Azerbaijan
TECHNICAL
University

CLIMATE ACTION PLAN ‘till 2030

Document type	**Plan**
Scope (applies to)	All staff
Applicable date	2024
Review/Expiry date	2026
Approver	University Council
Document owner	Chemical technology, recycling and ecology department
Document status	Published
Information classification	Public
Key terms	Climate Change/Action Plan
Purpose	The Climate Change Policy Document of ***Azerbaijan Technical University*** (hereinafter referred to as the Document) is prepared based on the decisions of the United Nations Framework Convention on Climate Change (UNFCCC) adopted at COP 28 conference in 2023, the Basic Regulations of the Forest Development Service under the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan (Baku, 2020), and the Decree of the President of the Republic of Azerbaijan Ilham Aliyev dated February 2, 2021, on the "National Priorities for Socio-Economic Development of Azerbaijan 2030" to combat climate change.

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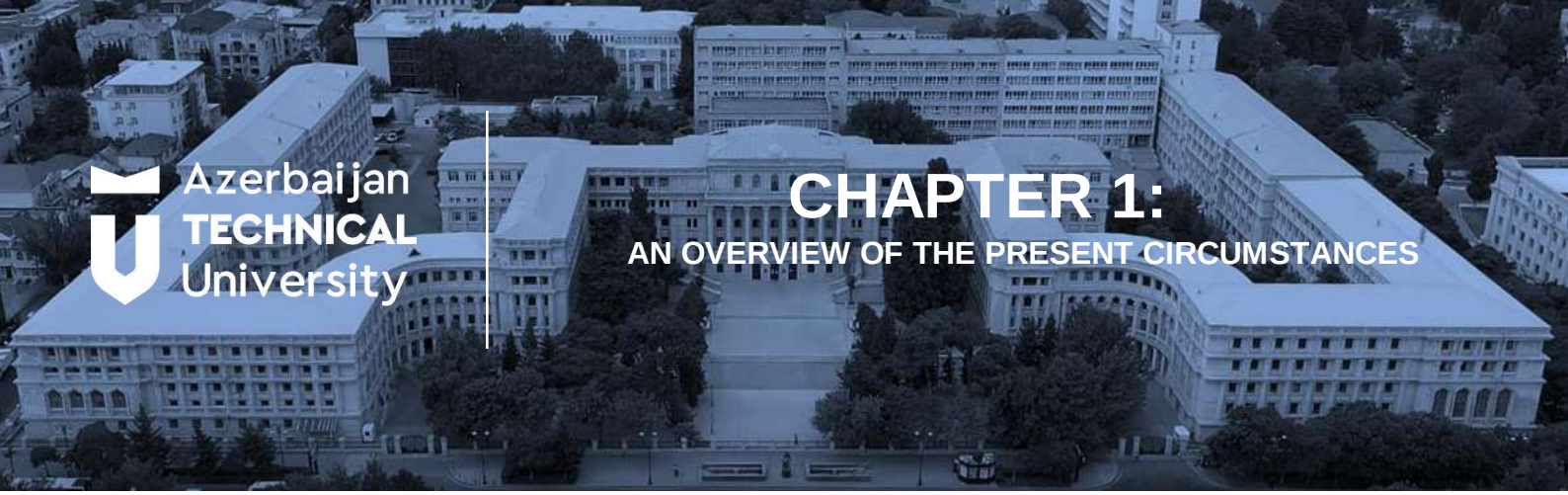


CHAPTER 1:
AN OVERVIEW OF THE PRESENT CIRCUMSTANCES

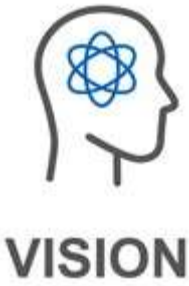
1.1 Introduction:

Our planet's climate has always been changing, but it's happening much faster now than ever before. The reason for this is that humans are releasing gases into the atmosphere that trap heat, causing the Earth to warm up. We do this by burning fossil fuels like coal, gas, and oil, and by farming and using the land in ways that contribute to climate change. This is a big problem because the Earth is changing too quickly for living things to adapt.

To help address this problem, the ***Azerbaijan Technical University (AzTU)*** has created a Climate Action Policy. The goal of this policy is to promote sustainable practices within the university community and contribute to global efforts to stop climate change. AzTU wants to be a leader in this area by becoming carbon neutral, which means not releasing any more greenhouse gases than they can remove from the atmosphere.

AzTU has a long history of being a leader in science, engineering, and technology, and they want to continue this tradition by producing projects that will help create a better future.

1.2. Vision & Mission:



Vision: Providing students with information about climate change and imparting knowledge about ways to mitigate it. Our goal is to help students understand the impact of climate change and ways to reduce its effects. We want to provide them with the knowledge and tools to protect the environment and create a sustainable future.

Mission: To mitigate climate change by minimizing environmental pollution and transitioning to green energy technologies.

Our mission is to encourage people to adopt sustainable practices that reduce pollution and promote green energy. By promoting awareness and encouraging sustainable behavior, we can create a healthier planet for future generations. We are dedicated to achieving this goal through education, advocacy, and community involvement.

1.3 Current Initiatives at AZTU

Azerbaijan Technical University is a leading institution that actively participates in regional and international networks to promote sustainability and higher education. The university is affiliated with prestigious associations like the Eurasian Universities Union (EURAS), the Eurasian Universities Association (EUA), The Association of State Universities of Caspian Region Countries, the Black Sea Universities Network, CIS International Innovation Centre for Nanotechnology, and EIFL (Electronic Information for Libraries), among others. Through these partnerships, ***Azerbaijan Technical University*** fosters opportunities for collaboration and knowledge-sharing with similar organizations worldwide, while underscoring its dedication to sustainability.

To mitigate its environmental impact, ***Azerbaijan Technical University*** has implemented various energy efficiency measures, including transitioning to clean and sustainable heating systems, installing hermetically sealed and double-glazed windows to reduce heat loss, and utilizing low-carbon, energy-efficient fuels. The university has also expanded renewable energy production, implemented efficient waste management technologies, and promoted the expansion of forest areas and gasification to prevent deforestation. These efforts align with its goal of reducing greenhouse gas emissions and promoting environmental stewardship.

Azerbaijan Technical University has installed two wind turbines and plans to install additional solar panels shortly to embrace sustainable energy solutions. The university supports national initiatives that emphasize the development of "smart" cities and villages in the liberated territories of Azerbaijan, declared as "green zone" territory by President Ilham Aliyev, following the victory in the 44-day Patriotic War. Azerbaijan Technical University leverages its scientific expertise and research capabilities to support these initiatives.

At ***Azerbaijan Technical University***, sustainability is not just a goal but a core principle that guides its actions, both locally and globally.

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CHAPTER 2:
CLIMATE CHANGE POLICY DOCUMENT OF AZTU

2.1. Purpose

2.1.1. The Climate Change Policy Document of ***Azerbaijan Technical University*** (hereinafter referred to as the Document) is prepared based on the decisions of the United Nations Framework Convention on Climate Change (UNFCCC) adopted at COP 28 conference in 2023, the Basic Regulations of the Forest Development Service under the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan (Baku, 2020), and the Decree of the President of the Republic of Azerbaijan Ilham Aliyev dated February 2, 2021, on the "National Priorities for Socio-Economic Development of Azerbaijan 2030" to combat climate change.

2.1.2. This Document serves to eliminate all activities at ***Azerbaijan Technical University*** (AzTU) that may negatively impact climate change resulting from environmental pollution and atmospheric contamination by harmful gases.

2.1.3. AzTU prioritizes the preservation of a teaching and working environment that does not allow activities contributing to climate change caused by environmental pollution and atmospheric contamination. It commits to undertaking appropriate measures to combat climate change in accordance with international agreements, conventions, conferences, and decisions accepted by international legal acts and national legislation.

2.2. Causes of Climate Change

2.2.1. The causes of climate change resulting from environmental pollution and atmospheric contamination include factors creating the greenhouse effect in the atmosphere, including increased emissions of CO2, methane, and other gases, the formation of the ozone hole due to the release of freons into the atmosphere, the excess accumulation of aerosols, anthropogenic dust, and similar factors. AzTU conducts scientific research in these areas, which will continue in the future. The increased amount of these gases has led to deviations from the average temperature norms on Earth, resulting in intensified and accelerated phenomena such as storms, droughts, heatwaves, hurricanes, precipitation, floods, and others. The surface of the ocean, which used to be warmed up to a depth of 1000 meters, now reaches depths of 2000 meters, negatively affecting the flora and fauna of marine ecosystems.

2.2.2. Global climate changes, including the excess emission of greenhouse gases and aerosols beyond the permissible levels, leading to the greenhouse effect and negatively affecting average climate indicators on Earth, unstable precipitation patterns, increased occurrences of floods and droughts, and the melting of glaciers leading to rising sea levels. The AzTU leadership and employees commit to a policy of limiting the temperature increase of the environment within 1.5-2°C.

2.3. Scope

2.3. The current Document applies to all students, academic and administrative staff participating in educational programs, especially in bachelor's programs such as "Environmental Engineering," "Chemical Engineering," "Occupational Safety Engineering," and master's programs such as "Reprocessing Technologies of Metallurgical Waste," "Efficient Use and Protection of Natural Resources," "Conservation and Recycling of Natural Resources," "Transport Ecology," "Environmental Protection in the Oil and Chemical Industry," and other related fields. It also applies to all members participating in the university's social activities.

2.4. Protected Values

2.4.1. This Document opposes and prohibits any activities in all state and private organizations, industrial sectors, and institutions that may contribute to global climate change resulting from environmental pollution and atmospheric contamination.

2.4.2. This Document declares AzTU's commitment to environmental protection, prevention of disturbances caused by climate change, and the obligation to create a clean and environmentally friendly environment suitable for human life.

2.4.3. AzTU instills a work culture that prohibits environmental pollution, combustion of waste, discharge of effluents into the environment without proper treatment, and emission of gases into the atmosphere without purification.

2.5. Education and Awareness

2.5.1. AzTU declares its commitment to organizing continuous conferences, seminars, and training sessions to address and raise awareness about the prevention of environmental pollution and climate change.

2.5.2. This initiative aims to foster mutual understanding and respect within the AzTU community.

2.5.3. The "Eco-Technology" society operates within AzTU, involving students, master's students, and teachers. They conduct awareness-raising activities and publish scientific articles on climate change and environmental protection.

2.6. Management and Responsibilities

2.6.1. All members of the AzTU community, including leaders (rectors, vice-rectors), employees, workers, students, and teachers, share the responsibility to support and promote the policy against pollution contributing to climate change.

Supervisors, regulators, and the professorial staff bear direct responsibility for preventing and eliminating incidents that may contribute to climate change and promptly reporting incidents according to their competence. A department for "Labor Protection and Technical Safety" is established within the university to implement these activities.

2.6.2. Any individual witnessing incidents contributing to climate change resulting from environmental pollution and atmospheric contamination must immediately report the incident to the relevant department (person).

2.6.3. All members of the AzTU community, including leaders (rectors, vice-rectors), employees, workers, students, and teachers, collaborate to implement joint activities based on the approved action plan to achieve sustainable development, combat climate change, and protect ecosystems on the university campus and in other locations."

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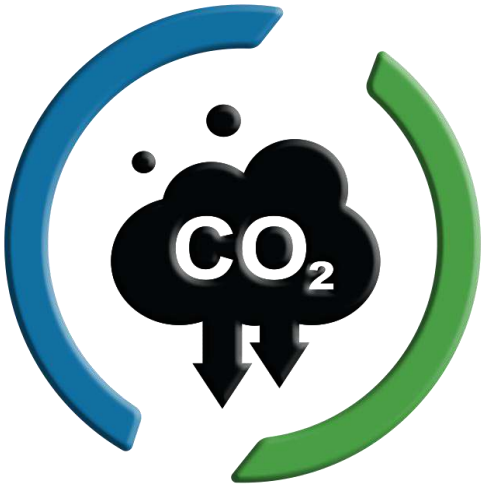
CHAPTER 3:
CARBON REDUCTION & CLIMATE CHANGE

3.1. Carbon reduction:



Azerbaijan, like many other countries, is working to reduce its carbon footprint and limit the impact of climate change. Azerbaijan Technical University has set a goal of reducing greenhouse gas emissions by 35% by 2030 compared to 1990.

To achieve this goal, ***Azerbaijan Technical University*** is taking several steps, including focusing on energy-efficient building design, reducing energy consumption on campus, and switching from gasoline/diesel-fueled vehicles to electric/hybrid ones. The university will also encourage sustainable transportation options, such as walking, biking, and public transportation, which can help reduce emissions.

The university is also committed to expanding its use of renewable energy sources, such as solar and wind power, to help further reduce carbon emissions. Additionally, the university will work to engage with the community and implement strategies to reduce waste and optimize energy use.

By taking these steps, ***Azerbaijan Technical University*** is doing its part to reduce carbon emissions and help combat climate change.

3.2. Experimental and Theoretical Investigations of CO_2 Adsorption with Zeolites:

Protecting the environment from the harmful emissions of industry and transportation is one of the global challenges facing humanity. In these circumstances, scientists and engineers need to address issues such as creating emissions-free production and combating CO_2 pollution of the biosphere. Additionally, the impact of CO_2 on the depletion of the ozone layer that surrounds us is significant, leading to the well-known "invading" of our planet.

It should be noted that it is possible to clean technological and industrial gases containing various harmful substances through the adsorption method. Gas cleaning involves a series of complex technical issues. If technological regulations, schemes, and equipment are selected correctly, harmful components can be completely removed from the gas mixture through adsorption.

The adsorption method is successfully applied in AzTU for the purification of CO_2 from various gas mixtures. However, the purification of CO_2 from gas mixtures using zeolite adsorbents has not been sufficiently researched. This work aims to study the process of CO_2 adsorption from gas mixtures using zeolite adsorbents with the help of system analysis, to develop a comprehensive mathematical model, and to calculate its parameters.

The developed mathematical model and the adsorption equilibrium constants obtained from experiments enable the study of the non-steady state of the process. In conducting scientific research at AzTU, the goal has been set to first study the purification of CO_2 from gas mixtures using synthetic zeolites and then conduct research on natural zeolites. The developed mathematical model can be applied to both synthetic and natural zeolites. This is relevant because there are sufficient natural zeolite deposits in Azerbaijan, and they are cheaper compared to synthetic zeolites. On the other hand, synthetic zeolites are not produced in our country.

The process of CO_2 adsorption was carried out with hydrophilic synthetic zeolites manufactured by the German company "Tricat Zeolites GmbH". In recent years, the issue of cleaning the environment from carbon dioxide and sulfur compounds remains a topical issue. At the same time, the purification of carbon dioxide and sulfur from natural gas is also of great importance. This is evidenced by the congresses and symposiums organized by the European Union and the United States. The normal operation of low-pressure air separation units relies on the important role played by the adsorbents used here. Therefore, it is essential to measure and analyze the properties of adsorbents to ensure the reliable and economically efficient operation of air separation units.

Thus, to ensure the reliable and economically efficient operation of air separation units, it is necessary to minimize the amount of carbon dioxide in the air. NaX-type (13 X molecular sieves) synthetic zeolites are used in air separation units to purify air from carbon dioxide and other impurities.

Experiments conducted at AzTU have shown that the adsorption properties of synthetic zeolites can vary widely. The main adsorption indicators of zeolites used in air separation units are their dynamic and equilibrium capacities for carbon dioxide. The dynamic and equilibrium capacities of zeolites are determined in laboratory units. After analyzing the results obtained, they can be used to design industrial adsorbers. The experiments have shown that the dynamic capacity of NaX zeolite for CO_2 is 4.2 cm3/g when the particle size is 2 mm in diameter.

The study of the adsorption properties of NaX zeolite is important for optimizing the design of industrial adsorbers. The purpose of studying NaX zeolite in the laboratory unit at AzTU is to determine its physicochemical and adsorption properties and to explore its potential for use in the purification and drying of natural gases.

As a result of the research, a more efficient nanomaterial has been obtained for the separation of binary gas mixtures of CO_2 and N_2 through short-cycle non-heating adsorption. Short-cycle non-heating adsorption is based on the adsorption of gases at various pressures. The separation of gases in such units depends on cycle parameters (cycle time, pressure change, etc.) and the type of adsorbent used. According to the information obtained from the research, the separation efficiency of N_2 and CO_2 gas mixtures on NaX zeolite is 1.5. When using nanomaterials, the separation efficiency is 2.1 for CSMS-650, 2.3 for CSMS-700, and 2.7 for CSMS-750.

Adsorption is considered the most universal method that allows for the practical complete removal of gases and vapors from the gas and liquid environment. Adsorption methods simplify the separation of complete components from mixtures, the purification of effluents and toxic substances, the drying of gases and liquids, and the synthesis of adsorbents in many chemical and technological processes. Compared to other mass transfer processes, adsorption is effective even for gases present in small quantities in the initial mixture. The separation and purification of gases using adsorption is one of the main areas of the modern chemical industry.

3.3. Climate Change

Climate variability (or climate change) refers to changes in the long-term weather conditions of the planet. These changes are caused by natural factors and human activities. One of the main causes of climate variability is the release of greenhouse gases (especially carbon dioxide, methane, and nitrous oxides) into the atmosphere. The impact of transportation and industry on the climate is a significant factor leading to climate changes in the world's atmosphere. Both produce harmful gases that spread into the atmosphere (such as carbon dioxide (CO2), methane (CH4), and nitrous oxides (NOx)).

Causes of Climate Change

1. **Natural Factors:**
   - **Solar Activity:** Changes in solar radiation can affect the climate.
   - **Volcanic Eruptions:** The release of large amounts of dust and gases into the atmosphere can lead to short-term cooling.
   - **Internal Cycles:** Natural cycles such as ocean currents and atmospheric circulation can affect the climate.
2. **Human Activities:**
   - **Burning Fossil Fuels:** The release of carbon dioxide and other greenhouse gases into the atmosphere.
   - **Deforestation:** The destruction of forests reduces the ability to absorb carbon and increases the level of carbon dioxide in the atmosphere.
   - **Agricultural and Industrial Activities:** The release of methane and nitrous oxides into the atmosphere.

Effects of Climate Change

- **Global Temperature Increase:** Climate variability leads to an increase in global temperature.
- **Rising Sea Levels:** Melting polar ice caps and thermal expansion lead to an increase in sea levels.
- **Extreme Weather Events:** More hurricanes, droughts, floods, and heatwaves are observed.
- **Ecosystem Changes:** Habitats change, and the risk of species extinction increases.
- **Impacts on Human Health:** Problems related to heatwaves, water quality, and

food safety arise.

Ways to Combat Climate Change

- **Renewable Energy Sources:** Transition to clean energy sources like solar, wind, and hydroelectric power.
- **Energy Efficiency:** Reducing energy consumption and implementing more efficient technologies.
- **Forest Restoration and Conservation:** Restoring forests and preventing deforestation.
- **Sustainable Transport Systems:** Development of public transport and the spread of electric vehicles.

Since climate change is a global problem, it requires international cooperation and joint efforts among governments, non-governmental organizations, and individuals. Combating climate change also requires aligning economic, social, and environmental policies.

3.4. Mitigation and Management of Climate Change

Various strategies and measures are implemented to mitigate and manage climate change. These measures are primarily aimed at reducing the causes of climate change (mitigation) and adapting to its impacts (adaptation).

Mitigation Strategies

Strategies aimed at reducing greenhouse gas emissions that cause climate change:

1. **Transition to Renewable Energy Sources:**
   - **Solar Energy:** Photovoltaic panels and solar thermal systems.
   - **Wind Energy:** Energy production through wind turbines.
   - **Hydroelectric Energy:** Electricity production using water power.
   - **Biomass Energy:** Obtaining energy from plant and animal materials.
2. **Increasing Energy Efficiency:**
   - **Building and Industrial Energy Efficiency:** Thermal insulation, high-performance windows, and energy-efficient appliances.
   - **Improving Transportation:** Expansion of electric vehicles and public transportation.
3. **Forest Conservation and Restoration:**
   - **Increasing Forest Areas:** Establishing new forest areas.

- **Sustainable Forest Management:** Preventing deforestation and protecting existing forests.

4. **Capture and Storage of Greenhouse Gases:**
    - **Carbon Capture and Storage (CCS):** Capturing and storing carbon dioxide underground.
    - **Soil and Ocean Ecosystems:** Naturally storing carbon in soil and ocean ecosystems.

Adaptation Strategies

Measures to adapt to and manage the impacts of already occurring climate change:

1. **Improving Infrastructure:**
    - **Storm and Flood Barriers:** Protective barriers against rising sea levels.
    - **Sustainable Infrastructure:** Buildings and roads resistant to heat and floods.
2. **Agricultural Adaptation:**
    - **Drought-Resistant Crops:** Growing crop varieties adapted to climate change.
    - **Water Management:** Efficient irrigation technologies and conservation of water resources.
3. **Public Health Measures:**
    - **Protection Against Heatwaves:** Protecting risk groups during heatwaves.
    - **Strengthening Health Systems:** Preventing the spread of diseases and strengthening health services.
4. **Nature-Based Solutions:**
    - **Ecosystem Restoration:** Restoration of wetlands, mangrove forests, and other ecosystems.
    - **Nature-Based Urban Design:** Increasing green spaces and creating natural barriers in urban areas.

International and Regional Cooperation

Effective management of climate change requires international and regional cooperation:

1. **Paris Climate Agreement:** An international agreement aimed at keeping global temperature rise below 2°C and striving towards 1.5°C.
2. **Sustainable Development Goals (SDGs):** The United Nations' goals to take measures against climate change and ensure sustainable development.
3. **Regional Climate Initiatives:** Climate change projects and cooperation programs

implemented at the regional level.

When these strategies and measures are implemented together, it is possible to minimize the impacts of climate change and create a more sustainable world for future generations.

3.5. Content and Topics Covered by Climate Change

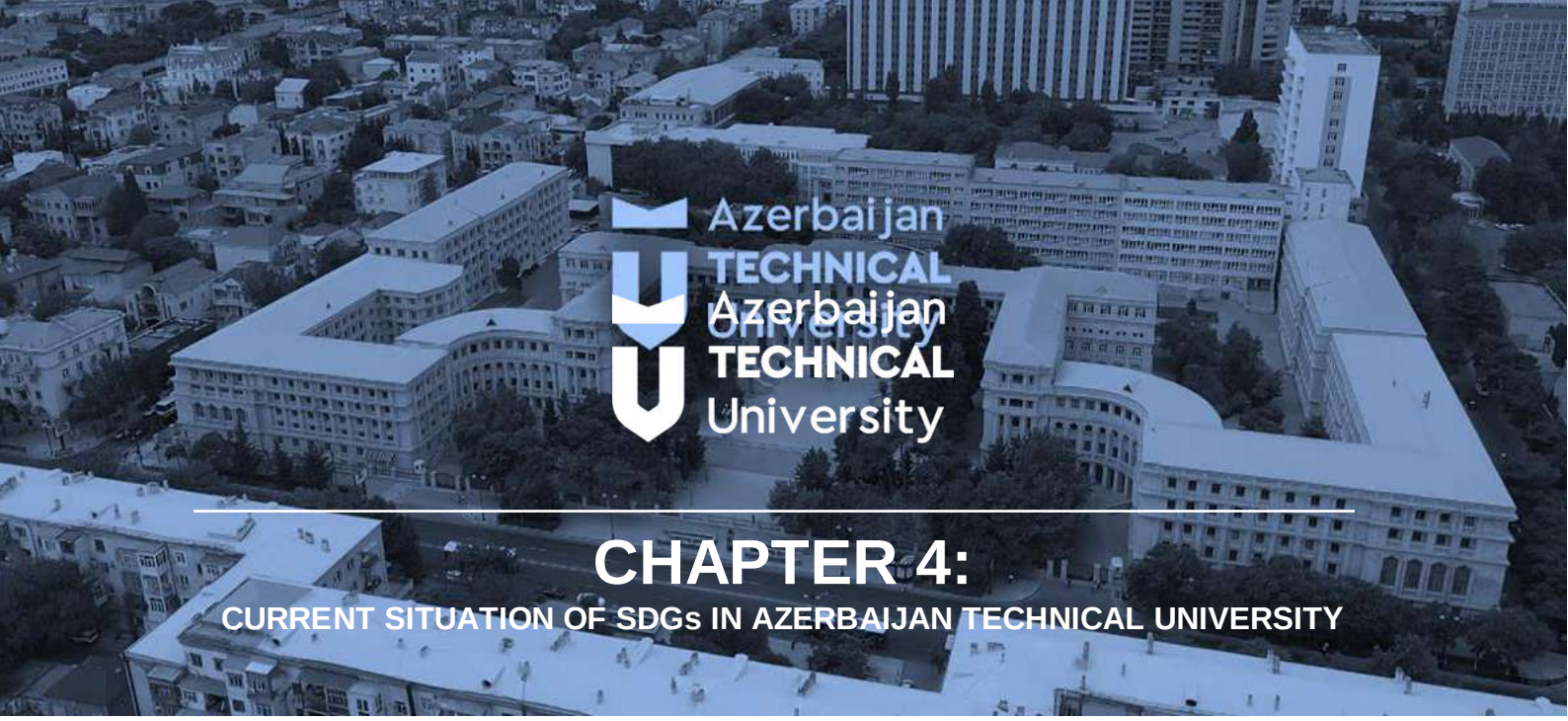
Climate change is a broad and complex topic that covers various scientific, economic, social, and ecological aspects. Below is an overview of the content and main topics covered by climate change:

1. **Scientific Aspects of Climate Change:**
   - **Greenhouse Effect and Greenhouse Gases:** Concentrations of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and other greenhouse gases in the atmosphere and their ability to retain heat.
   - **Climatology and Meteorology:** Climate system, weather events, long-term climate changes, and climatological models.
   - **Evidence and Observations:** Observations and data on temperature rise, glacier melting, sea level rise, extreme weather events, and biological changes.
2. **Causes of Climate Change:**
   - **Natural Causes:** Volcanic eruptions, changes in solar radiation, and natural climate cycles.
   - **Anthropogenic (Human-Originated) Causes:** Burning of fossil fuels, industrial activities, agriculture, and land-use changes.
3. **Effects of Climate Change:**
   - **Physical Effects:** Temperature rise, sea level rise, glacier melting, and extreme weather events.
   - **Biological and Ecological Effects:** Changes in ecosystems and species, changes in the distribution of species, and reduction in biodiversity.
   - **Economic and Social Effects:** Impacts on agriculture, reduction in water resources, impacts on health, settlement, and migration.
4. **Combating Climate Change:**
   - **Mitigation Strategies:** Reducing greenhouse gas emissions, transitioning to renewable energy sources, increasing energy efficiency, protecting and restoring forests.
   - **Adaptation Strategies:** Measures to adapt to the impacts of climate change, improving infrastructure, adapting agriculture, public health measures, and nature-

based solutions.

5. **Management of Climate Change:**
   - **National and International Policies:** Formulation and implementation of policies against climate change, the Paris Climate Agreement, and other international agreements.
   - **Economic Tools:** Carbon tax, carbon trading, and other economic incentives.
   - **Public Awareness and Education:** Public awareness campaigns, educational programs, and scientific research on climate change.
6. **Innovations and Technologies Related to Climate Change:**
   - **Green Technologies:** Renewable energy technologies, energy storage systems, carbon capture and storage technologies.
   - **Smart Cities and Infrastructure:** Sustainable urban planning, smart energy grids, and efficient transportation systems.
7. **Social and Cultural Aspects:**
   - **Climate Justice:** Fair distribution of the impacts of climate change, protection of vulnerable groups and developing countries.
   - **Behavioral Changes:** Changing behaviors at individual and community levels, rethinking consumption habits, and lifestyles.

Climate change is a multifaceted and global issue, and therefore, research, policies, and measures related to it are implemented on a wide scale and at various levels. All these topics together help in better understanding climate change and finding effective ways to combat it.



CHAPTER 4:

CURRENT SITUATION OF SDGs IN AZERBAIJAN TECHNICAL UNIVERSITY

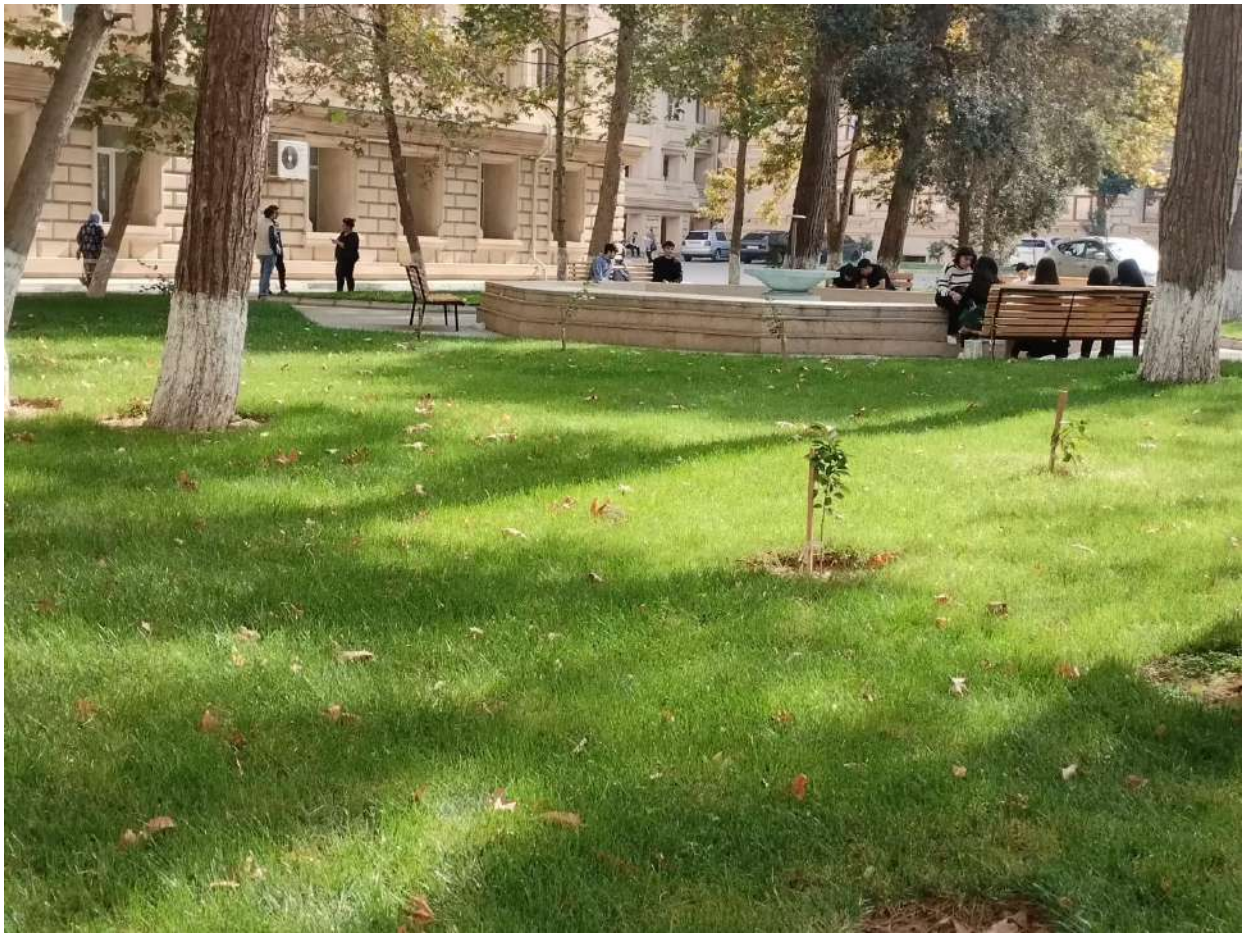
4.1. Ensuring Clean and Safe Drinking Water at Azerbaijan Technical University

Azerbaijan Technical University is located in the Yasamal district of Baku city, and the drinking water supply of this district falls under the responsibility of the Jeyranbatan reservoir and Oguz-Gabala-Baku water pipeline. The existence of the Jeyranbatan reservoir ensures stable water supply not only for our university, but also for our capital. The drinking water supply of this pipeline is able to meet the water demand of Baku city in the next few decades. In addition, the Oguz-Gabala, Baku-Shollar aqueducts and underground water of Khachmaz can also be mentioned. The least share in Baku's drinking water supply belongs to the Kura River. Reservoirs and aqueducts that supply our city and Azerbaijan Technical University with drinking water use many modern equipment, technologies, and methods for water desalination, disinfection, and sweetening. Drinking water is checked by passing certain tests, especially the determination of heavy metals, nitrite (NO2) or nitrate (NO3), determination of water turbidity, determination of chemical and physical composition. Such tests are conducted in special laboratories of our university and are organized to protect the health of employees. The composition of drinking water is physical, chemical, physical-chemical, etc. methods are carried out. Every person should save water so that water resources do not run out. It is necessary to consume at least 2 liters of water during the day. The water must contain fluorine (F) and calcium (Ca) minerals.

4.2. Accessible Drinking Water Facilities at Azerbaijan Technical University

The university as an institution provides free drinking water to students, staff, and visitors. There is a source of drinking water in every working room on the campus and it is used by both students and teachers free of charge.

There is also a water fountain in the garden on the campus of the University. Everyone uses the water fountain. Azersu joint-stock company is responsible for the purity of this drinking water, and at the same time, the University management also monitors the quality of the water. Employees are also provided with mineral water for sale. All these are carried out at the expense of the University. Visitors are provided with free mineral water on sale.



4.3. Biodiversity Conservation Efforts at Azerbaijan Technical University

Our University, as an institution, strives to protect and expand the biodiversity of both plants and animals, especially the existing ecosystems that are under threat. On the campus of our university, greenery has been planted, various types of drought-resistant trees have been planted, and the gardeners of the University are busy with these plants. However, animals are not kept on the campus of the University. However, the trees planted in the courtyard of the University are being agrotechnically cared for, the land is plowed, new types of trees are planted, and greening works are being carried out. It should be noted that we do not have relations with industries in this field. However, we have strong relations with the green management, and we can get the necessary help from them.

4.4. Environmental Education and Waste Management Initiatives at Azerbaijan Technical University

Since the university prepares specialists in "Ecological engineering" and "Environmental protection" specialties, information about ecosystems, especially water quality, is given a special place in education.

Our students studying "Ecological engineering" and "Environmental protection" specialties at the university join the calls for the reduction and disposal of waste in the environment as volunteers. In addition, subjects on waste management, recycling, and waste-free production processes are taught at both the bachelor's and master's levels. Waste, especially household waste, plastic waste occupies a large place due to its volume and quantity. Although it is not a dangerous waste, plastic waste takes 300-400 years to decay and disintegrate, so its accumulation in large quantities, taking up a lot of space in landfills, and its dumping into seas and oceans are a global problem for society. Collecting and recycling plastic waste is the most convenient way. The most convenient way is to make packaging boxes, trash cans, and household appliances that do not come into contact with food from recycled plastic waste. It is a convenient way to collect plastic waste in establishments, especially catering establishments, parks, and educational institutions. Our students participate in the initiatives of collecting and handing over plastic containers in the recreation areas of the city and on the beaches.

4.5. Compliance with the SDGs:

Climate Action (SDG 13):

Azerbaijan Technical University (AzTU) is devoted to addressing Sustainable Development Goal 13, which aims to combat climate change. Our research in this area demonstrates our commitment to reducing greenhouse gas emissions, although we have not yet set a target date for achieving carbon neutrality. We recognize the importance of tailoring climate change information, factual data, outcomes, and adaptation strategies to different target populations. Therefore, we are currently developing and customizing climate-related initiatives, taking into account various factors such as age demographics, types and degrees of educational institutions, and the unique requirements of different contexts.

Azerbaijan Technical University is committed to setting ambitious and measurable goals for reducing greenhouse gas (GHG) emissions, in line with global climate objectives. To track our progress towards these goals, our organization will conduct regular and transparent assessments of greenhouse gas (GHG) emissions and provide comprehensive reports. Additionally, our dedication includes preserving and expanding ecologically clean areas on the campus. By actively advocating for the preservation of biodiversity and the creation of suitable habitats for native fauna, we make an important contribution to achieving Sustainable Development Goal 13 and the overall goal of environmental sustainability.

Quality Education (SDG 4):

Azerbaijan Technical University (AzTU) has recognized the significance of incorporating sustainability, environmental ethics, and climate action into its academic programs to align with Sustainable Development Goal 4 (Quality Education) and Goal 13 (Climate Action). AzTU is committed to promoting a culture of environmental responsibility among its students and faculty as part of its dedication to quality education.

Azerbaijan Technical University understands that addressing sustainability challenges and mitigating climate change require interdisciplinary approaches and collaboration across academic fields. As a result, the university is striving to integrate these principles into various academic disciplines, ensuring that students are equipped with the knowledge and skills necessary to effectively tackle environmental issues.

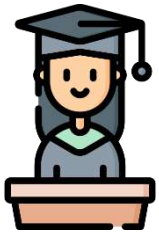
Azerbaijan Technical University is endeavoring to empower future generations of students to become agents of positive change in addressing global environmental challenges while advancing their education and contributing to sustainable development in Azerbaijan and beyond by incorporating sustainability, environmental ethics, and climate action into its curricula and research endeavors.

4.6. Action Plans of AZTU with COP29

COP29 is the 29th Conference of the Parties, a significant event in international climate negotiations under the United Nations Framework Convention on Climate Change (UNFCCC). It's a platform for countries to discuss and negotiate actions to address climate change.

Azerbaijan Technical University, being a technical education-focused institution, has immense potential to contribute to COP29 in various ways:

1. Research and Innovation: The university's researchers could present their findings or participate in discussions on climate change mitigation and adaptation, renewable energy, environmental engineering, or sustainable development.



2. Student Involvement: Students from the university could participate in COP events, providing them with opportunities to learn about international climate policy, network with professionals in the field, and engage in discussions on global environmental challenges.

3. Policy Engagement: The university's faculty members could use their expertise to inform climate policy discussions at the national or international level and engage with policymakers, providing insights based on their research and experience.

4. Capacity Building: The university could contribute to capacity-building efforts related to climate change through training programs, workshops, or collaborative projects aimed at enhancing the skills and knowledge needed to address climate challenges.

In conclusion, although there may not be a direct institutional relationship between Azerbaijan Technical University and COP29, the university has various avenues for engagement and contribution to the discussions and initiatives surrounding the conference.

CHAPTER 5:

ENVIRONMENTAL CHALLENGES AND AZTU'S IMPACT; RESEARCH AND EDUCATION INITIATIVES

Note that environmental issues are of particular relevance to the ***Azerbaijan Technical University*** (AzTU). In the Republic, one of the main sources of environmental pollution is the oil and gas industry and its various sectors. Up to 16% of oil is lost during extraction, preparation, storage, transportation, and processing. Leakage, accidents, and losses contribute to environmental pollution.

It is known that the loss of biodiversity and ecosystem degradation due to global ecological changes is a major concern for the world community. From this perspective, there is increasing attention in science and society to ecosystem services and their direct and indirect effects on human well-being.

At AzTU, determining and assessing ecosystem services, and integrating their values into state and private decision-making processes, is a key objective of our national, European, and international biodiversity, ecosystem conservation, and Sustainable Development Strategy.

Research conducted at AzTU in the field of business-oriented ecological services shows that during the operation of more than half of ecosystem services, services become degraded or are used non-continuously. As a result, this has a significant negative impact on business and production. The degradation of ecosystem services affects countries in the following ways:

- Failure to align with trends in EU countries will eliminate the currently provided ecosystem services for free. They will become more expensive in the future.

- The loss of ecosystem services will have its impact magnified in the operations of enterprises, affecting the financial remuneration and insurance of workers employed there.

- The use of more efficient ecosystem services will open up new opportunities for business activities.

At AzTU, these issues are relevant because, for example, if water ecosystem services are disrupted, biodiversity, materials, food products, and climate are affected. If the balance is disrupted, the enterprise will not be able to operate. For example, the water ecosystem will also have a significant impact on agriculture. Also, if industrial enterprises (including AzTU) release more harmful components into the environment (such as harmful gases CO2, CO, SO2, NO2, H2S, etc.), climate change will occur. As a result, ecological balance will be disrupted, leading to the creation of the "Greenhouse" effect.

In the educational programs of AzTU, especially at the bachelor's level in "Ecological Engineering," "Chemical Engineering," "Occupational Safety Engineering," and at the master's level in "Reprocessing Technology of Metallurgical Emissions," "Environmental Protection and Sustainable Use of Natural Resources," "Conservation and Recycling of Natural Resources," "Transport Ecology," "Environmental Protection in the Oil and Chemical Industry," students receive education in various specialties.

Azerbaijan Technical University has an "Eco-Technology" society where students, undergraduates, and teachers actively participate. They implement educational events on climate change and environmental protection and publish scientific articles.

CHAPTER 6:

CLIMATE ACTION PLANS OF AZERBAIJAN TECHNICAL UNIVERSITY

6.1. Climate Action Plans:

1. Conducting lectures on sustainable development to educate students.

2. Organizing seminars on environmental protection for master's students.

3. Holding training sessions and practical exercises related to climate change for doctoral students in oil and chemical industries.

4. Organizing conferences on climate change, current issues, mitigation strategies, and perspectives for members of the "Eco-Technology" community at our university.

5. Host symposiums for students specializing in environmental engineering to discuss modern research methods for minimizing emissions (CO_2, H_2S, NO_x) according to the Sustainable Development Plan.

6. Publishing scientific articles dedicated to climate change and mitigation strategies in prestigious international journals (Web of Science, Scopus, etc.) by the university's professorial staff.

7. Assigning dissertation topics related to climate change to doctoral students and conducting intensive scientific research.

8. Implementing environmental protection strategies for mitigating climate change at AzTU.

9. Exploring the scientific foundations and practical application of technology for purifying wastewater to address water scarcity related to climate change.

10. Developing and implementing technologies for cleaning oil-contaminated soil at AzTU.

Note: It has been projected that these plans will be presented by the year 2030.

6.2. Goals and Action Steps:

Goal 1: Increase Awareness of Sustainable Development Among Students

Action Steps:

- Develop a comprehensive curriculum for lectures on sustainable development.
- Schedule regular lecture sessions on sustainable development topics.
- Provide resources and materials to support student learning.
- Evaluate student understanding through assessments and feedback mechanisms.

Timeline: until 2030

Goal 2: Enhance Knowledge of Environmental Protection Among Master's Students

Action Steps:

- Plan and coordinate seminars on various aspects of environmental protection.
- Invite guest speakers and experts to share insights and experiences.
- Facilitate interactive discussions and workshops during seminars.
- Encourage active participation and engagement from master's students.

Timeline: until 2030

Goal 3: Equip Doctoral Students with Skills and Knowledge on Climate Change Mitigation

Action Steps:

- Design and organize training sessions focusing on climate change and its impact on oil and chemical industries.
- Arrange practical exercises to apply theoretical knowledge in real-world scenarios.
- Provide access to relevant resources and tools for further research and learning.
- Monitor progress and provide mentorship to doctoral students throughout their training.

Timeline: until 2030

Goal 4: Foster Collaboration and Knowledge Exchange Through Conferences

Action Steps:

- Plan and coordinate conferences addressing climate change, mitigation strategies, and related issues.
- Invite stakeholders and researchers from various fields to participate.
- Facilitate networking opportunities and collaborative discussions.
- Document and disseminate conference proceedings to share insights with the wider

community.

Goal 5: Facilitate Research and Innovation in Environmental Engineering

Action Steps:

- Organize symposiums focused on modern research methods for emission reduction.
- Encourage students to present their research findings and innovative solutions.
- Provide mentorship and guidance for students undertaking research projects.
- Foster interdisciplinary collaboration among students and faculty members.

Timeline: until 2030

Goal 6: Promote Scholarly Contributions on Climate Change in Prestigious Journals

Action Steps:

- Encourage university professors to conduct research and write scientific articles on climate change.
- Support faculty members in submitting articles to reputable international journals.
- Collaborate with editorial boards and reviewers to ensure quality publications.
- Track and measure the impact of published articles on advancing knowledge in the field.

Timeline: until 2030

Goal 7: Support Doctoral Research on Climate Change Mitigation

Action Steps:

- Assign dissertation topics related to climate change to doctoral students.
- Provide resources, funding, and access to facilities for research activities.
- Facilitate collaboration with industry partners and research institutions.
- Monitor progress and provide mentorship to doctoral students throughout their research journey.

Timeline: until 2030

Goal 8: Implement Environmental Protection Strategies in Azerbaijan

Action Steps:

- Collaborate with government agencies and environmental organizations to develop mitigation strategies.
- Implement initiatives to reduce carbon emissions and promote sustainable practices.
- Monitor and evaluate the effectiveness of implemented strategies.

- Advocate for policy changes and regulatory measures to support environmental protection efforts.
- ***Timeline: until 2030***

Goal 9: Investigate Technology for Wastewater Purification to Address Water Scarcity

Action Steps:

- Research to explore innovative technologies for wastewater treatment.
- Collaborate with industry partners and experts in the field.
- Pilot test promising technologies in real-world settings.
- Disseminate findings and recommendations to relevant stakeholders and policymakers.

Timeline: until 2030

Goal 10: Develop and Implement Soil Remediation Technologies for Oil-Contaminated Areas

Action Steps:

- Conduct research to identify effective methods for cleaning oil-contaminated soil.
- Design and test prototype remediation technologies in laboratory settings.
- Conduct field trials to assess the feasibility and efficacy of selected methods.
- Collaborate with environmental agencies and local communities for implementation and monitoring.

Timeline: until 2030

6.3. Zero Waste by 2040

Achieving zero waste to the environment by 2040 is a significant step towards minimizing harmful environmental impacts and ensuring sustainable development. Various measures and strategies must be implemented across different sectors to reach this goal. Below are the main strategies and measures in this direction:

1. **Zero Waste Strategies**
    - **Circular Economy:** Extending the lifespan of products through recycling and reuse to minimize waste.
    - **Waste Reduction:** Reducing the amount of waste in production processes and proper waste management at the consumer level.
    - **Reuse and Recycling:** Reusing and recycling waste materials in production and daily life.
2. **Technological Innovations and Infrastructure**
    - **Green Technologies:** Implementing new technologies in waste management, such as the development and use of biodegradable materials.
    - **Intelligent Infrastructure:** Applying digital and intelligent systems in the collection, transportation, and processing of waste.
3. **Zero Waste in the Energy Sector**
    - **Renewable Energy Sources:** Using clean energy sources like solar, wind, hydro, and biomass.
    - **Energy Efficiency:** Increasing energy efficiency and using energy more economically.
4. **Zero Waste in Agriculture**
    - **Sustainable Agricultural Practices:** Environmentally friendly agricultural methods and efficient use of natural resources.
    - **Waste Recovery:** Utilizing agricultural waste as compost and bioenergy.
5. **Zero Waste in Industry**
    - **Sustainable Production:** Production processes that generate less waste and conserve natural resources.

- **Waste Management:** Establishing systems for recycling and reusing industrial waste.

6. **Public Awareness and Education**
    - **Public Awareness Campaigns:** Informing the public about waste reduction and proper waste management.
    - **Educational Programs:** Expanding environmental education programs in schools and universities.
7. **Legislation and Regulation**
    - **Laws and Policies:** Enacting laws and policies for waste reduction and proper waste management.
    - **Mandatory Standards:** Implementing mandatory waste standards for producers and consumers.
8. **International Cooperation**
    - **Global Initiatives:** International zero waste initiatives and cooperation programs.
    - **Information Exchange:** Sharing best practices and information among different countries.

Sample Projects and Initiatives

- **Zero Waste Cities:** Setting and implementing zero waste targets by various cities.
- **Zero Waste Schools:** Programs for waste reduction and reuse in schools.
- **Green Industrial Parks:** Establishing waste management and recycling systems in industrial parks.

Achieving the goal of zero waste by 2040 requires extensive cooperation and joint efforts among governments, industrial enterprises, non-governmental organizations, and individuals. This goal is crucial not only for environmental protection and sustainable development but also for economic benefits and social welfare.

Azerbaijan TECHNICAL University

CLIMATE ACTION PLAN

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