Baku State University

2025 REPORT ON

7 AFFORDABLE AND CLEAN ENERGY

Introduction
SDG 7: AFFORDABLE AND CLEAN ENERGY

The transition toward sustainable energy systems has become one of the most critical global priorities of the 21st century. Universities play an essential role in this transformation by promoting research, innovation, and education related to renewable energy, environmental protection, and sustainable development. As climate change, energy security, and environmental degradation continue to challenge societies worldwide, academic institutions are increasingly expected to integrate sustainability principles into their infrastructure, teaching, and community engagement. In this context, initiatives that promote clean energy technologies, sustainable mobility, and environmental awareness are vital for shaping responsible future leaders and supporting global sustainable development goals.

Baku State University has taken a series of practical and strategic steps to contribute to sustainable energy development and environmental responsibility. Through initiatives such as renewable-energy powered charging stations, solar-powered campus facilities, eco-friendly transportation infrastructure, and active participation in international climate and energy events, the university demonstrates its commitment to sustainable innovation. These efforts not only improve the environmental performance of the campus but also create opportunities for students and researchers to engage directly with modern green technologies and sustainability practices. By integrating sustainability into both its infrastructure and academic activities, the university contributes to national and global efforts aimed at reducing carbon emissions, supporting green economic development, and promoting responsible energy use.

For previous year's report please see:

https://sdg.bsu.edu.az/report-on-sdg-7-affordable-and-clean-energy

Dedicated lanes for bicycles and small electric vehicles at the main entrance of BSU

Dedicated lanes for bicycles and small electric vehicles have been established at the main entrance of Baku State University. These lanes were created in accordance with the Decree of the President of the Republic of Azerbaijan, Ilham Aliyev, dated January 30, 2025, on the “Approval of the State Program for the Improvement of Transport Infrastructure in Baku and Surrounding Areas for 2025–2030.” The initiative aims to develop micromobility, reduce traffic congestion, decrease reliance on private cars, and promote sustainable and environmentally friendly urban transport. Secure bicycle parking spaces have also been installed along these lanes.

For more information, please click here

Opening of the “Student Space” at BSU

On May 26, 2025, Baku State University (BSU), in cooperation with the Azerbaijan Trade Unions Confederation (AHIK), opened a new “Student Space” on campus. During the ceremony, Rector Elchin Babayev described it as one of the most successful initiatives implemented within the “Year of Constitution and Sovereignty,” noting that it will enrich students’ social life.

The space is designed for leisure activities, discussions, and project implementation. It features solar-powered lighting and a 24/7 mini-library accessible to all students. AHIK Chairman Sahib Mammadov and other speakers emphasized that the project will promote student socialization, leadership skills, and the overall development of the university.

For more information, please click here

BSU and KOBIA open EcoEnergy Station on Campus

An EcoEnergy Station powered by renewable energy sources has been inaugurated at Baku State University (BSU) in partnership with the Small and Medium Business Development Agency (KOBIA). The station uses solar and wind energy to provide clean charging for electric vehicles.

Rector Elchin Babayev highlighted green energy and green economy as national priorities. The “Clean-Charge” AC station was among the winners of KOBIA’s 5th grant competition, receiving nearly 20,000 AZN in funding. Chairman Orkhan Mammadov emphasized support for innovation-driven projects.

With a total capacity of 22 kWh, the station aims to reduce carbon emissions, contribute to the UN Sustainable Development Goals, and be integrated into the academic curriculum. The event concluded with a live demonstration of an electric vehicle charging at the new station.

For more information, please click here

Opening ceremony of the UN Local Conference of Youth on Climate Change – “LCOY Azerbaijan 2025” held at BSU

The opening ceremony of “LCOY Azerbaijan 2025,” the United Nations Local Conference of Youth on Climate Change, was held at Baku State University, organized by the “EkoSfera” Ecological-Social Center in partnership with SEA BREEZE Resort and with media support from CBC – Caspian International Broadcasting Company.

The conference gathered more than 150 young climate leaders, government representatives, and international organizations. Speakers emphasized the key role of youth in combating climate change.

The event is part of the YOUNGO platform and aims to contribute to the upcoming COP30.

Panel discussions covered topics such as climate leadership, digital platforms, AI in environmental monitoring, and sustainable agriculture. The second day will continue at "SEA BREEZE Resort," where the Azerbaijan Youth Climate Declaration will be adopted.

For more information, please click here

BSU represented at Baku Energy Week

Baku State University took part in Baku Energy Week, which brings together three major platforms: the 30th Anniversary Caspian Oil and Gas Exhibition, the 13th Caspian Power Exhibition, and the 30th Anniversary Baku Energy Forum.

Within the "Smart Energy Hub" startup zone, 10 local and international projects were presented. At the BSU booth, the university showcased its renewable energy-powered charging station, operating with solar and wind energy and supporting CCS2 and GBT standards. In the future, it will also enable charging for electric bicycles and scooters used by students. This year, Baku Energy Week is hosting 267 companies from 39 countries.

For more information, please click here

National Youth Climate Statement of Azerbaijan adopted at the UN Local Conference of Youth on Climate Change

The second day of “LCOY Azerbaijan 2025,” organized by the “EkoSfera” Ecological-Social Center in partnership with Baku State University and SEA BREEZE Resort, with media support from CBC – Caspian International Broadcasting Company, was successfully held.

In his speech, Mukhtar Babayev described Azerbaijan’s hosting of COP29 as a historic milestone and emphasized the importance of active youth participation in climate processes. Other officials also highlighted the key role of young people in building a sustainable future.

Panel discussions covered sustainable infrastructure, circular economy, biodiversity, ESG principles, green jobs, and water security. At the end of the event, the draft National Youth Statement on Climate was adopted, which will contribute to the Global Youth Statement to be presented at COP30.

For more information, please click here

Systematic, planned and thoughtful measures are being implemented in our country to combat climate change – Elchin Babayev

The Rector of Baku State University, Elchin Babayev, stated at a roundtable titled "Information Warfare: The Nature and Objectives of Information Attacks Against Azerbaijan on the Eve of COP29" that systematic and well-planned measures are being implemented in the country to diversify the green economy and combat climate change. He emphasized that Azerbaijan has mobilized all its resources to organize COP29 at the highest level. The declaration of 2024 as the "Year of Solidarity for a Green World" by Ilham Aliyev reflects this commitment.

According to Babayev, Azerbaijan's achievements have triggered information attacks and disinformation campaigns ahead of COP29, aimed at undermining the country's growing international reputation and distracting it from its objectives.

For more information, please click here

BSU becomes the South Caucasus leader in "UI GreenMetric 2025" Ranking

Baku State University has become the leader in the South Caucasus according to the UI GreenMetric World University Ranking 2025. The university ranked 493rd among 1,745 universities from 105 countries, improving by 114 positions compared to last year, and secured the top position among 19 Azerbaijani higher education institutions included in the ranking.

The ranking evaluates universities based on ecological sustainability criteria, including campus environmental impact, energy policies, water management, digitalization, sustainable transportation, integration of environmental topics into education, and research output on sustainability.

This achievement highlights BSU's environmental initiatives and commitment to sustainable development, further strengthening its international standing.

For more information, please click here

Scientific seminar at BSU: Carbon credit market and potential opportunities

The scientific seminar titled “Carbon Credit Market and Potential Opportunities” was organized by the Nano-Research Scientific Laboratory operating under Baku State University. Presentations were delivered by laboratory researchers Orkhan Gulahmadov and Kim Jiseok.

Orkhan Gulahmadov described climate change and the energy crisis as two of the most serious global challenges of our time, explaining the negative impacts of increasing carbon dioxide (CO_2) emissions on ecosystems, human health, and economic systems. He also provided information about international initiatives and mechanisms implemented to address these issues.

Kim Jiseok explained the essence and functioning principles of the carbon credit market, as well as the economic value of credits granted in exchange for reducing emissions. He outlined the fundamental principles of the carbon credit system and referred to the experiences of the European Union, Japan, Canada, and South Korea.

During the seminar, it was emphasized that following COP29, held in Baku in 2024, the regulation of carbon emissions and the implementation of a carbon taxation system have become key priorities on Azerbaijan’s national agenda. It was noted that strengthening cooperation between government institutions, the private sector, and academic and research institutions is essential for the development of a national carbon credit market. The seminar concluded with a Q&A session.

For more information, please click here

Deputy director of the State Agency on Renewable Energy Sources delivers a masterclass at BSU

At the Faculty of Ecology and Soil Science of Baku State University (BSU), Fagan Abdurahmanov, Deputy Director of the State Agency on Renewable Energy Sources under the Ministry of Energy, delivered a masterclass entitled “Renewable Energy Sources and the Development of Green Energy in Azerbaijan: Current Status and Future Prospects.”

In his opening remarks, Faculty Dean Associate Professor Akif Agbabali highlighted the importance of such educational initiatives in enhancing students’ knowledge and skills, as well as in guiding their future career choices. He expressed his gratitude to the speaker and the delegation, emphasizing the value of providing students with internship and exchange opportunities within the relevant departments of the State Agency on Renewable Energy Sources.

During his presentation, Mr. Abdurahmanov elaborated on the role of green energy in environmental protection and provided comprehensive information about ongoing wind and solar energy projects, which are considered highly promising sectors in Azerbaijan. He discussed production mechanisms, economic efficiency, the country’s current utilization of renewable energy sources, the installed capacities of wind and solar power plants, and planned future projects. The session concluded with a Q&A segment, during which students’ questions were addressed.

For more information, please click here

The 1st International Scientific Conference on "A Sustainable Future: Integrated Development of Earth Sciences and Ecology" is being held at BSU

The 1st International Scientific Conference titled "A Sustainable Future: Integrated Development of Earth Sciences and Ecology" was held at Baku State University. The conference was organized with the participation of several international universities. During the opening ceremony, the Vice-Rector for Science and Innovation of BSU, Huseyn Mammadov, spoke about Azerbaijan's efforts to ensure energy security, transition to a green economy, and protect the environment. He also emphasized that the document Azerbaijan 2030: National Priorities for Socio-Economic Development identifies sustainable economic development and a clean environment among the country's main priorities. In recent years, more than 120 scientific projects have been implemented at BSU with the participation of over 700 students and researchers. Scientists from 12 countries are participating in the conference, and 280 scientific papers are included in the program. The Rector of Baku Higher Oil School, Elmar Gasimov, highlighted the importance of the conference for regional sustainable development and for discussing environmental issues related to the Caspian Sea.

For more information, please click here

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SUSTAINABLE DEVELOPMENT GOALS

Conclusion

The activities and initiatives described in the report illustrate how academic institutions can actively support the transition toward sustainable energy systems and environmentally responsible development. By implementing renewable energy solutions, encouraging sustainable transportation, and promoting climate awareness among students and researchers, the university demonstrates a comprehensive approach to sustainability. Such initiatives not only reduce environmental impact but also strengthen the educational and research environment by providing practical examples of green technologies and sustainable practices.

In the long term, continued investment in renewable energy, environmental education, and international collaboration will remain essential for achieving sustainable development objectives. Universities that prioritize sustainability contribute not only to scientific advancement but also to the development of environmentally conscious societies. Through its initiatives, research activities, and engagement with global climate discussions, Baku State University positions itself as an active participant in the global movement toward a cleaner, more sustainable future and serves as a model for integrating sustainability into higher education institutions.

SDG Focused Memberships

aashe member
The Association for the Advancement of Sustainability in Higher Education

WAITRO

CANIE
climate action network

ISCN
International Sustainable Campus Network

GUNI
GLOBAL UNIVERSITY NETWORK FOR INNOVATION

SDG FOCUSED RANKING RESULTS

Rated for Excellence

Baku State University

Through rigorous and independent data collection and analysis of performance metrics as set out in the QS Stars™ methodology Baku State University has been awarded 5 Stars.

★★★★★ TEACHING	★★★★★ FACILITIES
★★★★★ EMPLOYABILITY	★★★★★ GOOD GOVERNANCE
★★★★★ ENVIRONMENTAL IMPACT	★★★★★ ACADEMIC DEVELOPMENT
★★★★ GLOBAL ENGAGEMENT	★★★★ CHEMISTRY
★★★★★ DIVERSITY, EQUITY & INCLUSION	

QS Stars

The QS Stars™ rating system evaluates universities across a wide spectrum of important performance indicators as set against pre-established international standards. By assessing a broader scope of criteria than any world ranking exercise, QS Stars™ illuminates the unique strengths and diversity of the rated institution with both precision and clarity.

Leigh Kamolins, Head of Evaluation


UI GreenMetric
UNIVERSITAS INDONESIA
UI GreenMetric World University Rankings 2025
CERTIFICATE
This certificate is awarded to
Baku State University
as The 493rd World's Most Sustainable University
in 2025 UI GreenMetric World University Rankings
5 December 2025
Dr. Vishnu Juwono, S.E., MIA
Chairperson of UI GreenMetric

QS WORLD UNIVERSITY RANKINGS

SUSTAINABILITY RANKINGS 2025

Baku State University

941-950

in overall performance

December 2024

Date

Ben Sowter
Senior Vice-President
QS Quacquarelli Symonds

4. RANKING IN AZERBAIJAN

Country Ranking	SI Ranking	EC Ranking	WS Ranking
1	2	11	3

WR Ranking	TR Ranking	ED Ranking
5	1	2

2. RESULTS SUMMARY

World Ranking	SI Ranking	EC Ranking	WS Ranking
493	660	1102	654

WR Ranking	TR Ranking	ED Ranking
607	98	239

3. WORLD RANKINGS HISTORY

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UNIVERSITY PROFILE

NAME : BAKU STATE UNIVERSITY
EST. : 1919
COUNTRY : AZERBAIJAN

1. VERIFIED DATA

Campus Sustainability Scores

Overall Performance
68.75 %

Total Score
6875 / 10000

68.75%

SI Setting & Infrastructure
Current: **950** Maximum: 1500
63.33%

WR Water
Current: **662.5** Maximum: 1000
66.25%

EC Energy & Climate Change
Current: **1000** Maximum: 2100
47.62%

TR Transportation
Current: **1625** Maximum: 1800
90.28%

WS Waste
Current: **1075** Maximum: 1800
59.72%

ED Education & Research
Current: **1562.5** Maximum: 1800
86.81%

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THE IMPACT RANKINGS

THE Impact Rankings 2025

Download

OVERALL SCORE	OVERALL RANK	SDG PARTICIPATED
71.8 out of 100	401–600 out of 2318 institutions	15 out of 17 Sustainable Development Goals

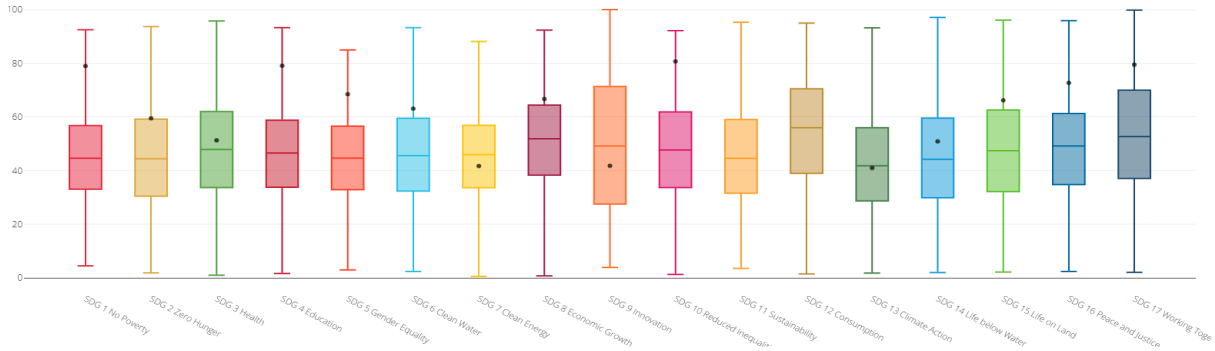
OVERALL RANK

401–600 out of 2318 institutions

7 AFFORDABLE AND CLEAN ENERGY

OVERALL SCORE	OVERALL RANK	SDG PARTICIPATED
71.8 out of **100**	**401–600** out of **2318** institutions	**15** out of **17** Sustainable Development Goals

SDG SCORES



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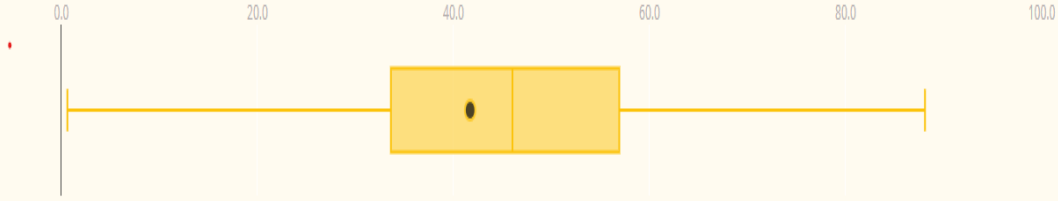
AFFORDABLE AND CLEAN ENERGY

SCORE **41.7** RANK **601–800** out of 1181 institutions



SCORE **40.3** Research on clean energy

27% OF THIS SDG

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SCORE
70.1 University measures towards affordable and clean energy

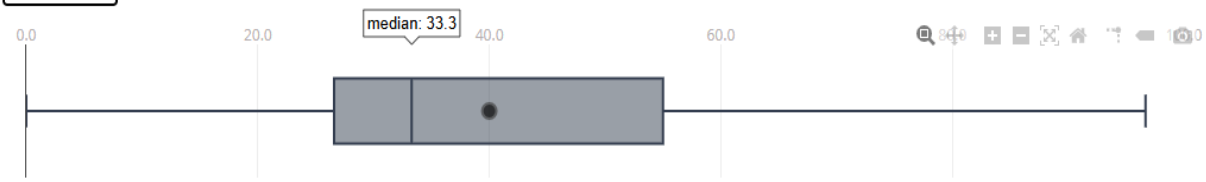
23% OF THIS SDG

SCORE
20.4 Energy use density

17% OF THIS SDG

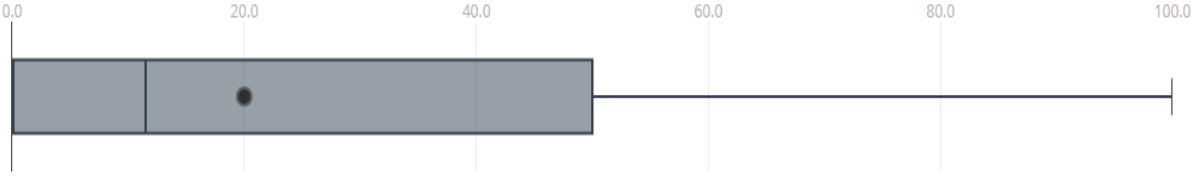
SCORE
40.0 Energy and the community

23% OF THIS SDG



SCORE
20.0 Low-carbon energy use

10% OF THIS SDG



SDG FOCUSED RESEARCH

Introduction

Baku State University (BSU) is actively contributing to the global effort to achieve Sustainable Development Goal 7 (SDG 7), which aims to ensure access to affordable, reliable, sustainable, and modern energy for all. Research at BSU focuses on advancing clean energy technologies, enhancing energy efficiency, and promoting sustainable energy practices tailored to Azerbaijan's national context. Scholars at BSU are engaged in a wide range of studies, from solar and wind energy systems to hydrogen production, energy storage, and smart grid technologies. These initiatives not only address local energy challenges, such as reliance on fossil fuels and seasonal fluctuations in energy supply, but also contribute to global sustainability efforts by exploring innovative, low-carbon solutions. By combining experimental, computational, and applied research approaches, BSU researchers aim to foster technological innovation, support the transition to renewable energy sources, and strengthen Azerbaijan's role in the international clean energy landscape.

For all SDGs related articles please visit :

https://www.scopus.com/pages/organization/60071969#tab=sdgs

SDG contributions

Goal 1: No poverty	9 documents	Goal 10: Reduced inequalities	40 documents
Goal 2: Zero hunger	74 documents	Goal 11: Sustainable cities and communities	37 documents
Goal 3: Good health and well-being	241 documents	Goal 12: Responsible consumption and productior	44 documents
Goal 4: Quality education	21 documents	Goal 13: Climate action	55 documents
Goal 5: Gender equality	12 documents	Goal 14: Life below water	50 documents
Goal 6: Clean water and sanitation	83 documents	Goal 15: Life on land	31 documents
Goal 7: Affordable and clean energy	353 documents	Goal 16: Peace, justice and strong institutions	36 documents
Goal 8: Decent work and economic growth	68 documents	Goal 17: Partnership for the goals	47 documents
Goal 9: Industry, innovation and infrastructure	101 documents		

1. Authors: Mammadov F.M., Babanly D.M., Bakhtiyarli I.B., Babanly M.B.

Focus: Fe-Ga-Se system, particularly FeSe–Ga_2Se_3–Se region, solid-phase equilibria, and thermodynamic properties of ternary phases.

Methods: EMF measurements across 300–450 K; analysis of Gibbs energy, enthalpy, and entropy for compounds and solid solutions.

Findings: Stable solid solutions of Ga_2Se_3 and $FeGa_2Se_4$ with elemental Se; key thermodynamic functions calculated.

Recommendation: Provides foundational thermodynamic data for Fe–Ga–Se compounds.

Full text

2. Authors: Ali I., Imanova G.T., Agayev T.N., Kurniawan T.A., Yangkou M.X.
Focus: Hydrogen production via water splitting using nano-BeO photocatalyst.
Methods: Radiation–thermal conditions, electron paramagnetic resonance (EPR) for defect analysis.
Findings: 90–96% of non-equilibrium carriers reacted with adsorbed water; high catalytic activity at elevated temperatures.
Recommendation: Promising approach for scalable green hydrogen production.
Full text

3. Authors: Mammadov E.S., Kerimli F.S., Akhmedova N.F., Mammadov S.E., Mirzaliyeva S.E.Q.
Focus: Modification of ZSM-5 HTsVM zeolite with cerium oxide for bioethanol-to-hydrocarbon conversion.
Methods: Catalytic testing, structural analysis of CeO_2/HTsVM catalysts.
Findings: 3% CeO_2/HTsVM improved isomerization selectivity (~46%) and gasoline fraction met Euro 5 standards.
Recommendation: Efficient catalyst design for sustainable fuel production.
Full text

4. Authors: Azeem N., Iqbal M.W., Kumar A., Ismayilova N.A., Alrobei H.
Focus: Cs_2CuMoX_6 (X = Cl, Br) double perovskites for lead-free solar cells.
Methods: DFT calculations of structural, electronic, optical, and mechanical properties.
Findings: Thermodynamically stable, suitable band gaps (1.28 eV for Cl, 1.15 eV for Br); $Cs_2CuMoBr_6$ shows superior light absorption.
Recommendation: Potential materials for sustainable photovoltaics.
Full text

5. Authors: Bekpulatov I.R., Imanova G.T., Nabiev D.K., Jabarov S.H., Aliyev Y.I.
Focus: Effects of annealing on Mn_4Si_7 thin films.
Methods: Electrical and optical property characterization.
Findings: Increased crystal size enhanced carrier mobility and conductivity; suitable bandgaps for NIR applications.
Recommendation: Promising material for photodetectors, optoelectronics, and thermal imaging.
Full text

6. Authors: Zeeshan M., Gouadria S., Alharbi F., Iqbal M.W., Sunny M.A., +5 authors
Focus: CuMn-MOF doped with Ag nanoparticles for supercapattery applications.
Methods: Hydrothermal synthesis, electrochemical testing.

Findings: Capacity of 2800 C/g, 63 Wh/kg at 1690 W/kg, 90% retention over 12,000 cycles; excellent HER performance.
Recommendation: Material suitable for energy storage, hydrogen production, and portable electronics.
Full text

7. Authors: Ashraf M., Gouadria S., Alharbi F., Iqbal M.W., Sunny M.A., +5 authors
Focus: Correction to previous article on CuMn-MOF/Ag composites.
Methods: Updated grant number and author affiliation.
Findings: Correct grant RPFAP-59-1445; Haseebul Hassan affiliated with Riphah International University, Pakistan.
Recommendation: Ensures accurate record of research contributions.
Full text

8. Authors: Salmanova F.A., Salamov O.M., Mustafayeva R.M., Velizade I.E., Yusupov I.M.
Focus: Thermal performance of solar collectors for Azerbaijan's Absheron Peninsula.
Methods: 2D heat transfer modeling, numerical simulation via spline method in Turbo Pascal.
Findings: Reliable prediction of thermal efficiency; supports solar energy adoption in the region.
Recommendation: Useful for sustainable solar water heating design.
Full text

9. Authors: Isik M., Altuntaş G., Gasanly N.M.
Focus: Thermal stability and decomposition of gallium sulfide (GaS).
Methods: TGA, DTA, DSC analysis.
Findings: Stable up to 722 °C; decomposition above 786 °C; suitable for high-temperature electronics.
Recommendation: Candidate material for thermophotovoltaics and sensors.
Full text

10. Authors: Zeynalova A.O., Soltanova N.S., Gurbanova U.M., Aliyev A.S., Tagiyev D.B.
Focus: Co-deposition of Ni and Co from glycine-containing electrolytes.
Methods: Electrochemical analysis of thin film formation.
Findings: Cobalt-dominant amorphous Ni-Co films with excellent HER activity (Tafel slope 118 mV/dec).
Recommendation: Promising for electrocatalysis and energy applications.
Full text

11. Authors: Zeeshan M., Gouadria S., Alharbi F., Iqbal M.W., Sunny M.A., +5 authors
Focus: Correction of affiliation for Haseebul Hassan.
Methods: Updated affiliation information.
Findings: Corrected to Riphah International University, Pakistan.
Recommendation: Accurate attribution for publication record.
Full text

12. Authors: Gulahmadov O., Muradov M.B., Gahramanli L., Karimova A., Mammadyarova S., +3 authors
Focus: Fe_3O_4 nanoparticle-embedded nylon films for triboelectric nanogenerators (TENGs).
Methods: Spray coating and weak magnetic field application.
Findings: Enhanced voltage (56.3 V) and current (4.62 μA); improved energy harvesting.
Recommendation: Promising approach for sustainable energy and sensors.
Full text

13. Authors: Asgarov T.K., Ragimova N.A., Gadirova E.M.
Focus: Intelligent control and energy management systems for energy complexes.
Methods: SCADA architecture, smart grid technologies, ML and deep learning for data optimization.
Findings: Optimized real-time energy consumption; classification of smart system components.
Recommendation: Framework for efficient energy management and smart infrastructure.
Full text

14. Authors: Teymurova V.E., Abdullayeva S., Muradova K., Aslanova M.M., Bayramli M.
Focus: Environmental challenges and human capital in Azerbaijan.
Methods: Analysis of air pollution, land degradation, water scarcity, climate change, and economic impacts.
Findings: HDI fluctuations; low vocational education limits innovation; green technology adoption crucial.
Recommendation: Strengthen human capital and environmental strategies for sustainable growth.
Full text

15. Authors: Rauf M.A., Iqbal M.W., Sunny M.A., Alomayri T.S., Alotaibi M.T.
Focus: PANI@$MoSe_2$/Cr_2C hybrid electrode for supercapacitors.
Methods: Hydrothermal synthesis, electrochemical testing.
Findings: High energy (72.92 Wh/kg) and power density (400 W/kg); excellent cycling stability; efficient HER performance.
Recommendation: Promising for energy storage and catalytic applications.
Full text

16. Authors: Mukhametov A.E., Moreva E.L., Bayramli M., Smirnov A.V., Egorov I.
Focus: SMART diversification strategies for Arabian Peninsula economies.
Methods: Economic structure and oil price analysis (1970–2023), modeling digital and renewable sectors.
Findings: Emphasis on renewables, food production, and technology for sustainable growth.
Recommendation: Guide for resilient regional economic development.
Full text

17. Authors: Aligayev A.K., Jabbarli U., Samadova U.F., Papanikolaou S., Huang Q.
Focus: Hydrogen production and dissociation from ammonia and methane on graphene.
Methods: Multi-scale computational modeling of pristine and Ni-doped graphene.
Findings: Ni-doped graphene improves adsorption, hydrogen transmission, and gas separation efficiency.
Recommendation: Suitable for hydrogen production, gas sensing, and catalysis.
Full text