



Co-funded by
the European Union



PRODUCT AND ENERGY CONSUMPTION

Go Green Against Climate Change -
2023-1-RO01-KA220-SCH-000161283



- 1) IMPORTANCE OF PRODUCT AND ENERGY CONSUMPTION
- 2) ENERGY AND ENERGY TYPES
- 3) ENERGY RESOURCES
- 4) THE IMPORTANCE OF USING ENERGY EFFICIENTLY
- 5) CONSUMER BEHAVIOR AND ENERGY CONSUMPTION
- 6) ZERO ENERGY AND SUSTAINABLE PRODUCTION





IMPORTANCE OF PRODUCT AND ENERGY CONSUMPTION

1.1. The Role of Energy and Product Consumption in Our Daily Life



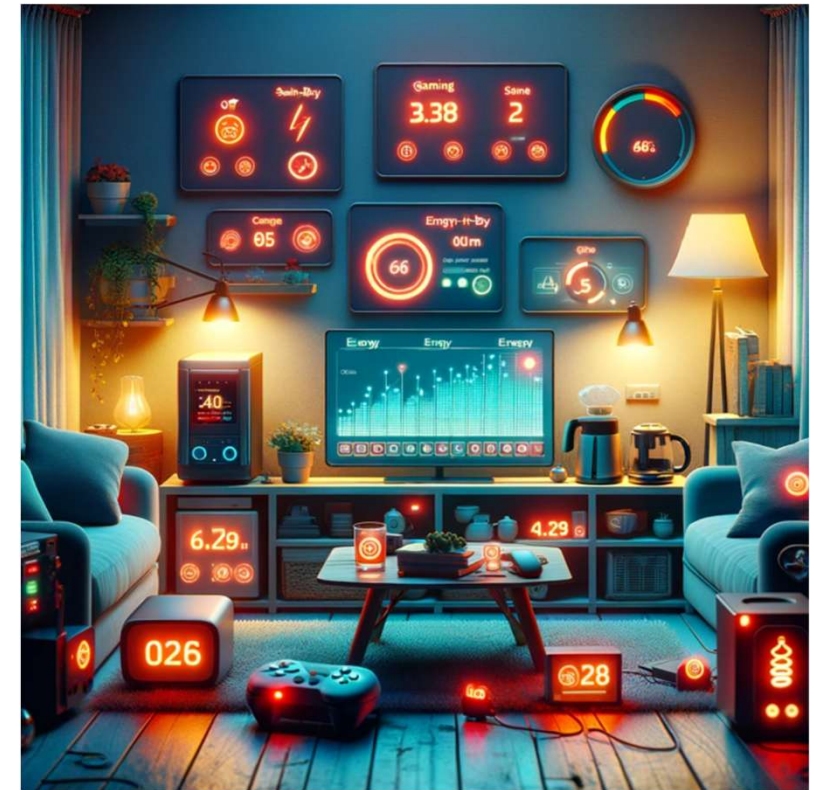
GO GREEN AGAINST CLIMATE CHANGE

Energy and product consumption are fundamental building blocks of modern life. The products and energy sources we use every day interact at every stage of our lives. The effects of these interactions are of great importance at environmental, economic and social levels.

1. The Impact of Energy on Our Daily Life

Energy is a basic necessity in our homes, workplaces, transportation and industrial activities. Resources such as electricity, natural gas, gasoline, diesel and renewable energy types are used in every aspect of daily life:

- **Energy Use at Home** : Lighting, heating, cooling, white goods, technology devices (phones, computers, televisions) are based on energy.
- **Transportation** : Modes of transportation such as driving, public transportation, and air travel consume large amounts of energy.
- **Industry and Production** : Energy is required for the production, processing and transportation of products. For example, from food production to electronic device production, all kinds of products are shaped by energy.



1.1. The Role of Energy and Product Consumption in Our Daily Life



2. The Impact of Product Consumption on Our Daily Life

Product consumption is the basis of our lives as consumers. The products we buy, everything we use, affects energy consumption and has economic and environmental consequences:



Consumer Habits : The products people buy directly affect the energy they consume. Choosing more energy efficient products can reduce our impact on the environment. For example, energy efficient white goods, LED bulbs, electric vehicles, etc. reduce energy consumption.

Production and Consumption Period : Energy is required for the production, packaging, transportation and delivery of products to the final consumer. Consumption habits directly affect the environmental impacts of these processes.

Waste Management : The waste generated at the end of product use also affects energy and resource consumption. Recycling helps us use energy consumption and natural resources more efficiently.

1.1. The Role of Energy and Product Consumption in Our Daily Life



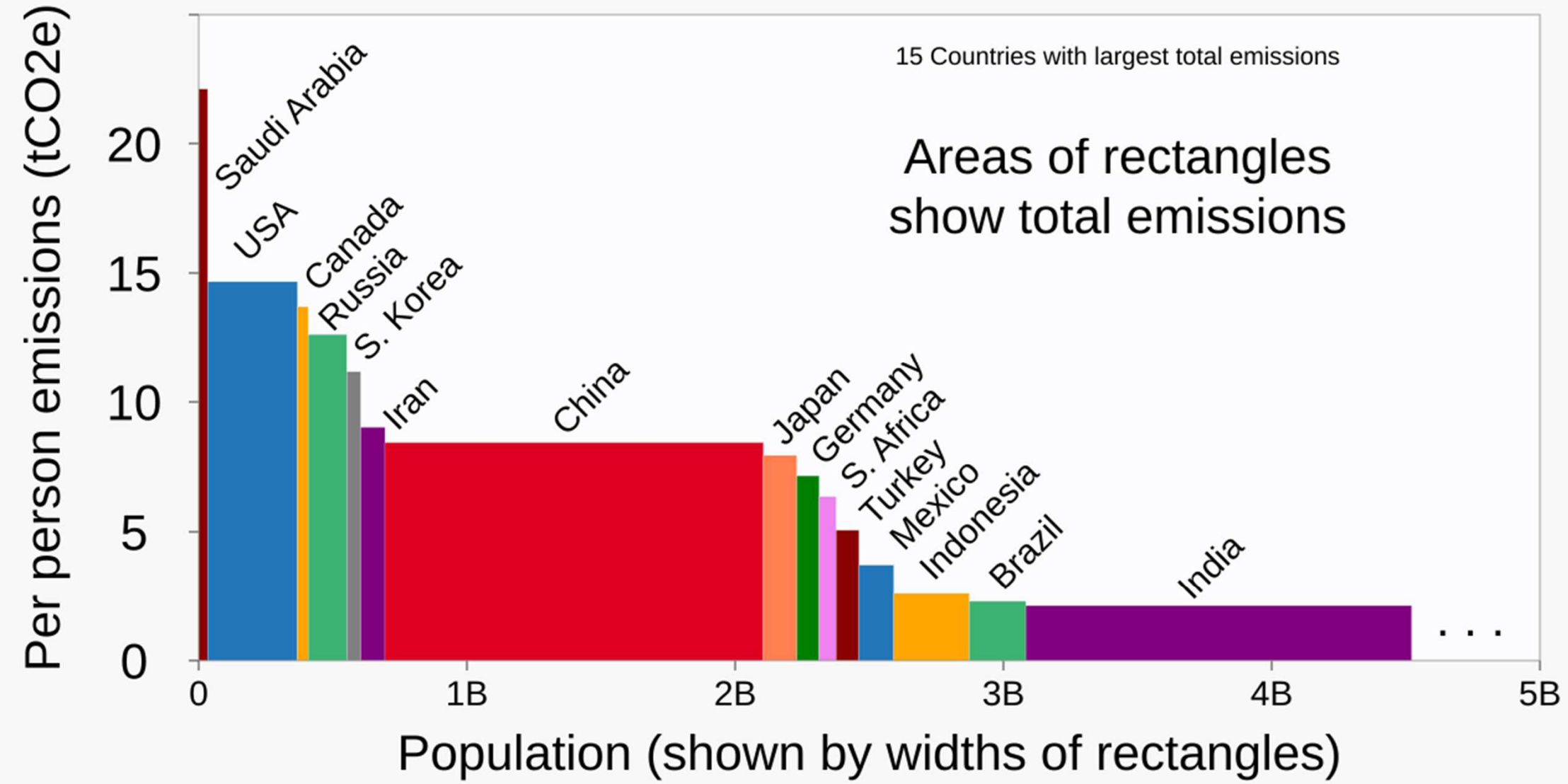
3. Global Impacts of Energy and Product Consumption

Energy and product consumption have major global impacts. Increasing energy demand and product consumption leads to increased use of natural resources worldwide and increased greenhouse gas emissions. This can lead to climate change and environmental degradation. Therefore, energy efficiency and sustainable product consumption are critical at both individual and societal levels.

Greenhouse Gas Emissions : Excessive consumption of fossil fuels and energy leads to carbon emissions, which accelerates global warming.

Depletion of Natural Resources : Excessive consumption of products and energy expenditures can lead to depletion of natural resources and environmental degradation, which creates difficulties in providing energy and raw materials for future generations.

Carbon dioxide emissions per person



1.1. The Role of Energy and Product Consumption in Our Daily Life



4. Sustainable Consumption

The role of energy and product consumption in our lives requires each individual to make conscious choices by considering their environmental impact. Turning to renewable energy sources, choosing energy-efficient products and reducing unnecessary consumption are important steps to take for a more sustainable world.





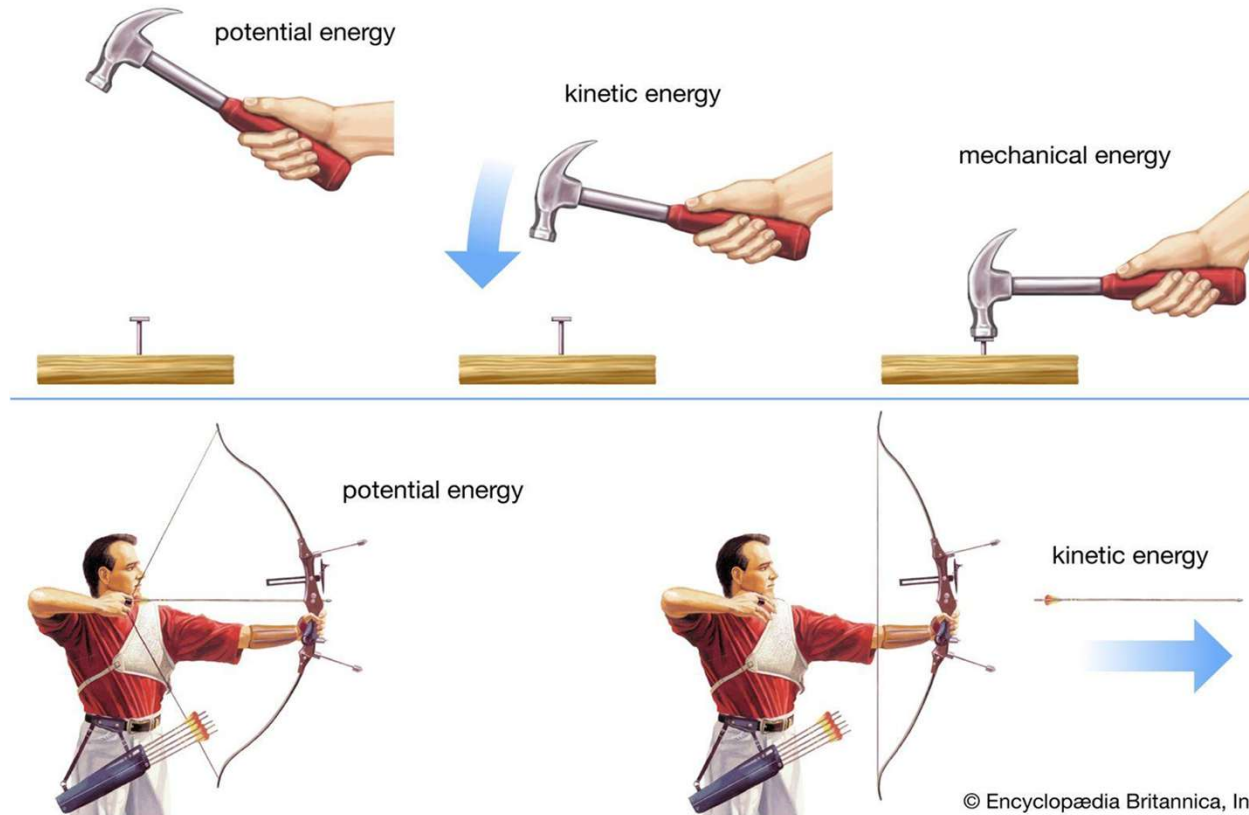
ENERGY AND ENERGY TYPES

2.1. Energy



- Energy is the ability of an object or system to do work. In our daily lives, energy comes in different forms. Such as heat energy, light energy, electrical energy, chemical energy and nuclear energy. However, energy is generally examined under two headings: potential and kinetic.
- Energy is generally examined under two main headings:
 - **Potential Energy:** The energy an object has due to its position.
 - **Kinetic Energy:** The energy an object has due to its motion.
 - The sum of the kinetic and potential energy of a system is called " **mechanical energy** ".
- to the "law of conservation of energy" in physics, the total amount of energy in a system remains constant. According to this law, energy is not lost but can change form. In other words, this law states that energy cannot be created or destroyed but can be transformed into other forms of energy. By utilizing this law, energy is produced to use in our daily activities.

2.1. Energy



2.1. Energy



- The rapid population growth, industrialization, increasing urbanization and increasing use of technology in the world also increases the need for energy. As a result of the increasing demand for energy, the use of limited natural resources has gained great importance. Greenhouse gases released with energy production and use constitute the vast majority of greenhouse gases formed by human impact. The existence of greenhouse gases, which operate in a natural process in nature, ensures that the temperature of our world remains at a certain level. However, with the acceleration of the increase in greenhouse gases, the layer formed by these gases around the world thickens and the sun rays reaching our world are prevented from being reflected and returning to space. This negatively affects the greenhouse effect on our world and causes global warming. The use and production of energy in a way that will not trigger global warming is of great importance. Greenhouse gases are; Water vapor (H₂O), Carbon dioxide (CO₂), Methane (CH₄), Nitrogen Oxides (NO_x), Ozone (O₃) and Chlorofluorocarbons (CFCs).
- Various studies have been initiated since the 1980s to reduce the negative impact of humans on the climate regarding global warming. As a result of the studies carried out under the leadership of the United Nations and international organizations, the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) were established. These agreements bring legal regulations to limit and reduce human-induced greenhouse gas emissions.

2.2. Energy and Energy Types



GO GREEN AGAINST CLIMATE CHANGE

- Heat Energy
- Light Energy
- Electrical Energy
- Chemical Energy
- Nuclear energy



MECHANICAL

TYPES OF ENERGY



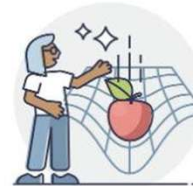
THERMAL



SONIC



NUCLEAR



GRAVITATIONAL



KINETIC



CHEMICAL



ELECTROMAGNETIC



POTENTIAL



IONIZATION

2.3. What is Energy Saving?



- Energy saving is using energy efficiently and not wasting it without any decrease in production, comfort and workforce. In other words, doing the same job using less energy. 26% of energy in our country is used for heating. These losses can be reduced by taking heat insulation measures. It is possible to achieve fuel savings of 25% to 50% with the insulation of buildings.
- The energy produced may decrease due to various losses in the transmission and distribution stages. In our country, the loss-leakage rate, especially in the distribution system, is around 15%, which is quite high. This rate is around 4% in OECD countries and 6% worldwide. It is of great importance to review the systems and perform maintenance and follow-up.

2.4. Why Should We Use Energy Efficiently?



If energy consumption in the world continues in this way, it is estimated that half of the fossil fuel resources will be consumed by 2020. Fossil resources are used not only as fuel but also in the chemical sector, especially in medicine, and in many other areas. In this respect, it is important to protect them or at least reduce their consumption.

CO₂ is formed as a result of burning fossil fuels such as coal or oil. Measurements show that the CO₂ level, which has varied between 180-280 ppm (one unit per million) for millions of years, has reached 360 ppm today. Carbon dioxide, with a rate of 55% compared to other greenhouse gases, causes global warming by having the greatest effect on the disruption of natural temperature balances. The greenhouse effect plays a major role in the formation of global warming. We can briefly explain the “Greenhouse Effect” as an atmospheric event that occurs when the gas layer that allows the short-wave rays coming from the sun to pass through, retains a large portion of the long-wave rays reflected from the earth. This normally natural process has begun to have a harmful effect with the excessive increase in greenhouse gases.



2.4. Why Should We Use Energy Efficiently?



Other greenhouse gases released into the atmosphere are toxic gases such as CO, SO₂, NO_x and radioactive substances. When coal is used as fuel in thermal power plants, industry and buildings, ash is also released in addition to these pollution factors. Ash has a high polluting effect because it contains Mercury, Lead, Arsenic and Cadmium.

After the oil crisis in the 1970s, interest in energy increased and the issue of energy saving came to the agenda. Saving energy is important for the family budget. If we use energy efficiently, we pay less for bills. Saving energy is also very important for the state budget. And most importantly, we protect nature and the other living things in it.



ENERGY RESOURCES

3. ENERGY RESOURCES



- Energy resources are examined under two headings: renewable and non-renewable resources.
- Renewable energy is energy that is assumed to be practically unlimited, can be used continuously and repeatedly, and can be replaced in a short time.
- Non-renewable (exhaustible) energy is defined as energy that is used but does not regenerate in a short period of time. Non-renewable resources are resources that are constantly consumed by humans, constantly harm the environment as they are consumed, and decrease over time.

3.1. NON-RENEWABLE ENERGY RESOURCES



In fact, there is no non-renewable energy type in nature, but some energy sources take a very long time to renew, which is one reason why they are formed. That is why they are called non-renewable energy sources.

Today, the use rate of non-renewable energy sources is over 95%. For this reason, it is predicted that the most widely used fossil energy sources such as natural gas and oil will be depleted in the next 50 years.

The greatest harm of non-renewable energy sources is seen on the environment. Due to these sources that pollute the environment to the fullest, they may consume our world before they run out themselves within the next 50 years. Because global warming is becoming more dangerous day by day with greenhouse gas emissions. When this is the case, it is not possible to predict what kind of climate the world will have even 20 years from now.

Non-renewable energy sources can be examined under two headings: fossil fuels and nuclear energy.



3.1.1. FOSSIL FUELS



Fossil fuels are fuels such as coal, oil and natural gas that have formed from underground sediments over hundreds of millions of years. Coal, oil and natural gas are easily extracted and transported from underground as a concentrated energy source. When burned, coal and oil pollute the environment a lot. Millions of tons of Sulfur and Nitrogen Oxides and tens of thousands of tons of polluting particles are produced annually from fossil fuel power plants and these are emitted into the atmosphere. Sulfur and Nitrogen Oxides cause acid rain.

Other gases and particles emitted from fossil fuels cause respiratory diseases, cancers and premature deaths.

Another problem with fossil fuels is that the current reserves are running out. There are currently 700 billion barrels of oil reserves in our world, and annual consumption is 2 billion barrels. In this case, there will be oil until 2020. Coal reserves are enough for 300 years, and natural gas reserves are enough for 50 years.



3.1.2. NUCLEAR ENERGY



- These are Uranium, Plutonium and Thorium. These heavy atoms found in nature can barely be stable because they have too many neutrons and protons in their nuclei. They feel uncomfortable just like a very fat person. In order to get rid of their excess weight and relax, these atoms sometimes try to turn into smaller and more stable nuclei by throwing particles outward. Sometimes they split spontaneously where they stand, and two or three smaller atomic nuclei, neutrons and energy are released. All these small atoms and neutrons are scattered around with the help of the energy released after the division. In other words, energy is also released during the division event, and most of the energy released is carried with the particles scattered around. This event is called "spontaneous division". Spontaneous division is a very rare event in nature.
- As a result of the studies carried out by scientists, it was revealed that heavy nuclei, which rarely undergo spontaneous fission, immediately begin to divide when neutrons are sent to them. This discovery led to the birth of nuclear energy as we know it today. Nuclear energy, which is formed as a result of the splitting of the atomic nucleus, is used to produce electricity.

3.2. RENEWABLE ENERGY RESOURCES



- The energy demand in our world is increasing by approximately 4-5% every year. In contrast, the fossil fuel reserves that meet this need are decreasing much more rapidly. In addition, the use of fossil fuels has increased the average temperature of the world to the highest values in the last thousand years. This situation has caused a visible increase in natural disasters such as floods/storms that cause millions of dollars in damage as well as intense air pollution. Already, settlement areas on many islands located at sea level in the world have been evacuated due to melting glaciers and rising water levels. For this reason, humanity must turn to clean energy sources without waiting for fossil fuel reserves to run out.
- The use of renewable energy sources should be expanded for reasons such as reducing external dependency, having no fuel costs, providing cheap energy after depreciation, being environmentally friendly, and providing new business opportunities for the agricultural and manufacturing industries.

3.2.1. HYDROELECTRIC (WATER) ENERGY



It can be defined as the development and use of water resources, including energy purposes. In other words, it is an energy provided by converting the potential energy of water into kinetic energy.

Hydroelectric power is still the largest source of renewable energy worldwide.

A significant portion of hydroelectric energy is produced by large dams. As hydroelectric technology has become more accessible and used around the world, hydroelectric power plants of various sizes have become increasingly common.



3.2.1. Hydroelectric (Water) Energy Advantages and Disadvantages

Advantages	Disadvantages
It is a Renewable Energy Source : Hydroelectric energy is a source based on the water cycle, so it is a type of energy that cannot be exhausted. Water evaporates and returns, creating a continuous cycle. Low Carbon Emission : There is no carbon emission during hydroelectric energy production. Therefore, hydroelectric power plants are environmentally friendly compared to power plants based on fossil fuels. Uninterrupted Energy Production : Hydroelectric power plants have the capacity to produce energy continuously at all hours of the day and in all seasons, compared to other renewable energy sources, such as wind or solar. This makes hydroelectric energy a reliable source of energy. Flexible Energy Production : In hydroelectric power plants, energy production capacity can be increased or decreased by controlling the water level and flow. This flexibility is important in ensuring the balance of the electrical grid. Storage and Energy Management : Hydroelectric power plants with dams can increase electricity production during times of high demand because they have storage capacity. This provides a significant advantage, especially during times of increased energy demand. Economic Benefits : Although hydroelectric energy has high installation costs, its long-term operating costs are low and it has a long life.	High Installation Costs : The construction of hydroelectric power plants, especially the establishment of dams and infrastructures, requires large investments. Therefore, the initial investment costs are quite high. Environmental Impacts : Dam construction can have serious impacts on the environment. Dams can disrupt ecosystems by changing the natural flow of water, negatively affecting underwater vegetation and animal life. In particular, fish migration routes can be blocked, which can endanger biodiversity. Impacts on Residential Areas : Dams can cause inundation of residential areas. This can lead to displacement and social problems. Additionally, large areas may need to be allocated during dam construction, which can result in loss of agricultural land. Risk of Earthquakes and Other Natural Disasters : Dams create a huge load by storing large amounts of water. This can potentially lead to disasters such as earthquakes, landslides or dam failure. Such hazards are especially significant for large dams. Drought and Changes in Water Flow : Hydroelectric power generation is dependent on water levels and flow. During periods of drought, water availability may decrease, leading to lower energy production. Additionally, seasonal changes can affect energy production. Efficiency Issues : The efficiency of hydroelectric power plants varies depending on water levels and flow rates. If the flow rate of water is low, energy production decreases.

3.2.2. GEOTHERMAL ENERGY



Geothermal energy is an energy source obtained by converting heat found deep in the earth into energy. The temperature in the interior of the earth is much higher than on the surface. This heat is stored in the lower layers of the earth's crust and energy can be produced by using this heat. Geothermal energy is a renewable and sustainable energy source because the heat deep in the earth is considered an almost infinite resource.

Geothermal energy is generally used in the following ways:

Heat Pumps : Geothermal energy can be used not only to generate electricity, but also for heating and cooling in buildings. Geothermal heat pumps provide heat to buildings by taking advantage of the constant temperature difference underground or are used for cooling in the summer.

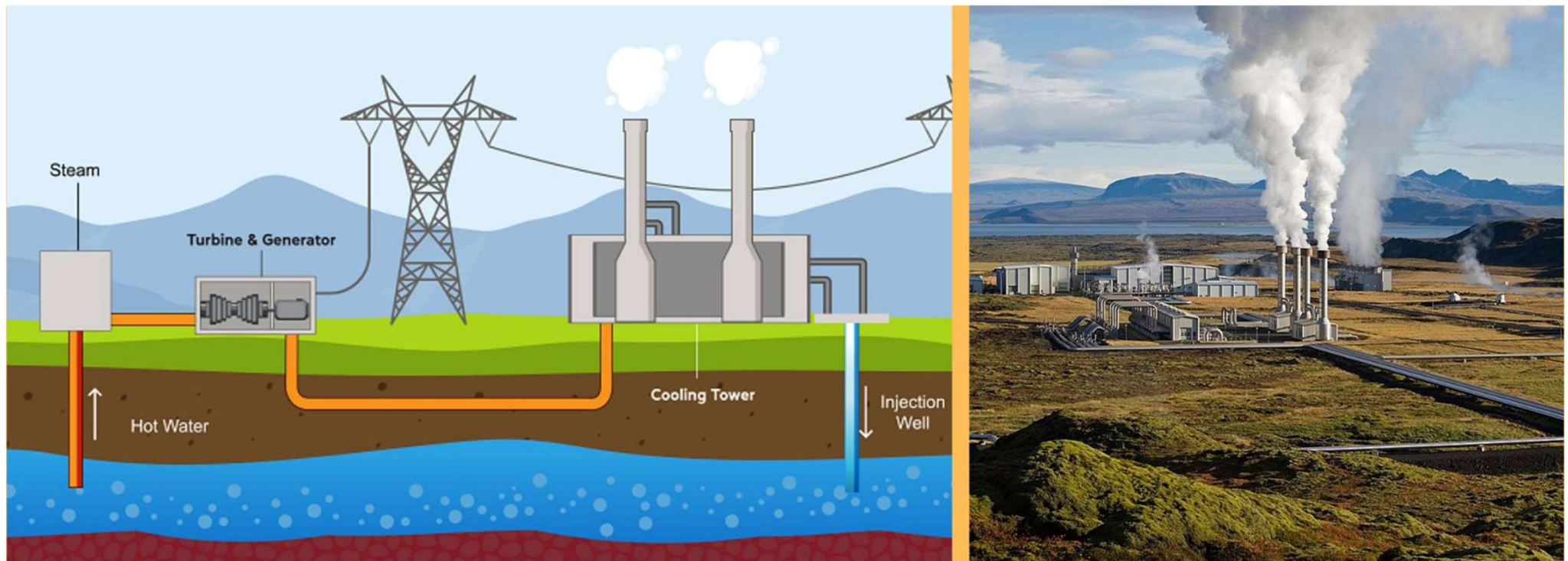
Geothermal Power Plants : Geothermal power plants bring hot water and steam underground to the surface and direct the steam to turbines. As the turbines turn, electricity is produced. There are three basic systems in these power plants:

1. **Dry Steam Systems** : Electricity is generated using direct steam underground.
2. **Flash Steam Systems** : Hot water turns into steam under low pressure and electricity is generated by steam turbines.
3. **Circulation (Binary) Systems** : Hot water heats a second liquid, causing it to evaporate and generate electricity.

3.2.2. GEOTHERMAL ENERGY



GO GREEN AGAINST CLIMATE CHANGE



3.2.2. Advantages and Disadvantages of Geothermal Energy



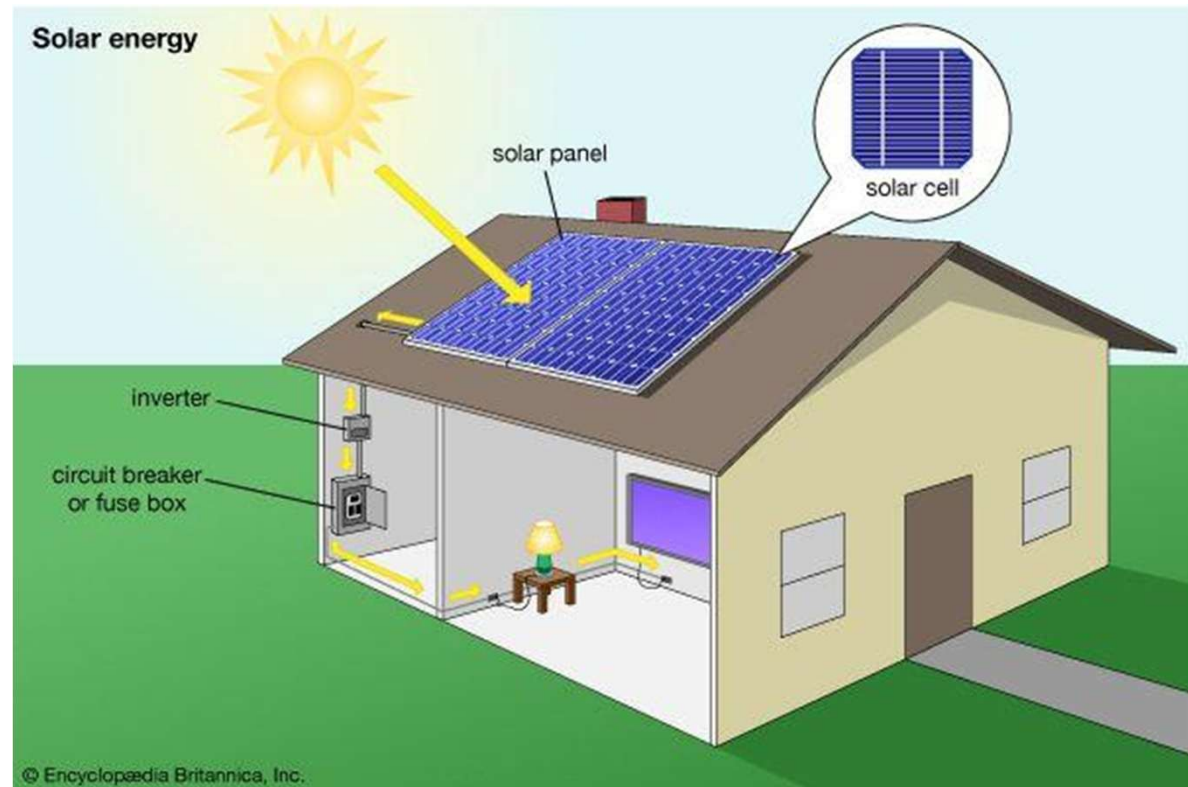
Advantages	Disadvantages
Renewable and Sustainable: It is a continuously available and inexhaustible energy source. Environmentally Friendly: Compared to fossil fuels, greenhouse gas emissions are extremely low. Local Resource Use: Increases energy security by reducing external dependency. Versatile Use: Can be used in electricity generation, central heating, greenhouse heating and industrial processes.	Limited Electricity Production Potential: A large portion of the existing resources in Turkey are not suitable for electricity production. Regional Limitations: Geothermal resources are often concentrated in certain regions, which can create logistical challenges for transportation and use. Investment Costs: Initial investment and drilling costs are quite high.

3.2.3. SOLAR ENERGY



Solar energy is a powerful energy source obtained from the sun's rays. Sun rays are converted into electrical energy by solar panels. While the energy obtained from the sun for one hour can meet the global energy needs for one year, as humans, we can only use 0.001 percent of this energy coming to the world.

In addition to the increasing demand reducing investment costs, panel technology has improved significantly thanks to various technological innovations, and solar energy has become a much more efficient and cleaner energy source thanks to solar energy storage systems.





3.2.3. Advantages and Disadvantages of Solar Energy

Advantages	Disadvantages
It is a Renewable Energy Source : The sun is a natural resource and can be used unlimitedly. This makes solar energy a sustainable energy source. Environmentally Friendly : The use of solar energy does not harm the environment as it does not emit carbon. This reduces air pollution and greenhouse gas effects. Low Operating Cost : The installation costs of solar energy systems can decrease over time and the operating costs are quite low. The system requires very little maintenance once installed. Lowers Electricity Bills : Solar panels can significantly reduce electricity bills for homes and businesses. When there is excess production, revenue can be generated by selling it to the energy grid. Portability : Solar panels can be moved around without being tied to a specific location. This is especially useful for providing electricity in rural areas. Energy Independence : Solar energy reduces dependency on energy providers. Individuals and businesses that produce their own energy are not affected by fluctuations in energy prices from external sources.	Initial Cost : The cost of installing solar energy systems can be high initially. However, in the long run, this cost can be amortized over time as savings on energy bills are achieved. Weather Dependent : Solar energy is dependent on sunlight. Efficiency may decrease during weather conditions and at night. Energy production decreases during cloudy or rainy days. Space Requirement : Solar panels can require large areas. Especially to generate more energy, a large area may be needed, which may prevent settlement or farming activities in some areas. Storage Problems : There may be differences between the time solar energy is produced and the time it is consumed. Expensive battery storage systems may be required to solve this situation. Efficiency Issues : Solar panels have limited efficiency and cannot convert all sunlight into electrical energy. The efficiency rate is usually around 15-20%. Environmental Impact (Production Phase) : The production of solar panels involves energy consumption and some chemicals. This can harm the environment during the production phase.

3.2.4. WIND ENERGY



Wind energy is the conversion of the kinetic energy of the wind into mechanical energy and the use of this energy to produce electricity. Wind turbines capture this energy and convert it into electrical energy. This method is environmentally friendly and offers a sustainable form of energy production because it is based directly on a natural resource.

How Does Wind Energy Work?

Wind energy uses the movement of the wind to turn the blades of the turbine. The movement of the blades turns the shaft of the turbine, and this rotational movement is converted into electricity by the generator. This system works in the following steps:

Wind Turns Turbine Blades : Wind moves the blades of the turbine. The blades are usually designed in an aerodynamic way and rotate according to the direction of the wind.

Conversion of Mechanical Motion into Electricity : The rotational motion of the turbine is transmitted to the generator via the shaft. The generator converts this mechanical energy into electrical energy.



3.2.4. Advantages and Disadvantages of Wind Energy

Advantages	Disadvantages
Renewable and Unlimited Resource : Wind is a natural and continuous resource. Therefore, it is impossible to run out and provides sustainable energy production. Environmentally Friendly : Wind energy does not emit carbon and does not produce environmentally harmful waste. Unlike fossil fuels, it does not harm nature. Low Operating Cost : The operating costs of wind energy systems are generally low. Maintenance and repair costs of wind turbines are quite economical after installation. Reduce Electricity Bills : Electricity generated by wind energy can reduce energy bills for homes or businesses. Additionally, when excess electricity is produced, that energy can be sold to the grid, generating revenue. High Efficiency : Modern wind turbines operate at very high efficiency. Thanks to developing technology, the efficiency of wind turbines is increasing. Creates New Employment Areas : The installation and maintenance of wind power plants creates new job opportunities and contributes to the local economy.	Dependence on Weather Conditions : Wind energy production depends on wind speed and direction. In areas with weak winds or calm weather, energy production is limited. This can prevent wind energy from being an uninterrupted source. High Installation Cost : Wind turbines may require high initial costs to install. However, in the long run, these costs decrease thanks to the energy production. Visual and Noise Pollution : The large structures of wind turbines can be visually unpleasant for some people. In addition, the noise generated by the turbines' rotational motion can be disturbing in some areas. Area Requirement : Wind power plants require large areas. They are more effective when installed in windy areas with large areas for efficient energy production. This can sometimes have negative effects on agricultural areas or natural habitats. Effects on Animals : Wind turbines are known to be deadly, especially to birds and bats. The high-speed spinning blades of the turbines can cause animals to be struck.

3.2.5 MARINE BASED ENERGY



Marine renewable energy is a type of energy used to produce electrical energy from natural resources in the seas and oceans (such as waves, tides, currents, temperature differences). This type of energy enables environmentally friendly and sustainable energy production by using the mobile and thermal energy provided by the seas. Marine renewable energy is an alternative energy source that can replace fossil fuels and does not harm the environment. This type of energy produces energy for humanity by utilizing the power of the seas.

Types of Marine-Based Renewable Energy:

1. **Wave Energy** : Wave energy refers to the energy obtained from the movement of waves on the sea surface. Wave turbines and wave energy harvesting systems produce electricity by converting the movement of waves into mechanical energy. Since wave energy is in constant motion, it can be quite efficient in certain areas.
2. **Tidal (Salt Water) Energy** : Tidal energy is the energy obtained from the tides in the oceans. The high and low water levels that occur in the oceans depending on the Earth's cycle cause the water to flow. By using this flow, tidal power plants generate electricity.
3. **Ocean Current Energy** : Ocean currents refer to the energy created by water flows under the seas. These currents are formed by the constant movement of water. Current energy systems convert the movement of water into electrical energy through turbines located under the sea surface.
4. **Marine Thermal Energy** : Using the temperature difference between the hot water on the surface of the ocean and the cold water in the deep waters, electrical energy can be generated with special thermal engines. This technology allows the hot water in the oceans to be evaporated and a turbine to be driven.

3.2.5. Advantages and Disadvantages of Marine Based Energy



Advantages	Disadvantages
Renewable and Unlimited Resource : Marine-based energies are based on continuous natural events that cannot be exhausted. Events such as waves and tides in particular have the capacity to provide continuous energy production. Environmentally Friendly : Marine-based renewable energy does not produce emissions harmful to the environment like fossil fuels. It does not create carbon emissions and does not cause water pollution. Continuity of Energy Production : Especially tidal and ocean current energy sources are quite regular and predictable, so these types of energy provide more stable energy production compared to other renewable sources (e.g. solar and wind energy). High Potential : The fact that oceans cover a large area and that most of the world's population lives in areas close to the seas indicates that marine-based renewable energies have a wide potential area. Efficient Use of Sea and Land Areas : Since marine-based energy systems are installed in the depths or on the surface of the sea, they leave more space on land for agriculture or settlement areas. This ensures that sea and land areas are used together efficiently.	High Installation and Maintenance Costs : Since marine energy systems are generally installed on the sea surface or in depth, their construction and maintenance costs are quite high. Special technologies are required for the infrastructure and durability of these systems. Environmental Impacts : Marine energy projects can have negative impacts on marine ecosystems. For example, wave and tidal energy systems can impact marine life, cause changes in undersea ecosystems, or disrupt fish migration routes. Energy Production Efficiency : Some forms of marine energy, particularly wave and ocean current energy, may have limited efficiency. These forms of energy may operate at low capacity with current technology and may require technology development to provide greater efficiency. Harsh Environments : Marine and ocean environments have harsh environmental conditions such as storms, high waves and salt water. This can make it difficult to ensure the durability and longevity of power plants. Installation Site Limitations : Marine energy systems require certain geographical conditions to be efficient.

3.2.6 . BIOMASS ENERGY



Biomass energy is a renewable energy source obtained by burning organic materials, namely plant and animal waste, or by converting them into energy through biochemical processes. Biomass covers all organic materials that can be used in energy production, and these materials come from naturally renewable sources. Biomass energy enables the conversion of waste into energy without harming the environment.

Sources of Biomass Energy:

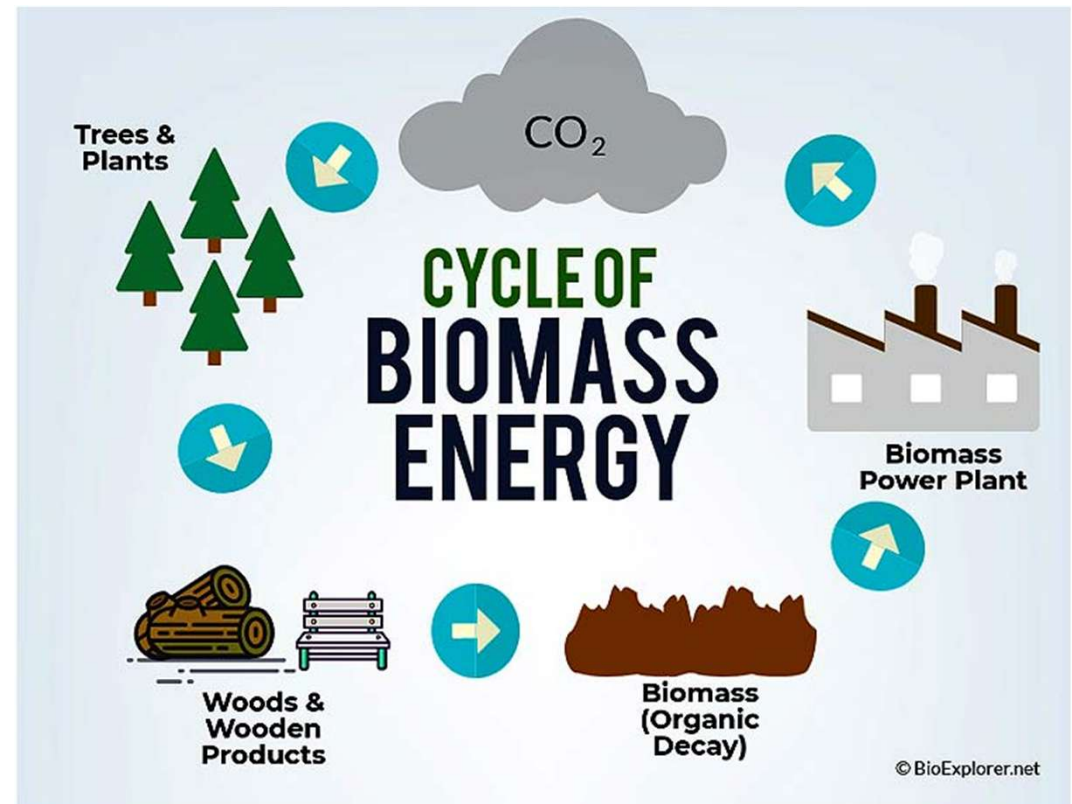
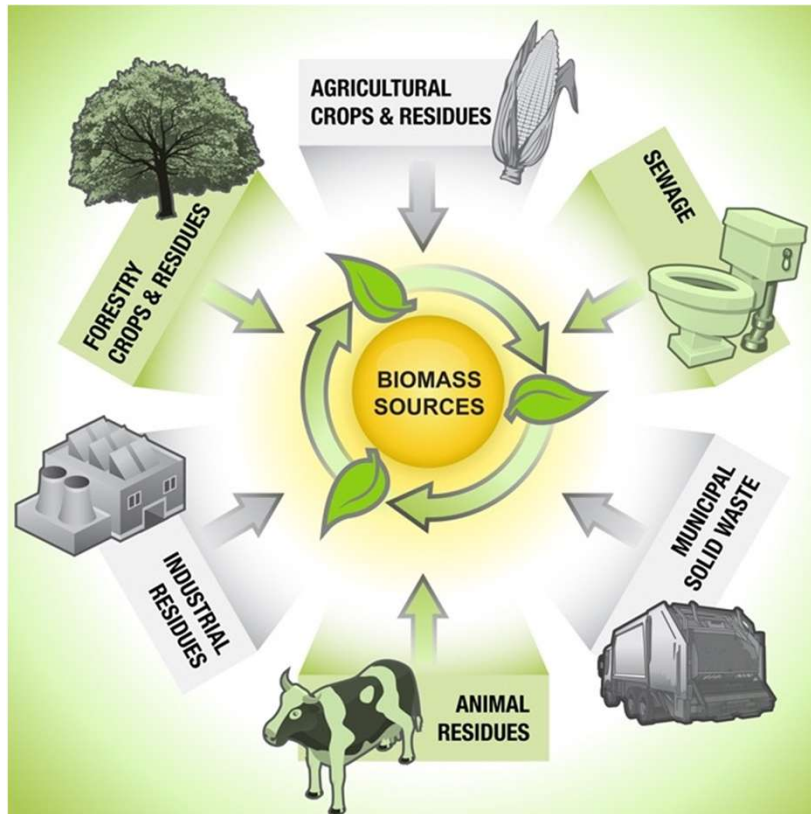
Biomass can be obtained from the following organic materials:

- **Plant Wastes** : Plant materials such as stems, leaves, fruit peels, wood residues and forest waste of agricultural products.
- **Animal Wastes** : Wastes related to animal husbandry (e.g. manure).
- **Food Waste** : Kitchen waste, waste from food factories and waste obtained from innovative food processing methods.
- **Wood and Wood Residues** : Wood and wood derivatives obtained from forests (post-cutting waste, tree branches, etc.).
- **Agriculture for Energy Production** : Specific plants grown for energy purposes (e.g., corn, sugar cane, soy, etc.).

3.2.6 . BIOMASS ENERGY



GO GREEN AGAINST CLIMATE CHANGE





3.2.6. Advantages and Disadvantages of Biomass Energy

Advantages	Disadvantages
Renewable Resource : Biomass is a naturally renewable resource. Agricultural products and organic waste are produced continuously, making biomass sustainable. Recycling of Wastes : Biomass energy prevents waste from the agricultural and food industry from directly harming the environment by converting it into energy. Low Carbon Emissions : When biomass is burned, it is generally considered "carbon neutral" because biomass photosynthesizes by taking carbon dioxide from the atmosphere and when burned, this carbon is released back. This leads to lower net carbon emissions compared to fossil fuels. Local Energy Production : Biomass energy supports local energy production as it can be obtained from local agricultural products or waste, thus reducing external dependency and strengthening the local economy. Flexible Usage Areas : Biomass has a wide range of uses, including electricity generation, heating, motor fuels (biofuels) and even biochemical production.	Efficiency Issues : Biomass energy production is often limited in terms of efficiency. For example, burning biomass can be less efficient than using solar or wind energy directly. Land and Water Use : Biomass production requires agricultural land and water resources. This can affect agricultural production and put pressure on the ecosystem. Emissions : Biomass releases carbon when burned, which can have some environmental impacts. However, biomass energy has lower carbon emissions than fossil fuels. High Costs : Biomass energy systems can be more expensive to install compared to fossil fuels or some other renewable sources. Biomass can also be costly to collect, transport, and process. Destruction of Natural Areas : Growing large amounts of biomass for energy production can lead to the destruction of natural habitats, loss of biodiversity and destruction of forests.



GO GREEN AGAINST CLIMATE CHANGE

THE IMPORTANCE OF USING ENERGY EFFICIENTLY

4.1. Why Should We Use Energy Efficiently?



- **Economic Savings:** According to calculations, there is an energy saving potential of approximately 7.5 billion TL. With this saving; the annual energy needs of 30 million houses can be met.
- **Depletion of Fossil Fuels:** If current energy consumption rates continue, it is estimated that half of fossil fuels will be depleted by 2020. Fossil fuels are used not only in energy production but also in many areas such as the pharmaceutical and chemical sectors. Therefore, the protection of these resources is of vital importance.
- **Environmental Effects:** As a result of burning fossil fuels, greenhouse gases such as CO₂ are released into the atmosphere. While the CO₂ level remained constant between 180-280 ppm for millions of years, it has increased to 360 ppm today. Carbon dioxide is 55% effective on global warming. Other greenhouse gases (CO, SO₂, NO_x) both create pollution in the atmosphere and harm the environment and human health.
- **Global Warming and the Greenhouse Effect:** The greenhouse effect allows short-wave radiation from the sun to enter the atmosphere, while trapping long-wave radiation reflected from the earth's surface. This natural process becomes harmful with the increase of greenhouse gases.
- The ash and toxic substances (mercury, lead, arsenic, cadmium) released during the use of coal in thermal power plants cause high levels of environmental pollution.

4.2. Importance of Energy Saving



GO GREEN AGAINST CLIMATE CHANGE

Contribution to Family and State Budgets: When energy is used efficiently, bills decrease and budget savings are achieved.

Environmental Protection: Less energy consumption reduces greenhouse gas emissions and negative impacts on the environment.

Sustainability: Energy resources are protected for future generations and the destruction of nature is prevented.

Energy saving is a vital issue for individuals, institutions and governments to fulfill their economic, environmental and social responsibilities. Efficient energy use is an important step that everyone can contribute to.





CONSUMER BEHAVIOR AND ENERGY CONSUMPTION

5.1. Individual Consumption Habits and Energy Consumption



Individual consumption habits play a significant role in a person's energy consumption. The small choices we make every day affect our total energy consumption and can directly increase or decrease environmental impacts. Factors that are important in energy consumption:

- **Electronic Devices Used at Home** : Television, computers, phone chargers and white goods make up a large portion of energy consumption at home. The usage time and energy efficiency of devices affect individual energy consumption.
- **Heating and Cooling Systems** : Heating and cooling systems in the home (air conditioning, heaters, central heating systems, etc.) are among the devices that consume the most energy. Usage habits are decisive in increasing or decreasing energy consumption. For example, continuous use of air conditioning at high temperatures leads to more energy consumption.
- **Light Usage** : The length of time the lights in your home are on and the type of bulb used also affect energy consumption. While traditional bulbs consume a lot of energy, LED bulbs use less energy and have a longer lifespan.
- **Transportation and Transport Choices** : The vehicles and modes of transport people use (car, public transport, walking or cycling) directly affect energy consumption. Electric vehicles are more efficient and environmentally friendly than fossil fuel-powered vehicles.

GO GREEN AGAINST CLIMATE CHANGE

A cluster of green gears of various sizes, each containing a white icon representing a different aspect of sustainability: a factory, a trash can, a car, a globe, a sun, a house with a leaf, a leaf, a plug, a lightbulb, a tree, a recycling symbol, a water tap, and a globe with a leaf.

Go Green Against Climate Change -
2023-1-RO01-KA220-SCH-000161283

5.2. Steps for Sustainable Consumption



GO GREEN AGAINST CLIMATE CHANGE



Thermal Insulation and Home Insulation : Applying good thermal insulation to save energy at home reduces heating and cooling costs. Preventing energy loss by insulating windows, doors and walls increases energy efficiency in the home.

Reducing Waste and Recycling : Changing consumer behavior in a sustainable way can reduce waste production and therefore energy expenditure. Recycling saves energy by converting waste into energy.

Water Conservation : Reducing water usage indirectly reduces energy consumption. Pumping and heating water require energy, so saving water increases energy efficiency.

5.3. Energy-Saving Products and Technologies



Advancing technology has created a number of energy-saving products and technologies. These products and technologies can help reduce individual energy consumption and protect the environment:

Energy-Efficient White Goods : Energy-efficient washing machines, refrigerators, dishwashers and ovens can significantly reduce energy consumption. These products are usually labeled as "A++" or "A+" energy class.

Smart Thermostats and Heating Systems : Smart thermostats optimize heating and cooling systems. Heating or cooling processes can be regulated according to the temperature needs of the room, which saves energy.



5.3. Energy-Saving Products and Technologies



Electric Vehicles : Electric vehicles consume much less energy and cause less damage to the environment than gasoline or diesel vehicles. Electric vehicles provide cleaner transportation by reducing the use of fossil fuels.

Solar Panels : Solar panels used in homes generate electricity from sunlight. This reduces energy consumption, lowers energy bills and provides renewable energy use.

Energy-Saving Home Appliances : Smart devices optimize energy consumption by monitoring energy usage in the home. For example, smart plugs prevent devices from consuming unnecessary energy.



ZERO ENERGY AND SUSTAINABLE PRODUCTION

6. ZERO ENERGY AND SUSTAINABLE PRODUCTION

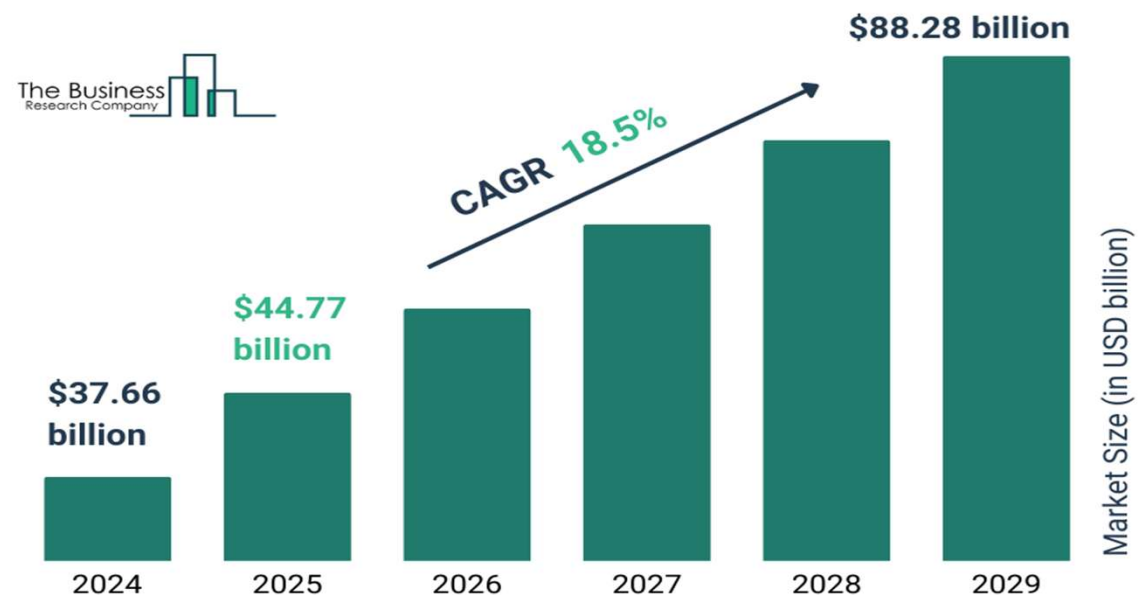


GO GREEN AGAINST CLIMATE CHANGE

Zero energy and sustainable production refers to a production and lifestyle where environmentally friendly technologies and efficient resource use are at the forefront. These approaches aim to minimize energy consumption, use renewable energy resources efficiently, and minimize environmental impacts. Particularly zero energy homes and factories, future energy consumption trends and sustainability goals are important steps for protecting the environment and a more efficient world.

<https://www.thebusinessresearchcompany.com/report/net-zero-energy-buildings-global-market-report>

Net-Zero Energy Buildings Global Market Report 2025



6.1.1. ZERO ENERGY HOUSES



GO GREEN AGAINST CLIMATE CHANGE

Energy Efficient Design : These types of houses are designed with features such as insulation, window insulation and energy efficient appliances that provide low energy consumption. Designs that reduce heat loss minimize the energy needs of the house.

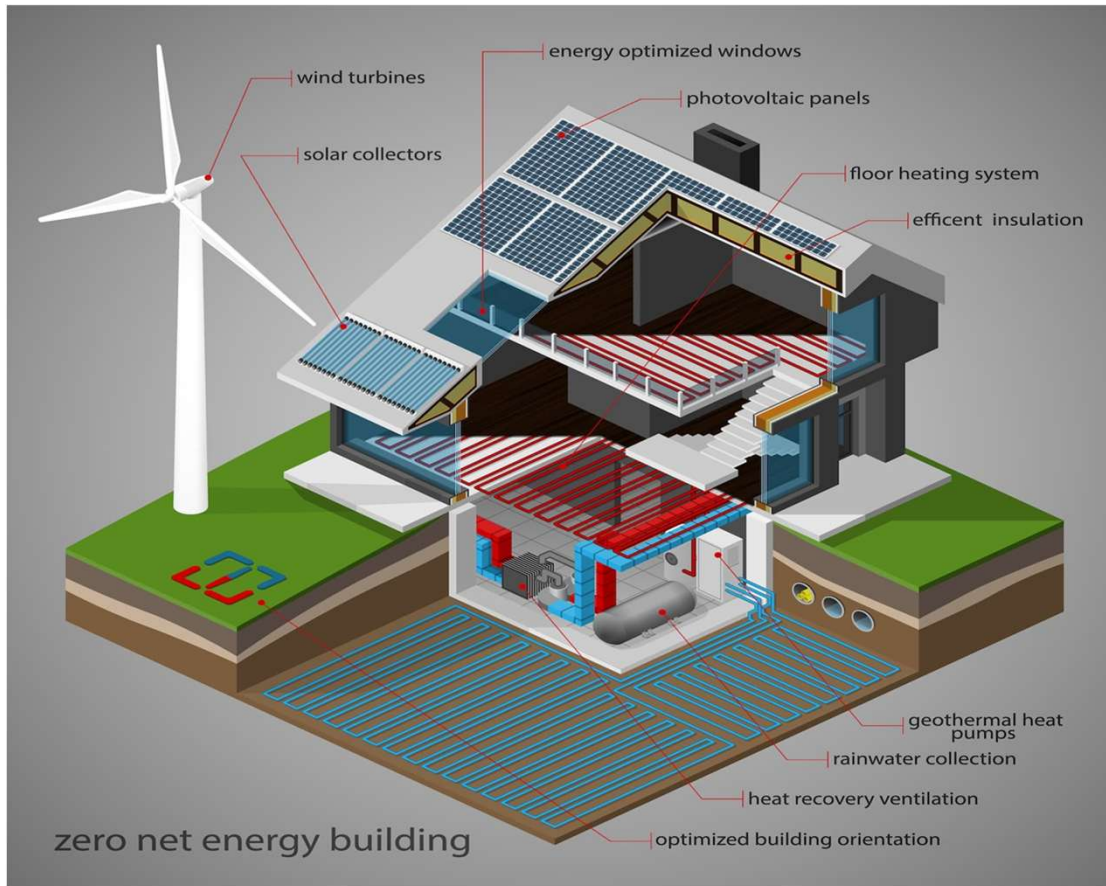
Renewable Energy Systems : The energy needs of the house are met by using renewable energy systems such as solar panels, wind turbines or geothermal heating systems. These structures aim for zero energy consumption by providing a balance between energy production and consumption.

Smart Home Technologies : Smart home systems optimize energy use. Technologies such as smart thermostats, energy monitoring systems, and automatic lighting make energy consumption in the home more efficient.



Go Green Against Climate Change -
2023-1-RO01-KA220-SCH-000161283

6.1.2. Zero Energy Houses



Energy Efficient Design : These types of houses are designed with features such as insulation, window insulation and energy efficient appliances that provide low energy consumption. Designs that reduce heat loss minimize the energy needs of the house.

Renewable Energy Systems : The energy needs of the house are met by using renewable energy systems such as solar panels, wind turbines or geothermal heating systems. These structures aim for zero energy consumption by providing a balance between energy production and consumption.

Smart Home Technologies : Smart home systems optimize energy use. Technologies such as smart thermostats, energy monitoring systems, and automatic lighting make energy consumption in the home more efficient.

6.1.3. Zero Energy Factories

Renewable Energy Integration : Zero-energy factories meet their own energy needs using renewable sources such as solar energy and wind energy. In addition, waste heat from production processes can be used to provide energy recovery.

Efficient Production Processes : Optimization of production processes is ensured with energy-efficient machines, automation systems and low-energy consumption equipment. In this way, the energy efficiency of factories is increased and zero energy targets are achieved.

Waste Management and Recycling : Waste management is a critical element to ensure the sustainability of factories. Recycling, converting waste into energy or making it reusable, reduces energy consumption.



GO GREEN AGAINST CLIMATE CHANGE

