



Sustainable KTU

SUSTAINABILITY REPORT 2025

7 AFFORDABLE AND
CLEAN ENERGY



www.ktu.edu.tr/sustainability



surdurulebilirktu@ktu.edu.tr



CONTENT

Rector's Message.....	2
Foreword.....	3
Institutional Structure.....	4
2025 Events and Activities.....	8



Sustainability is one of the most important areas of responsibility shaping our future through its environmental, economic, and social dimensions. Universities are not only institutions that produce knowledge, but also pioneering structures that guide sustainable development and contribute to social transformation.

In line with the United Nations Sustainable Development Goals (SDGs), the development objectives of our country, and the vision of sustainability in higher education, we, as Karadeniz Technical University, place sustainability at the core of our education, research, social contribution, and institutional governance processes.

Throughout 2025, our university carried out significant initiatives in many areas, including quality education, climate action, energy efficiency, scientific research, social inclusion, and regional development. Through projects focused on scientific knowledge production and societal contribution, we continued to support the achievement of sustainable development goals.

This report presents our university's activities in the field of sustainability and our commitment to the future. Guided by science and in collaboration with our stakeholders, we believe that we will continue working towards a more sustainable future.

Prof. Dr. Hamdullah ÇUVALCI

Rector, Karadeniz Technical University



7 AFFORDABLE AND CLEAN ENERGY



Affordable and Clean Energy is one of the key components of sustainable development, aiming to increase access to safe, sustainable, and affordable energy resources. Within the scope of SDG 7 established by the United Nations, expanding the use of renewable energy, improving energy efficiency, and supporting sustainable energy infrastructures are among the primary global goals.

Higher education institutions play an important role in producing scientific knowledge and increasing public awareness in the field of energy. Universities contribute to the transition toward low-carbon energy systems through research and educational activities related to renewable energy, energy efficiency, and sustainable energy management.

Karadeniz Technical University (KTÜ), in line with its sustainable development goals, carries out various initiatives to improve energy efficiency, expand the use of renewable energy resources, and support environmental sustainability. Research projects, energy management practices, and awareness activities conducted within the university contribute to integrating sustainable energy principles into the institutional structure.

This report aims to evaluate KTÜ's activities, practices, and institutional contributions within the scope of SDG 7 from a general perspective. At the same time, the report supports the visibility of good practices aimed at promoting the transition to clean energy and increasing energy awareness.



Institutional Structure

KTU has developed a multi-stakeholder, multi-level institutional structure to support the Affordable and Clean Energy (SDG-7) goal. This structure is based on systematic task allocation and coordination aimed at improving energy efficiency across the campus, promoting the use of renewable energy, and enhancing societal awareness.

Units such as the Environmental and Climate Change Application and Research Center, Office of International Relations, Energy Systems Engineering, Electrical and Electronics Engineering, Physics, Architecture, Maritime Transportation and Management Engineering, and Urban and Regional Planning contribute to increasing the university's scientific production capacity in energy technologies through interdisciplinary education, research activities, and sectoral collaborations.

Additionally, student clubs (e.g., the KTU Energy Club) organize activities to raise energy literacy and enhance student awareness, completing the voluntary component of the institutional structure.

The Construction and Technical Affairs Directorate manages LED conversion projects for campus lighting systems, natural gas transition projects, and maintenance of energy infrastructure. Monitoring systems such as electricity consumption, heating systems, generators, and UPS units contributes to the safe and efficient operation of sustainable energy infrastructure.

To support energy-focused student projects, a Technology Competitions Coordination Office was established, with its directive implemented in 2024. This office particularly supports student teams working on sustainable mobility, electric vehicles, and clean energy solutions.

Through this institutional structure, KTU contributes systematically to the SDG-7 targets not only in the areas of infrastructure and technology but also across strategic governance, human resource development, and public awareness initiatives.





Technology Competitions Coordination

KTU enacted the "Technology Competitions Coordination Directive" on June 11, 2024, to encourage the effective and systematic participation of students and student groups in national and international technology competitions. This directive defines the duties and responsibilities of the Technology Competitions Coordination Directorate, specifically aiming to support student teams developing projects in areas such as energy, mobility, environment, and sustainability. Within the scope of this directive, energy efficiency-focused vehicle and system projects developed in line with the SDG-7 goals are supported by the relevant student groups with a stronger structure, and students are empowered to develop practical skills in areas such as competition participation, prototype production, and international representation. This institutional structure strengthens the university's student-based R&D capacity in the field of sustainable energy technologies and facilitates the implementation of innovative solutions.



[KTU Technology Competitions Coordination](#)



Best Practices in the Blue Economy, Climate Change and Clean Energy Sectors Sharing of Knowledge and Experience



MAVİ EKONOMİ, İKLİM DEĞİŞİKLİĞİ VE TEMİZ ENERJİ ALANLARINDA İYİ UYGULAMALARI BİLGİ VE DENEYİM PAYLAŞIMI



PROF. DR.
FATMA TELLİ KARAKOÇ
Karadeniz Teknik Üniversitesi



MEHMET BOZDOĞAN
Doğu Karadeniz
Kalkınma Ajansı



NAZLI GENÇ
Trabzon Ticaret Borsası



TALHA ALTUN
Politek Su Ürünleri



ÖĞR. GÖR.
EMRAH AYVAZ
KTÜ TTM Müdürü | Moderatör



12 Aralık Cuma



14.00



Prof. Dr. Osman Turan
Kültür ve Kongre Merkezi
Fahri Kuran Salonu

As part of initiatives focusing on themes related to SDG 7, the “Knowledge and Experience Sharing Days” organised by the Technology Transfer Centre (KTÜ TTM) at Karadeniz Technical University, were continued with the “Knowledge and Experience Sharing Event on Best Practices in the Fields of Blue Economy, Climate Change and Clean Energy”, held on Friday 12 December 2025 at 14:00 in the Fahri Kuran Hall of the Prof. Dr. Osman Turan Culture and Congress Centre. During the event, projects and examples of best practice in the fields of the blue economy, climate change and clean energy were discussed.

Participants had the opportunity to hear insights and experiences on the subject from Prof. Dr. Fatma Telli Karakoç (Faculty of Marine Sciences, Sürmene, Karadeniz Technical University), Mehmet Bozdoğan (Blue Economy Unit, Eastern Black Sea Development Agency), Nazlı Genç (Trabzon Chamber of Commerce and Industry) and Talha Altun (Politek Aquaculture).

The event was moderated by Lecturer Emrah Ayvaz; the speakers shared their research, sector-specific experiences and practical examples with the participants. Throughout the programme, participants were informed and the event helped to raise awareness in the relevant fields. The event concluded with a question-and-answer session.



Energy Conversation



Within the scope of activities related to SDG-7, an “Energy Talk” was held at the Of Faculty of Technology with the participation of Energy Club students and academic staff. Current developments in the energy sector and sustainability issues were discussed during the event. Throughout the talk, participants were informed, and opinions were shared during the question-and-answer session. The event was completed with the contributions of the participants. It was observed that the event contributed to increasing students’ awareness of the energy field and strengthening their knowledge of sectoral developments. It was also evaluated that such talks provide an important contribution to academic and professional development.



Access to Affordable and Clean Energy Event-1

ENERJİNİ YENİLE, DÜNYAYI KURTAR



KTÜ
KARADENİZ
TEKNİK ÜNİVERSİTESİ



**KARADENİZ
TEKNİK ÜNİVERSİTESİ**
SÜREKLİ VE SAĞLIKLI
ENERJİ

GÜNEŞ ENERJİSİ

Güneş enerjisi projeleri güneşten gelen ışığı ve ısıyı elektrik enerjisine dönüştürür. Güneş panelleri evlerin, iş yerlerinin veya bir bölgenin enerji ihtiyacını karşılamak için kullanılabilir. Türkiye gibi yıllık güneşli gün sayısı fazla olan ülkeler için önemli bir temiz enerji kaynağıdır.

HER GÜN DOĞAN GÜNEŞ, GELECEĞİN EN BARKAK KAYNAĞI



RÜZGAR ENERJİSİ

Rüzgar enerjisi, havadaki basınç değişikliği kaynaklı hareket enerjisinin rüzgar türbinlerini döndürmesi sonucu elektriğe dönüştürülmesidir. Rüzgar santralleri diğer temiz enerji projelerine kıyasla daha az yer kaplar ve mevimsel, gün ışığı ve yağış gibi değişikliklerden etkilenmez.



BİYOKÜTLE ENERJİSİ

Biyokütle enerjisi, tarım atıkları ve hayvansal atıklar gibi organik maddelerden elde edilen enerjidir. Güneş ve rüzgar gibi kesintisiz olarak değil, sürekli enerji sağlama potansiyeline sahiptir.

DOĞADAN GELEN GÜÇ ATIKTAN DOĞAN ENERJİ



HİDROELEKTRİK ENERJİSİ

Hidroelektrik enerjisi akan suda yaratılan kinetik enerjiyle elektrik enerjisinin üretimi anlamına gelir. Jeotermal enerji, biyokütle enerjisi, rüzgar enerjisi ve güneş enerjisi gibi hidroelektrik enerjisi de yenilenebilir, sürdürülebilir bir enerji kaynağıdır.



JEOTERMAL ENERJİ

Jeotermal enerji, yer kabuğunun derinliklerindeki ısı, sıcak su ve buharın elde edilen termal enerjidir. Elektrik ve ısı üretimi için kullanılabilir bir kaynak olan jeotermal enerji ucuz, yenilenebilir ve çevre dostudur.

SICAKLIKLA HAYATI BESLE



DALGA ENERJİSİ

Dalgalar, deniz ve okyanuslardaki dalgaların faydalanarak elde edilen bir enerji türüdür. Doğal yollarla değerlendirilmesi ile ortaya çıkan bu enerji, kaynağı güneş ve ayın çekim gücünden alır. Bu sayede dünya, ay ve güneş var oldukça dalgalar enerjisi kullanımına devam edilebilir.

MAVİLERDEN GELEN TEMİZ GÜÇ



GÜNEŞ ENERJİSİNİN AVANTAJLARI

- Güneş enerjisi en temiz yenilenebilir enerji kaynağıdır.
- Tükünmeyen enerji kaynağıdır.
- Enerjiye ihtiyaç duyulan her yerde her alanda kullanılabilir.
- İşletme maliyeti oldukça azdır.
- Doğal ve çevreci enerji kaynağıdır. Çevreye zararlı atıkları yoktur.
- Dışarı bağımlı değildir. Ekonomik bunalımlardan etkilenmez.

RÜZGAR ENERJİSİNİN AVANTAJLARI

- Temiz ve çevre dostu.
- Düşük işletme maliyeti.
- Yenilenebilir ve sınırsız.
- Enerji bağımsızlığı sağlar.
- Kararlı enerji için uygundur.
- Az alan kullanım gerektirir.
- Hızla kurulabilir.

DOĞA ESİYOR ENERJİNİ SEN DEĞERLENDİR

BİYOKÜTLE ENERJİSİNİN AVANTAJLARI

- Her yerde her yerde yapılabilirliği.
- Üretim ve çevrim teknolojilerinin iyi bilmesi.
- Her ölçekte enerji verimi için uygun olması.
- Düşük ışık şiddetinin yeterli olması.
- Depolanabilir olması.
- Sosyo-ekonomik gelişmelerde önemli olan.
- Çevre kirliliği oluşturmaması.
- Sıra etkisi oluşturmaması.
- Alet yağmalarına yol açmaması.

HİDROELEKTRİK ENERJİSİNİN AVANTAJLARI

- Su döngüsüne bağlı olduğu için sürekli olarak üretilir.
- Fosil yakıtlar gibi hava kirliliği veya sera gazı yaymaz.
- Yerli kaynak kullanımını sayesinde dışa bağımlılığı azaltır.
- Karbon ayak izini önemli ölçüde düşürür.

SUYUN GÜCÜYLE AYDINLANAN GELECEK

JEOTERMAL ENERJİNİN AVANTAJLARI

- 7/24 enerji üretilebilir, hava koşullarından etkilenmez.
- Yer altı ısısı tüketmez, sürekli yenilenir.
- Düşük karbon salımı ile iklim dostudur.
- Isı doğrudan kullanılabilir için enerji dönüşümünde kayıp azdır.
- Santraller kompakt yapıda olduğu için çevreyi çok az etkiler.

DALGA ENERJİSİNİN AVANTAJLARI

- Yenilenebilir bir enerji kaynağıdır.
- Çevre dostu bir kaynağıdır.
- Yığın ve bozca bulmaz.
- Çeşitli yollar ile elde edilebilir.
- Dış kaynaklara bağımlılığı azdır.
- Aktive zarar vermez.
- Güvenilir bir kaynağıdır.

KAYNAKLAR

<http://www.kocaeli.edu.tr/enerji/enerji-ve-temiz-enerji/>

<http://www.kocaeli.edu.tr/enerji/enerji-ve-temiz-enerji/>

<http://www.kocaeli.edu.tr/enerji/enerji-ve-temiz-enerji/>

<http://www.kocaeli.edu.tr/enerji/enerji-ve-temiz-enerji/>

438041-HELİN BAHADIR
438045-ESMANUR AKÇAY
438043-AYSU BAY
438070-BÜSRA ELİF GÖKTÜRK

438041-HELİN BAHADIR
438045-ESMANUR AKÇAY
438043-AYSU BAY
438070-BÜSRA ELİF GÖKTÜRK

Within the scope of educational activities related to SDG-7, a poster presentation event was held on 23.05.2025 with the participation of second-year Vocational School students. Within the framework of the theme "Affordable and Clean Energy," students prepared poster presentations. The works addressed topics such as renewable energy sources (solar, wind, hydroelectric, biomass), the environmental impacts of fossil fuels, energy conservation, and carbon footprint. Students expressed the information they obtained through their research via visual presentations. In the prepared posters, the environmental sustainability and economic dimensions of clean energy use were emphasized, and the presentations contributed to raising awareness among participants through shared discussions during the event.

9



During the event, contributions were made to the development of students' research, analysis, visual expression, and presentation skills. The activity was completed in a way that supported increasing students' awareness of energy efficiency and sustainability issues.

Opening Ceremony of the Energy Efficient Composite Materials Laboratory



Within the scope of research and infrastructure development activities related to SDG-7, the “Energy Efficient Composite Materials Laboratory” established within the Department of Metallurgical and Materials Engineering was officially inaugurated. The opening ceremony was attended by the President of the Council of Higher Education (YÖK), Prof. Dr. Erol Özvar, KTÜ Rector Prof. Dr. Hamdullah Çuvalcı, Dean of the Faculty of Engineering Prof. Dr. Temel Varol, and Head of the Department Prof. Dr. Aykut Çanakçı.

In the laboratory, research is conducted in fields focused on energy efficiency and advanced materials technologies, including thin-film coatings, supercapacitors, gas sensors, battery technologies, superconductors, electrochromic devices, as well as radar-absorbing materials. A total of 13 ongoing projects supported by TÜBİTAK and institutional BAP funds are currently being carried out within the laboratory, and support processes for newly proposed projects are also ongoing.

It is aimed that the newly inaugurated laboratory will contribute to academic studies in the fields of energy efficiency and sustainable technologies.



1st Access to Affordable and Clean Energy Event



Within the scope of awareness-raising activities related to SDG-7 (Affordable and Clean Energy), the "Access to Affordable and Clean Energy Event-1" was organized by the Vocational School of Health Services.



Career in the Energy Sector

ENERJİ SEKTÖRÜNDE KARIYER

Konuşmacı: Ali OKUR
Sanko Enerji
Koçlu HES İşletme Müdürü

Tarih: 16 Mayıs 2025
Saat:14.30

Adres: Karadeniz Teknik Üniversitesi
Halis Duman Amfisi
Ortahisar/TRABZON

KARADENİZ TEKNİK ÜNİVERSİTESİ
Elektrik-Elektronik Mühendisliği

MİLLÎ EĞİTİM BAKANLIĞI MÜHÜRÜ

Within the scope of activities related to SDG-7, a talk event titled "Career in the Energy Sector" was organized. The event addressed career opportunities and sectoral experiences in the energy industry. Ali Okur, Plant Manager of Sanko Energy Koçlu Hydroelectric Power Plant, participated as the keynote speaker. Participants had the opportunity to gain insights into energy production processes, the operation of hydroelectric power plants, and career planning in the energy sector. The event was held on May 16, 2025. The program aimed to increase students' awareness of the energy sector and support their professional orientation.



The Potential and Exploration Activities of Black Sea Energy Resources

KARADENİZ ENERJİ KAYNAKLARININ POTANSİYELİ VE ARAMA FAALİYETLERİ

PANEL

KATILIMCILAR



Uzm. Jeofizik Müh. Ender KARAKUŞ
(TPAO Arama Daire Başkanlığı)
"Karadeniz'de Petrol ve Doğalgaz Arama Çalışmalarının Güncel Durumu"



Prof. Dr. Sadettin KORKMAZ
(KTÜ Jeoloji Müh. Bölümü-Emekli)
"Doğu Karadeniz Havzasının Enerji Kaynakları ve Potansiyeli"



Prof. Dr. Günay ÇİFCİ
(DEÜ Deniz Bilimleri ve Teknolojisi Enstitüsü Deniz Jeofiziği Öğretim Üyesi)
"Yakın Geleceğin Enerji Kaynağı: Gaz Hidratlar (Yanan Buz veya Sıkıştırılmış Gaz)"

MODERATÖR
Prof. Dr. Nilgün SAYIL
(KTÜ Jeofizik Müh. Bölüm Başkanı)

13:00
27 Şubat 2025
Hamamizade İhsanbey
Kültür Merkezi
Salon 1

Scan Me



On February 27, 2025, a panel titled "The Potential and Exploration Activities of Black Sea Energy Resources" was held at the Hamamizade İhsan Bey Cultural Center. The panel was chaired by Prof. Dr. Nilgün SAYIL. The event featured speakers including Geophysicist Expert Ender KARAKUŞ from the Exploration Department of the Turkish Petroleum Corporation (TPAO), Prof. Dr. Sadettin KORKMAZ, retired faculty member of the Department of Geological Engineering at Karadeniz Technical University, and Prof. Dr. Günay ÇİFCİ, faculty member of Marine Geophysics at the Institute of Marine Sciences and Technology, Dokuz Eylül University. During the panel, the energy resource potential of the Black Sea, ongoing and planned exploration activities aimed at revealing this potential, as well as current scientific and technical approaches were discussed.

Industry Meeting: "8th Energy Day"

Organized by the Energy Club of the Department of Energy Systems Engineering, the "Energy Days" event brought together leading representatives of the energy sector with students. The event addressed current developments in energy markets, career opportunities in the sector, and future expectations.

Guest speakers shared their professional experiences in the energy industry, including the challenges they encountered and their career success stories, in a sincere and engaging manner. Current topics such as renewable energy sources, energy efficiency, and the impact of digitalization on the energy sector were followed with great interest by participants. The speakers also provided important advice on the technical and personal competencies required for students to succeed in the field.

In the Q&A session, students had the opportunity to directly address their questions to industry representatives, gaining deeper insights into the functioning of the energy sector. The interactive nature of the event increased student participation and created a productive learning environment.

Overall, the "Energy Days" event significantly enhanced the sectoral awareness of Energy Systems Engineering students, contributed to their career planning, and supported the development of their professional vision. Department officials stated that similar events will continue to be organized in the coming periods.



Informative Event on Solar Power Plants in the World and in Türkiye within the Scope of ESML 5119 Course

Within the scope of the course ESML5119 - Computer-Aided Analysis of Renewable Energy Resources, an online informative event titled "Solar Power Plants in the World and in Türkiye" was held on November 6, 2025. The event was presented by Energy Systems Senior Engineer Abdurrahman SAKA, Technical Office Manager at MOY Renewable Energy Construction Import Export Limited Company. The presentation provided comprehensive information on the current status, development process, application examples, and sectoral trends of solar power plants in both the world and Türkiye. The event contributed to increasing students' knowledge and awareness in renewable energy sources, particularly in the field of solar energy.

4th Architecture and Energy Workshop on "Existing Buildings with the Goal of Carbon Neutrality"



Hosted by the Department of Architecture, Faculty of Architecture, Gebze Technical University, the "4th Architecture and Energy Workshop" was held on April 11-12, 2025. As a continuation of the workshop series, the first of which was organized at Balıkesir University in 2018, the second at Trakya University in 2022, and the third at Bursa Uludağ University in 2023, this event was carried out under the theme "Existing Buildings with the Goal of Carbon Neutrality". The main objective of the workshop was to raise awareness among Architecture students regarding global climate change and to enable them to develop a holistic approach toward carbon-neutral buildings in design processes.

Within the scope of the event, presentations were delivered by academics and industry representatives, addressing topics such as environmental issues, energy-related problems, architectural design approaches, and user comfort. On the second day of the workshop, design studies were conducted by student teams at the designated working area on the Çayırova Campus of Gebze Technical University. In this process, participants developed original, energy-efficient, environmentally friendly, and feasible design proposals in line with the given scenario. The activities were carried out under the supervision of academic coordinators and through collaborative team work.





Academic Contributions

In 2025, Karadeniz Technical University (KTÜ) continued its scientific production and research activities in the fields of energy efficiency, renewable energy systems, sustainable energy technologies, and energy management. Within this scope, a total of 85 scientific publications indexed in the Scopus database were produced, supporting the university's research capacity and academic visibility in the field of energy. According to institutional and external records, a total of 19 energy-related projects were supported, contributing to the development of research and implementation activities in sustainable energy.

In order to strengthen academic human resources in the field of energy, 4 doctoral dissertations and 2 master's theses were completed during 2025. These thesis studies contributed to scientific knowledge production in areas such as renewable energy applications, energy efficiency, environmental sustainability, and energy management. In addition, research activities conducted within the university supported interdisciplinary collaborations and contributed to the development of academic diversity in the energy field.

Throughout 2025, KTÜ carried out various initiatives aimed at raising awareness of sustainable energy management, encouraging the development of innovative technologies, and increasing student participation. Practices implemented in the areas of energy efficiency, renewable energy technologies, educational activities, and sectoral collaborations strengthened the university's institutional sustainability approach while also contributing to knowledge production in the energy field.





Sustainable KTU

Prepared by.

Assoc. Prof. Makbule ONUR

Asst. Prof. Demet Ülkü GÜLPINAR SEKBAN

This publication has been prepared by KTU Office of
Research Coordination



www.ktu.edu.tr/sustainability



surdurulebilirktu@ktu.edu.tr