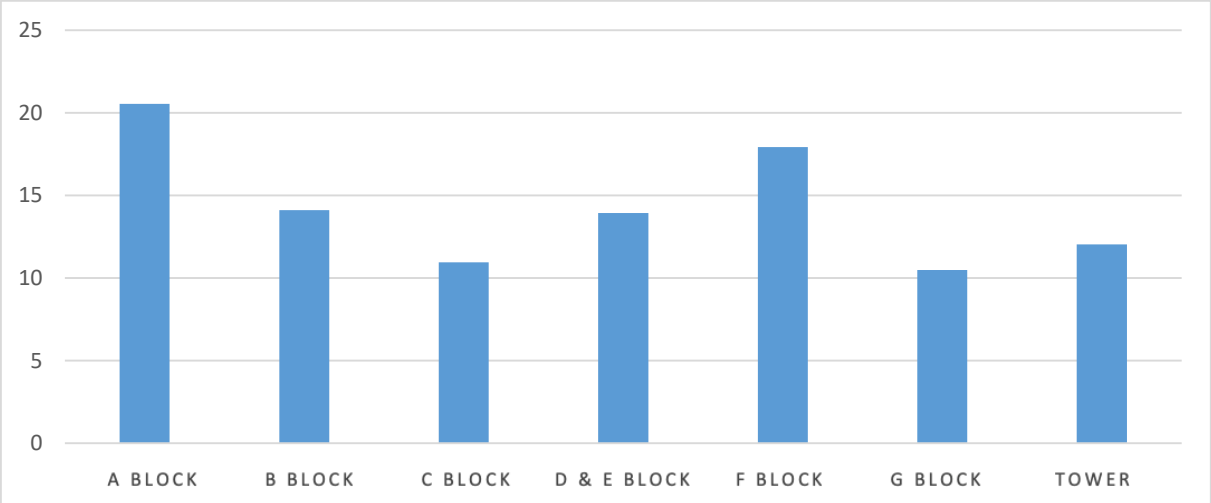


Table 3. Annual kW Consumption Values for $1m^2$.

3. CARBON FOOTPRINT

Carbon footprint is a term used to describe the amount of greenhouse gases released into the atmosphere by particular human activities, such as; transportation, heating, energy consumption, or purchase of any product. The major contributor to the carbon footprint is energy. Hence, improving energy efficiency and decreasing energy consumption is considered as a factor that will directly lead to reduce the carbon footprint.

A carbon footprint is composed of two parts, a primary and secondary footprint.

- **The primary footprint** is the sum of the direct carbon dioxide emissions of the burning of fossil fuels used for energy consumption and transportation activities.
- **The secondary footprint** is the sum of indirect emissions associated with the manufacture and breakdown of all products an individual or business consumes.

3.1. Calculating Carbon Footprints

3.1.1. The Purpose and Constraints of Calculating

The purpose of the calculation is to determine the current emission status by calculating the carbon footprint of Istanbul Gelisim University, to provide a basis for the Carbon Management Plan,

and to generate a solution for reducing emissions. The calculation is constrained to only the primary carbon footprint calculation and 2019 data of all units of Istanbul Gelisim University.

3.1.2. Calculation Method

The primary carbon footprint was determined by the IPCC calculation method. Therefore, the carbon footprint calculation of the University consists of electricity, transportation, and heating. Carbon dioxide emissions are easy to calculate because they are related to the combustion of fuel. Many criteria are required to calculate other greenhouse gases. The IPCC calculation method consists of 3 different categories under the Tier name. Tier 1 approach was used in this study. For this approach;

1. Gasoline, diesel, LPG, natural gas, and electricity consumption amounts were provided from the official records of the University. 0.584 tons/mWh was used to calculate the emission from electricity consumption which was specified as the IPCC carbon dioxide emission factor in the master's study prepared by Toroz (2015: 79).

2. Energy content is calculated by multiplying the consumption values of fuels with the conversion values given in the IPCC Manual. Conversion values are stated in the Communiqué on Monitoring and Reporting of Greenhouse Gas Emissions published in the Official Gazette dated 22.07.2014 and numbered 29068 and specified in the IPCC 2006 Manual. These values are shown in Table 3.

Fuel Type	Net Calorific Value (Tj/Dg)
Gasoline	44,3
Diesel	43
Natural gas	48

Table 4. Net Calorific Value of Fuels (Source: Ministry of Environment and Urbanization, 2014: 40)

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

3. At this stage, carbon emission factors in the IPCC guide for each fuel group were selected to calculate the total carbon content in the fuel.

Carbon Content (tC) = Carbon Emission Factor (tC/TJ) × Energy Consumption (TJ)

Fuel Type	Emission Factor (tC/Tj)
Gasoline	18,9
Diesel	20,2
Natural gas	15,3

Table 5. Emission Factor of Fuels (Source: TURKSTAT, 2013: 16)

4. The amount of unoxidized carbon is found during combustion, and the complete combustion of carbon value is calculated.

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

Fuel Type	Oxidation Rates
Gasoline	0,99
Diesel	0,99
Natural gas	0,995

Table 6. Oxidation Rates of Fuels (Source: Ministry of Environment and Urbanization, 2014: 40)

5. At this stage, the CO2 emission value is found by multiplying the previous value by 44/12 that is the proportion of the molecular weight of CO2 to the molecular weight of carbon.

CO2 Emission (Gg CO2) = Carbon Emission (Gg C) × (44/12)

3.2. Carbon Footprint Calculation Findings

Calculations were made with the IPCC methodology Tier 1 approach and data relating to electricity, gasoline, diesel, natural gas, and Fuel Oil consumption were received from the university to determine the primary carbon footprint of the University for 2019 and shown in Table 6.

Energy Type	Consumption Amount (Year 2019)	Consumption Amount (Ton)	Net Calorie Value (Tj / Gg)	Carbon Emission Factor (tC / TJ)	Carbon Oxidation Rate	Ton CO2	Percent (%)
Gasoline	1.585 Liter	1,22	44,3	18,9	0,99	3,65	0,147
Diesel	12.498 Liter	11,38	43	20,2	0,99	33,74	1,365
Natural gas	242.128 m3	193,32	48	15,3	0,995	503,03	20,354
Electricity	3.305.363 kWh					1.928,895	78,131
Total						2.471,315	

Table 7. Carbon Footprint Calculation of Istanbul Gelisim University (2019)

4. PLANS TO INCREASE ENERGY EFFICIENCY AND REDUCE CARBON EMISSIONS

Increasing energy efficiency will directly reduce carbon emissions. Therefore, conversions to increase energy efficiency are also valid to reduce carbon emissions.

There are two major components in this transition to ensure energy efficiency.

- Lighting
- Heating/Cooling Systems

4.1. Studies to increase energy efficiency

1. As part of our plan to replace our fluorescent lighting with LED lighting, all of our Block G lightings have been replaced **(Figure 1)**. The longer life of LED lightings, less energy consumption, and better lightning at less cost provide serious benefits in terms of energy efficiency. Therefore, it is planned to change our lighting in other blocks.

Figure 1. Some areas of Block G with lighting works

2. It was decided to use sensors in all common areas such as corridors and toilets in the buildings in 2018 and a great majority was implemented **(Figure 2)**. Areas that have not yet been completed will be completed within 2019.

Figure 2. Some areas with sensor implementation

3. The plan to convert the environmental lighting to LED projectors and ensure their control with timers or light sensors which were decided in 2018 was implemented in all our campuses. It is planned to adjust and maintain the timers used for the continuation of energy efficiency according to seasonal conditions.

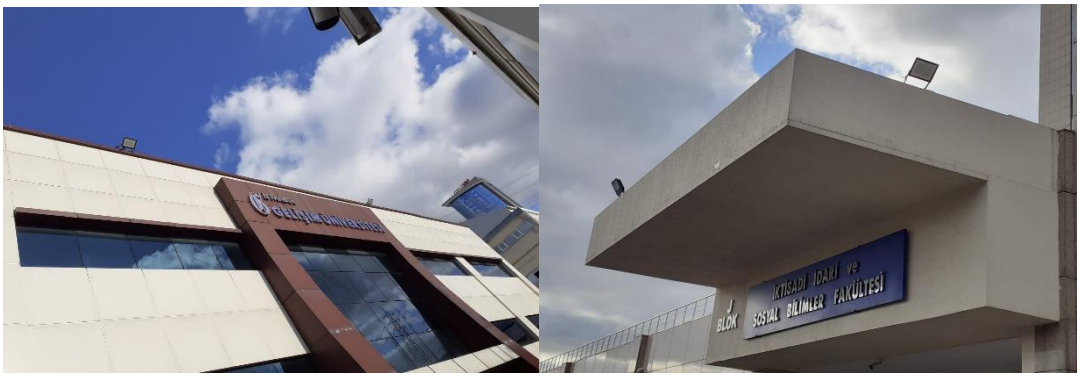


Figure 3. Some areas with LED projectors for environmental lighting

4. The plan to control the heating/cooling systems with DDC panels has become operational with our Tower campus **(Figure 4)**. The same planning continues in other possible campuses.

Figure 4. The MCC and DDC panels of Tower Campus

5. Our priority planning for reducing electric heaters, which planned in 2018, was to ensure that existing heating systems worked smoothly, and our heater usage was reduced by maintaining all of them. The new plan to reduce the use of heaters due to the efficiency of the heating system is to prevent heat losses in the campuses. In this context, preventive actions such as adding air curtains on the entrances of the building are planned.

6. It is planned to increase the studies on the use of renewable energy (wind and solar energy) and to make the university to provide its own energy in areas such as environmental lighting. In this context; the wind and solar environmental lighting was installed in the garden of Block D as an example **(Figure 5)**, and there is a study prepared by our academicians and presented to the management for the operation of Block A environmental lighting with solar panels.

Figure 5. Block D environmental lighting pole powered by solar and wind energy

7. In the procurement processes of the new devices to be used in the campuses, energy-saving features will be the primary selection criteria, and these selection criteria are planned to be taken as a basis in the next year.

8. Revisions are made in order to improve the compensation panels' efficiency used to prevent consumption of total energy, and these are planned to be monitored regularly in the next year **(Figure 6)**. The aim of this study is to minimize consumption values and to make energy consumption more efficient. Monitoring this issue is crucial as it will directly affect conductor cross-sections, efficiency, voltage drop, and energy consumption.

Figure 6. Image and COS values of one of our compensation panel

9. The maintenance and repair of the central systems were carried out to reduce the use of room-type air conditioners in closed areas of the campuses. It is planned to continue to reduce the use of air conditioners by continuing maintenance to increase the efficiency of central systems.

10. Negotiations for the signing of a contract with an electricity distribution company should also continue in the New Year to consult on savings and reduce the unit price.

11. The use of various electrical appliances such as tea and coffee machines in personnel offices increases energy use. It is planned to build common kitchen use areas in the campuses to reduce energy use. In this context, an area has been made for the use of personnel in Block F **(Figure 7)**. Our search for an area for other campuses continues.

Figure 7. Block F rest area for staff

12. As in 2018, training activities are planned for all employees on energy efficiency within the framework of a certain periodic calendar during this year. In this context, last year, a training on compensation panel maintenance and efficient use of heating/cooling systems was held with our technical team. Trainings will also be planned in different concepts for this year.

4.2. Studies to reduce carbon emissions

1. For the purpose of reducing the carbon footprint of the University and ensure sustainable use of resources, senior management has supported academic and administrative staff to create projects. They must continue with the same determination.

2. In order to raise awareness in society, not only with the precautions to be taken at the Istanbul Gelisim University, education and information activities should be carried out for external stakeholders that will increase their awareness of environmental problems and global climate change.

3. Elective courses including environmental issues, nature conservation, global climate change and sustainable use of natural resources should be planned in all academic departments of the university.

4. Studies have been carried out on ensuring the lowest level of waste production (ensuring reduction at the source), waste management plans that will ensure the separation of waste at the source, and the creation of a recycling system. As part of the zero-waste project, glass, paper, metal, plastic collection boxes were left to the campuses **(Figure 8)**. Contracts have been signed with authorized organizations for the collecting of medical waste and waste oils. The studies should continue with the same determination.

Figure 8. A waste collection area created within zero-waste project

5. To save water, electricity, heating, and transportation are planned for the purpose to reduce the carbon footprint. Efforts to ensure that the products supplied in the purchasing processes have low carbon emissions that provide environmentally sensitive energy savings should continue with the same determination. In this context, some of the preferred products last year; air conditioners with inventors (can reduce consumption by up to 10%.), LED lightings (50-90% savings compared to other lightings).

6. Use of environmentally sensitive products (cleaning material, fuel, etc.) and studies that promote the use of recycled materials should be planned.

7. In order to reduce the carbon footprint, regular seedling planting/afforestation works should be planned every year. As part of the 2018 plan, about 100 seedlings were planted in the campuses.

8. The regional and drought-resistant plant species should be selected in the use of ornamental plants on campus.

9. Projects for the reuse of rainwater and gray water should be devised, and practices about saving and awareness should be planned.

10. Necessary studies should be performed to make new environmental-friendly green buildings.

5. STANDARDS TO BE APPLIED IN OUR BUILDINGS

In the relevant section of the report, information is shared on the building standards planned to increase energy efficiency and to create environmentally friendly buildings with measures to reduce carbon emissions in new campuses and buildings that will be in the use of Istanbul Gelisim University.

5.1. Standards to be Applied in New Buildings

- Sustainable energy solutions will be used to provide heating, cooling, ventilation, and electricity needs.
- Designs will be made to take maximum advantage of natural light.
- Plants that will be used for landscaping will be selected from species that consume less water.
- In garden irrigation, systems will be designed to use the cleaned water after the treatment of wastewater.
- Attention will be paid to the use of saving materials in material selection.
- Methods that minimize excavation will be used to ensure that less fuel is consumed during construction.
- Construction residues will be re-evaluated by various methods and environmental pollution will be minimized.
- Ecological approaches will be applied in material selection and construction technique.
- Materials that are not in danger of depletion and are obtained from sources as close as possible will be preferred.

5.2. Standards to be Applied in Converted Buildings

- Energy-saving led lighting will be used.
- The sensor system will definitely be considered when planning common areas.
- While the environmental lighting is planning, the plan will be checked by photocells, unnecessary consumption due to inattention of the personnel will be avoided.
- Heating/cooling systems will be controlled through central control systems.
- To prevent heat loss, sheathing will be applied. Therefore, the use of air conditioners and heaters in offices will be reduced.
- All devices to be used will select as energy efficient.
- Personnel kitchens will be built and the use of tea and coffee machines in offices will be avoided.

6. CONCLUSION

As Istanbul Gelisim University, we organize and monitor our activities to minimize environmental damage by reducing the carbon footprint and the efficient use of energy resources in all our campuses and to transform into an environmental-friendly organization with an ecological identity in line with sustainable and clean energy.

The aims in this context are as follows:

- A productive energy manager should be selected to monitor and manage all processes in the university,
- Organizing trainings on energy efficiency for all staff and students, including academic/administrative/support units in the university, in accordance with the guidance of the energy manager,
- Establishing an Energy Efficiency and Environmental Awareness Coordination Committee with representatives from all units under the chairmanship of the Energy Manager,
- Ensuring a 15% reduction of energy consumption per m^2, within 5 years
- Ensuring the reduction of energy consumption per capita within 5 years
- Organizing educational and informational activities on environmental awareness and energy for all external stakeholders of the University,
- Ensuring that the zero-waste management process is activated within the University
- Creating a resource savings plan in accordance with sustainability aims,
- Creating a detailed carbon management plan,
- Ensuring that articles that will ensure the supply of energy-saving and environmentally friendly devices in purchasing processes are added to the purchasing specifications.

THE GLOBAL GOALS
For Sustainable Development

IGU for **"Ecological, Social and Economic Sustainablity"**

www.**gelisim**.edu.tr