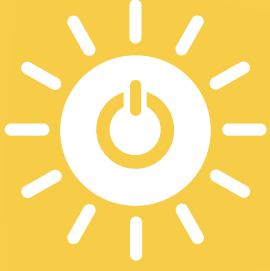


# SDG PROGRESS REPORT

on **SDG-7 AFFORDABLE** and **CLEAN ENERGY**

**20  
21**



# SDG PROGRESS REPORT

ISTANBUL MEDENIYET  
UNIVERSITY

**Istanbul Medeniyet University  
Sustainability Office**

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## **SDG Icons**

<https://www.un.org/sustainabledevelopment/news/communications-material/>

## **Sustainable Development Report Maps**

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Between 1990 and 2010, the number of people with access to electricity has increased by 1.7 billion, and as the global population continues to rise so will the demand for cheap energy. A global economy reliant on fossil fuels, and the increase of greenhouse gas emissions is creating drastic changes to our climate system. This is impacting every continent.

Efforts to encourage clean energy has resulted in more than 20 percent of global power

being generated by renewable sources as of 2011. Still one in seven people lack access to electricity, and as the demand continues to rise there needs to be a substantial increase in the production of renewable energy across the world.

Ensuring universal access to affordable electricity by 2030 means investing in clean energy sources such as solar, wind and thermal. Adopting cost-effective standards for a wider range of technologies could also reduce the global electricity consumption by buildings and industry by 14 percent. This means avoiding roughly 1,300 mid-size power plants. Expanding infrastructure and upgrading technology to provide clean energy in all developing countries is a crucial goal that can both encourage growth and help the environment.



percent of global greenhouse gas emissions accounting by energy

**789 MILLION**

people lack electricity (2018)



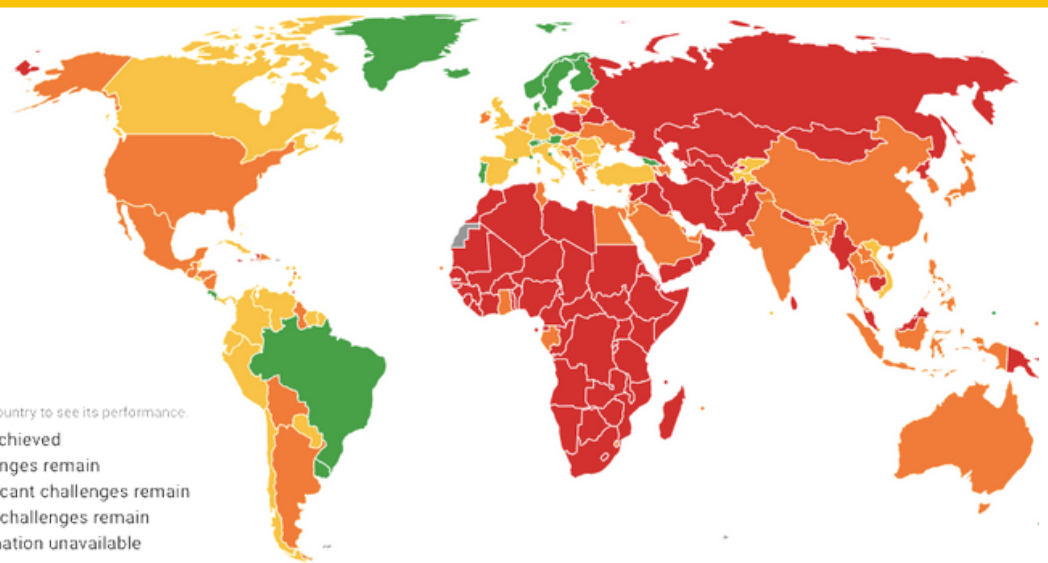
people still lacks access to electricity; most of them live in rural areas of the developing world

**3 BILLION**

people rely on polluting and unhealthy fuels for cooking

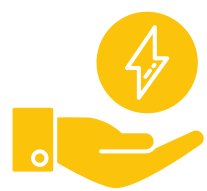


of power is generated through renewable sources, as of 2011



**0.085**  
**ELECTRICITY**

use density in IMU campuses (GJ/m<sup>2</sup>)



energy management unit to ensure energy efficiency

**0.138**

energy use density in IMU in 2021 (GJ/m<sup>2</sup>)



**0.050**  
**NATURAL GAS**

use density in IMU campuses (GJ/m<sup>2</sup>)

**0.003**  
**FUEL**

use density in IMU campuses (GJ/m<sup>2</sup>)

In accordance with the regulations of the Ministry of Energy and Natural Resources on energy efficiency and measurement, in buildings belonging to public institutions, all institutions must comply with these national regulations and have an energy manager.

As a public institution, Istanbul Medeniyet University created and put into practice [“Istanbul Medeniyet University Energy Directive”](#) in 2021 in order to regulate its energy management practices; to ensure effective and efficient energy use; to prevent energy waste; to reduce the burden of energy costs on the institution’s budget; and to increase efficiency in energy use for environmental protection. In addition, an Energy Management Unit was formed within the university to implement the directive instructions and energy managers were appointed for the institution.

## Energy-efficient Buildings and Renovation

Istanbul Medeniyet University has a policy on carrying out the energy management activities within the institution in accordance with the applicable national or international qualifications and standards that form the basis for certification. This policy was put into effect with [Istanbul Medeniyet University Energy Directive](#). In this context, in order to ensure and certify energy efficiency in the buildings used by our university, the Energy Performance Certificates that were put into effect as per the [Energy Performance of Buildings Regulation](#) were designated as our national standard and the International TS EN ISO 50001 Energy Management System as our international standard and a decision was made that all construction work would be carried out according to these qualifications and standards.

Istanbul Medeniyet University attaches importance to ensuring energy efficiency both in its newly constructed buildings and its older buildings that have been taken into reuse after refunctioning and renovation and carries out certain practices to increase energy efficiency for brownfields. For instance, much work has been done to achieve efficiency in different types of

energy in our administrative building in our Göztepe South Campus, which was taken over from the State Supply Office and was still in use in early 2021. Stone wool insulation was applied to achieve thermal insulation for the building and the existing lighting system was renewed with photocell lighting assemblies to reduce electricity use.

## Plan to Reduce Energy Consumption

IMU primarily aims to use designs that will reduce the need for energy consumption. In line with this objective, our newly constructed campus buildings are designed to ensure natural lighting and ventilation.

Our secondary objective is to reduce the energy consumption in campus buildings and other activities of the university. In line with this objective, we rely on projects that guarantee energy efficiency or performance to reduce energy consumption and achieve efficiency in institutional buildings and annexes and have made this decision binding by [“Istanbul Medeniyet University Energy Directive”](#), which was approved in 2021.

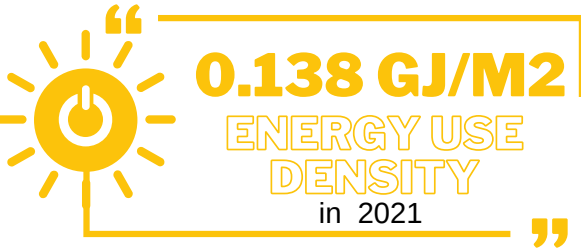
Furthermore, this planning has been put into implementation through several applications. For instance, frequency converters are used to reduce the energy consumed for water supply and thus energy consumption is reduced during the hours with less water consumption; electricity consumption in offices has been reduced outside working hours through the photocell lighting systems installed in the buildings; energy consumption from lighting has been reduced by switching to energy saving light bulbs in all the lighting systems; minimum lighting is used in the campus buildings for security purposes outside the office hours when building lights are automatically turned off to reduce electricity consumption from lighting; energy consumption for heating/cooling has been reduced through thermal insulation applied in all the buildings; and a homogeneous distribution of heat inside the buildings is achieved through the central heating system installed in all buildings to reduce energy consumption due to heating.



## Energy Use Density

Every year, Istanbul Medeniyet University measures the total amount of energy consumed in the campus areas and depending on the campus related uses, and determines the energy use density. Energy usage density is used as an important guide in policies to be determined next year to reduce energy consumption.

As a result of all these strategies toward energy efficiency and reduction of energy consumption, the **energy use density** in 2021 for the six campus areas used by IMU with a total building area of 171,844 m<sup>2</sup> was 0.138 GJ/ m<sup>2</sup>.



The **electricity consumption** in all the indoor and outdoor areas in all our campuses in 2021 was 4,045,649kwh with an electricity use density of 0.089 GJ/m<sup>2</sup> in 2021.

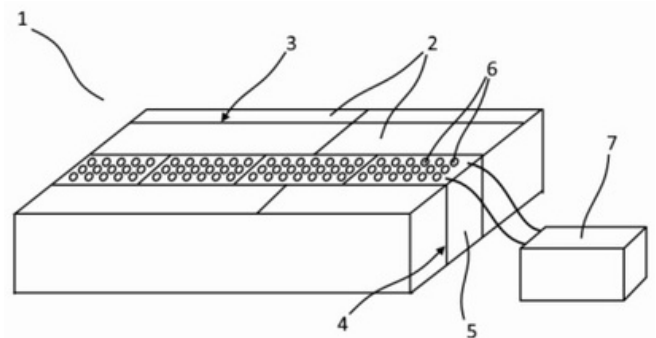
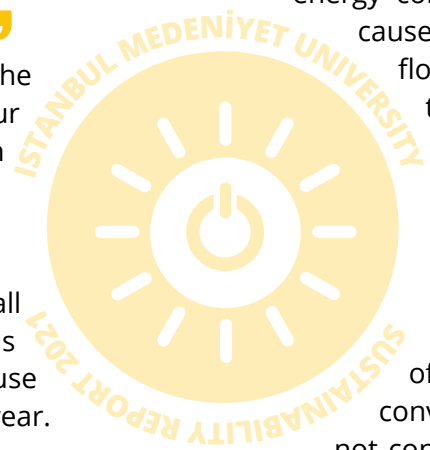
The **natural gas consumption** in all our campus areas in 2021 was 228,881 m<sup>3</sup> with a natural ga use density of 0.050 GJ/m<sup>2</sup> in the same year.

The **energy equivalent of the fuels consumed** by the vehicles used by the institution in 2021 was 13,7 kiloliter.

Energy Type	Consumption in 2021	IMU Use Density in 2021
Electricity	4,045,649 kwh	0.089 GJ/m <sup>2</sup>
Natural Gas	228,881 m <sup>3</sup>	0.050 GJ/m <sup>2</sup>
Fuels	13.7 kl	0.003 GJ/m <sup>2</sup>
<b>TOTAL</b>	<b>23,786 GJ</b>	<b>0.138 GJ/m<sup>2</sup></b>

As Istanbul Medeniyet University, we not only lead the society by carrying out activities to achieve Sustainable Development Goals (SDGs) at the institutional level and but also guide how the SDGs are applied at local, national, and international levels as a community through our collaboration efforts and support solving of problems through our research projects.

An invention by Asst.Prof.Dr. Fatih ÖZALP, from the Department of Civil Engineering titled **“Concrete Roads and Grounds Harvesting Energy”** has been patented. The patent was registered by the Turkish Patent and Trademark Office on October 21, 2021. He stated that the rapid depletion of oil, coal, natural gas and other non-renewable energy resources around the world and the increasing demand for supply increase the need for renewable energy. The project aims to meet this need and to achieve energy conservation by harvesting the energy caused by vibration on concrete roads or floors. Thanks to the piezoelectric transducer system positioned in the slots formed on the concrete blocks of the roads or floors that are the subject of the invention, it is aimed to harvest energy from the loads of the vehicles passing over them. This Project is a good example of the use of clean energy technologies by converting mechanical energy, which is not considered to be idle on the roads, and resulting from the passage of vehicles, into electrical energy. Reducing energy consumption and ensuring energy efficiency was another goal of this project. Another goal of this innovation is to develop sustainable transportation.



Concrete Roads and Grounds Harvesting Energy



The invention titled "Combined Multi-Source Energy Harvesting and Communication Management System" developed by Asst.Prof.Dr. Doğay ALTINEL from the Department of Electrical and Electronics was found eligible for a patent by the US Patent and Trademark Office (USPTO) and the patent was registered on January 12, 2021. The patented system aimed to provide energy transition to wireless devices with a common energy harvesting method and to present a communication management solution. With this improvement, performance is increased with optimum energy consumption according to the communication demand, and it has become possible to obtain a sustainable network structure by providing uninterrupted energy access to the devices. Along with energy efficiency, product innovation was also achieved by obtaining the energy used by the existing wireless devices in a more beneficial way.

## Local Community Outreach for Energy Efficiency

On the second day of Istanbul Medeniyet University **Sustainability Week** activities, a workshop on renewable and clean energy production was held to inform our students, staff and local community about clean energy and energy efficiency.

"ElectriCITY: Energy Preferences Game", a role game, which the participants produce energy policies as decision makers in the energy production of the city, was played at the workshop. The workshop was conducted by our Department of City and Regional Planning Res.Asst. Ayça ÇELİKBİLEK and geological engineer Gökhan SAPMAZ.

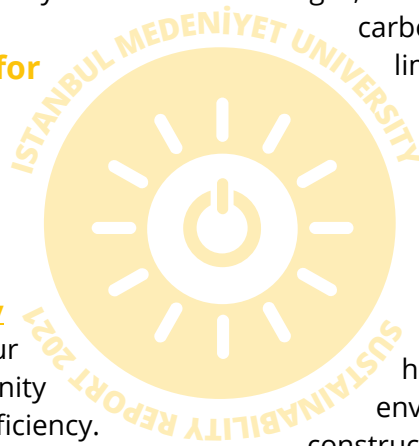
At the beginning of the workshop, general information about the energy system and energy management used in cities was given. In this context, the participants were informed about primary energy sources such as fossil fuels, renewable energy sources and other energy sources. Afterwards, technologies and facilities that convert these primary energy sources into usable energy were mentioned and it was stated which primary energy sources these facilities use to generate electricity and which end-use sectors such as trade, industry, transportation and residential can use this electricity. After all this information, the energy produced from which energy sources is used in which sector, the

amount of potential energy that each energy source can produce and the amount of lost energy (energy efficiency) were discussed with the participants via the Sankey diagram. Finally, in order to understand why energy policies are important for the environment, information was given to the participants about air pollutants, greenhouse gases and water consumption resulting from source selection in energy production. Thus, the participants were made to understand the importance of energy management in the global climate crisis.

In the second part of the workshop, the game, which is a simple simulation of the energy system in cities, was introduced to the participants and the rules of the game were explained. The game started by dividing the participants into five groups, each representing a city with different resources. The game, which was designed as a simulation of real life, was played as 6 different stages, in which carbon costs gradually increased,

carbon emissions were kept at a certain limit, water consumption was kept at a certain limit, and different political and economic conditions were developed for each group. At each stage, it was discussed how the changes in political, economic and environmental conditions reflected on the energy policies produced by the groups and how these policies were reflected on the environmental costs in addition to the construction and operating costs.

At the end of the workshop, the total cost (installation+operation+environmental) of the energy policies produced by each team for their city was calculated. The workshop ended with the announcement of the first three teams that became low-carbon society at the end of the 6 stages.



21 December 2021

ElectriCITY: Energy Preferences Game



Learning processes are key in achieving SDGs. Thus, universities play a critical role both by training professionals who will prioritize SDGs in their future practices and by increasing local, national, and global capacity to successfully achieve SDGs. As Istanbul Medeniyet University, we are fully aware of our critical role and thus aim to empower and motivate for SDGs not only our students through course contents, co-curricular activities, and student club activities, but also the community at large at a much wider scale. Therefore, we organize university-wide life-long learning activities, online courses, certificate programs, seminars, workshops, congresses, symposia, and panels that are open to all segments of society for participation.



The fifth seminar of the “Mimarlık Araştırmaları” seminar series organized by the Department of Architecture, was held online on September 9, 2021 with the presentation of our Res.Asst. Furkan ERUÇAR. In his presentation titled “Akıllı Binalar ve Uygulama Örnekleri” (Smart Buildings and Examples to Their Applications), In his presentation, ERUÇAR presented sections from the emergence and historical development of the concepts of smart cities and smart buildings. He underlined that smart cities include smart components such as smart buildings and smart grids. He mentioned the importance of the usage of advanced technological systems that increase the energy efficiency of lighting systems, which have an important place in terms of energy consumption today. Later, he stated that renewable energy should be encouraged by governments. He gave an example that a building producing a very high amount of energy via photovoltaics which can be used in almost any type of building. Finally he mentioned the term energy poverty and made some recommendations about the subject.

The 26th seminar of the “Istanbul Urban Studies” seminar series organized by the Department of Urban and Regional Planning was held online on November 24, 2021. Prof.Dr. Nurhan YENTÜRK and Işık BAŞTUĞ presented their study titled “İklim Krizi ile Mücadelede Belediye Bütçeleri ve İstanbul Örneği” (Municipal Budgets in the Fight against Climate Crisis and the Case of Istanbul). The researchers shared the results of their research report published in November 2021 titled ‘Türkiye’de Çevre Koruma ve İklim Değişikliği ile Mücadeleye Ayrılan Kamu Kaynaklarının İzlenmesi’ (Monitoring of Public Fundings Allocated to Fight Against Environmental Protection and Climate Change in Turkey) via their presentation. They analyzed the public expenditures run by municipalities and their co-partners to fight against environmental protection and climate change under 4 categories; renewable energy usage and energy efficiency-based mitigation management; adaptation expenses, waste management and other expenses like nature protection, environmental awareness training and environmental management. Researchers evaluated Kadıköy Municipality’s related budget and said that 75% of the budget is allocated for cycle route construction, solar energy usage and waste-free street projects, all of which serve as mitigation projects.

Seminar on Municipal Budgets in the Fight Against Climate Crisis



The academic staff members of our university carry out research on ensuring universal access to modern energy services; increasing the share of renewable energy in the global energy mix; doubling the rate of improvement in energy efficiency; supporting access to clean energy research, technology, and investments; and expanding and upgrading the energy services for developing countries, publish the results of their research and share them with other researchers, decision-makers, stakeholders, and the public as a foundation for policies toward achieving SDGs.

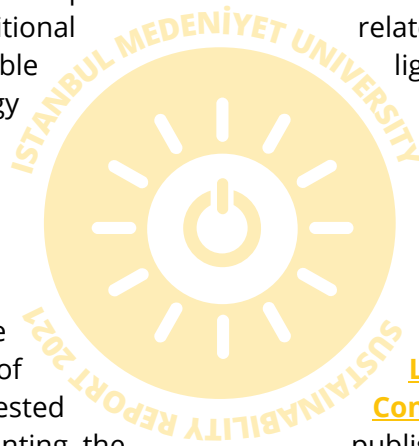
The project titled **“Potential Losses and Gains of Government Incentives for Renewable Energy Resources”**, involved Istanbul Medeniyet University Faculty of Political Sciences Public Finance Department Member Asst.Prof.Dr. Sinan ATAER as a researcher, has reached the final stage. At first, a field study on environmental literacy was applied to citizens. The participants were asked questions about traditional energy production methods, renewable energy sources and renewable energy production methods. Then, once views were collected about the role of the state in energy production and in creating energy policies, researchers obtained necessary data from the participants who make up the individual consumption side of energy. After that, the data requested from both the industrialists representing the industrial energy consumption and the representatives of the energy production and transmission companies representing the supply side were obtained by interview.

The book titled **“Global Transformation in Energy System, Renewable Energy, and Public Policies”** authored by Asst.Prof.Dr. Dilek AKBAŞ AKDOĞAN from IMU Department of Public Finance was published. The author first explained how renewable energy sources are used as a tool in the fight against climate change and its effects within the framework of climate action plans of countries. Then, she emphasized the importance of renewable energy sources for economic goals such as sustainable economic growth. For the purposes of using and disseminating renewable energy resources for sustainable economic growth and economic development, she analyzed in detail the EU’s renewable energy policy within the scope of partnerships at EU level and Turkey’s renewable energy policy.

An article by Dr. Gülfer VURAL of the Department of Economics titled **“Analyzing the impacts of economic growth, pollution, technological innovation and trade on renewable energy production in selected Latin American countries”** was published in Renewable Energy Journal. VURAL draws attention to renewable energy, eliminating the harmful effects of fossil fuels, and protecting the environment and addresses issues such as GDP per capita, carbon dioxide emissions per capita, technological innovation and trade as the determinants of renewable energy production for selected Latin American countries in the 1991-2014 period. The empirical analyses performed by the author revealed that GDP per capita, technological innovation and trade have a positive and statistically significant effect on renewable energy production per capita. On the other hand, the study has shown that carbon dioxide emissions and renewable energy production are negatively related. The policy recommendations in the light of the empirical findings are also discussed in the article.

Prof. Dr. KÜRŞAT AYAN from the Department of Electrical and Electronics Engineering co-authored the article **“A Curve Fitting Modelling Approach to Forecast Long-Term Electrical Energy Consumption: Case Study of Turkey”** published in Sakarya University Journal of

Computer and Information Sciences. Turkey’s eleventh National Development Plan (NDP11) focuses on ensuring uninterrupted, high-quality, sustainable, reliable and affordable energy supply. In this regard medium- and long-term energy supply-demand planning is regarded as a key input to the planning process. Using Turkey’s electrical energy consumption data from 1970 to 2015, this study presents novel Gaussian, Fourier and Exponential curve fitting and extrapolation approaches to forecast Turkey’s electrical energy consumption up to the year 2025. Major interest is put on how the model forecasts electrical energy consumption for year 2023 because this year marks a century of the establishment of the Republic of Turkey and all strategic plans are focused on how to achieve the targets as outlined in Vision 2023.





Assoc.Prof.Dr. Hasan KÖTEN from the Department of Mechanical Engineering co-authored an article titled ["Blades Optimization for Maximum Power Output of Vertical Axis Wind Turbine"](#) published in the International Journal of Renewable Energy Development. In their study, it was stated that wind power is a significant and urging sustainable and renewable power source asset to petroleum derivatives. Wind machines, for example, H-Darrieus vertical pivot wind turbines (VAWTs) have increased much notoriety in research networks throughout the most recent couple of decades because of their applications at destinations having moderately low wind speed. Be that as it may, it is noticed that such wind turbines have low effectiveness. The point of this study is to develop rotor cutting edges which could create the most extreme power yield and execution.

