

Green ECONOMY

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PREFACE

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To make Azerbaijan a clean environment and "green growth" country is targeted in the socio-economic development of the country in the next decade as one of the five National Priorities "Azerbaijan 2030: National Priorities for socio-economic development" approved by the Decree of the President of the Republic of Azerbaijan Mr. Ilham Aliyev dated February 2, 2021.

Together with the prospective economic development of the country, environmental health, rapid restoration and increase of greenery, efficient use of water resources and sustainable energy sources are pressing necessities of contemporary world. Under this priority, it is aimed to achieve the effective realization of two goals - a high-quality ecological environment and a "green energy" space in the strategic period

It is mentioned in the National Priorities that the ecological environment should be balanced with economic growth. The purpose of a high-quality ecological environment is to protect a quality and clean ecological environment in the country, and to ensure the efficient use of resources. A comprehensive solution to environmental problems encountered over many years and sustainable development should be upmost priority in this field. Environmental risks from economic and demographic growth should be reduced in the coming years.

Achieving these priorities, in turn, makes the issue of "green economy" relevant in Azerbaijan. In this regard, at the Climate Conference (COP 26) held in Glasgow, Scotland in 2021, the Republic of Azerbaijan took a new initiative on mitigating the effects of global climate change and as an additional voluntary commitment to reduce emissions by 40 percent by 2050. Azerbaijan also declared the intention to create a "net zero emission" zone in the territories freed

from occupation by 2050.

I am confident that, introducing of "green energy" zone, "green agriculture", "green transport", "smart" cities, "smart" villages approaches and reforestation of thousands of hectares in the liberated territories by 2050, will play a major role in reaching the goal of "net zero emissions" in the direction of revitalization of war-affected zones.

As well-known, it is important to consider each of the economic, social and environmental aspects to ensure continuity of efforts in increasing the level of people's well-being and meeting their needs in a globalized world. In economic literature, the concept that provides a unified approach to these aspects is called as "green economy". The concept of "green economy" is, first of all, directly related to the direction of ecological economy.

Over time, the implementation of urgent measures to solve these mentioned problems becomes even more urgent. The problems that were not solved in time, explained as a small natural phenomenon, have now turned into a process that can end with global, unstoppable disasters in front of humanity. Solving environmental problems is also considered important in the Republic of Azerbaijan, and complex measures are implemented in this direction.

Our country contributes to the implementation of the principles of the "Sustainable Development" concept adopted by progressive humanity and works towards mitigating the effects of climate change. According to the Order No. 560 of the President of the Republic of Azerbaijan dated March 11, 2020, measures are being implemented by the State Commission on Climate Change within the framework of the relevant action plan. In order to achieve the set goals, increasing the use of renewable and alternative energy sources and energy-efficient technologies, expanding forest areas and other measures are being implemented in Azerbaijan in order to reduce the effects of climate change.

In the book "Green Economy" intended for a large readership, one of the main environmental problems faced by our world - the impact of the climate change phenomenon on the economy is investigated and the importance of the concept of "green economy" is elaborated in the context of sustainable development issues.



INTRODUCTION

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Economy uses the limited resources of nature to satisfy unlimited demand, in other words, it is a dialectical unity with nature. As the traces of economy in nature multiply, the dictates of nature also increase. Since there is no prospect of fighting nature, the economy takes on the green color of nature in the conditions of the 4th industrial revolution and in preparation for the 5th industrial revolution. Green economy! In this book, the green economy paradigm is analyzed from the perspective of Azerbaijan, which has been known as an energy country for centuries.

The term "green economy", which was first used by a group of economists in a report prepared for the UK government in 1989, now represents one of the main lines of human development at the global level. During the further development of the idea - during the global crisis of 2008, the term "green stimulus package" was coined and the UN Environment Program (UNEP) came up with the "Green economy initiative". As the "breath" of climate change is felt, the concept of green economy is also strengthening its position. Even though, there is currently no commonly accepted definition of the term green economy, it is understood as a sustainable economy that provides a better quality of life for all without disrupting the ecological balance. The UN Environment Program defines "green economy" as a low-carbon, resource-efficient and socially inclusive economy. In order to increase employment and income in the green economy, public and private investments are directed to areas that reduce carbon emissions and pollution, increase energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. Summarizing the most diverse approaches, we can say that it is possible to move towards a green economy in three directions: regulatory framework, business model and public awareness.

The term "green growth", which is a logical continuation of the green economy concept, originated in Asia and the Pacific Ocean. At the Fifth Ministerial Conference on Environment and Development (MCED) held in Seoul in March 2005, 52 Governments and other stakeholders from Asia and the Pacific agreed to move beyond the rhetoric of sustainable development and embrace the concept of 'green growth'. The concept of green growth, which has become a regional initiative of UNESCAP, was adopted as a strategy aiming at sustainable development within the framework of the Millennium Development Goals. The key here is to ensure a harmonious approach between economic growth and environmental protection.

Sustainable development can only be achieved through the "reconciliation" of economic growth and environmental goals. In general, there is a decrease in the rate of economic growth in the world. In the pre-Covid-19 era, the global economy was "stuck" at an annual growth rate of 3-3.5 percent. Even terms such as "hundred-year recession" and "permanent stagnation" were coined in connection with economic growth. Klaus Schwab wrote in his book titled "The Fourth Industrial Revolution" that there were many different explanations for why global growth was currently slowing, from the misallocation of capital to debt and demographic changes. Schwab focuses on only two factors, aging and fertility. Because both are interrelated, especially with technological development. The current world population of 7.2 billion is expected to increase to 8 billion in 2030 and 9 billion in 2050. This will lead to an increase in aggregate demand. But in addition, there is a strong demographic trend: aging. Aging poses an economic threat. In addition to Schwab's approach, we would like to state that economic growth is not a goal in itself, but the goal is to achieve human well-being and decent living conditions without damaging the environment. As in all eras, the main issue of the economy was efficiency, but with one difference: in the green economy, efficiency should also include the use of resources and should not threaten inclusion. One of the five National Priorities for socio-economic development of Azerbaijan in the next decade is the country of clean environment and "green growth". At the same time, the essence of the green energy approach adopted in Azerbaijan means, on one hand, energy will be purchased more and more from renewable sources, and on the other hand, our

energy saving is more efficient than producing that amount of energy. As part of the "Green Growth" concept, Azerbaijan is implementing a policy related to the transformation of liberated Karabakh and Eastern Zangezur region into a "Green Energy Zone".

According to the "New Policy" (New Deal) course, which includes socio-economic reforms in the fight against the crisis in the 30s of the 20th century, the concept of "New Green Policy" (Green New Deal) is being put forward. The "New Green Policy" includes government policies aimed at combating climate change, creating jobs and eliminating economic inequality. Although global leaders understand the gravity of the climate problem, they are not able to show the desired result in their activities. The United Nations Climate Change Conference (COP26) in Glasgow has been a disappointment: Global promises of "net zero" emissions on one side and short-term interests at national levels collide on the other. Fulfilling the commitment of governments to reduce global warming by 1.5°C under the Paris Agreement does not seem credible. The reduction in carbon emissions due to the COVID-19 shutdowns is temporary. Azerbaijan, in turn, aimed to increase the share of renewable energy in the total energy production capacity from the current 17% to 30% by 2030.

As an energy country, Azerbaijan plays an important role in providing energy security of Europe with natural gas, which is considered as a transitional fuel. The Southern Gas Corridor, which is worth 33 billion US dollars or three times the size of Armenia's economy, promises new perspectives for producer, transit and consumer countries. First, the demand for buying "blue fuel" through the Southern Gas Corridor is increasing. Thus, the Western Balkan countries want to buy "blue fuel" from the Southern Gas Corridor, and the existing consumers, especially Turkey and Georgia, are determined to increase natural gas imports. In turn, the European Union adopted a package related to the hydrogen and decarbonized gas markets in December 2021 and declares its intention to use natural gas as a means of transition to clean energy. Even by 2030, natural gas will account for 22 percent of Europe's total energy consumption. As it can be seen, the Southern Gas Corridor project, realized under the leadership of Azerbaijan, can further increase its role in the supply of the southern flank of the European energy map. Of course, as the demand for the Southern Gas Corridor increases,

the expansion of the project becomes more urgent. This requires time and money. The European Union, which is more interested in the issue, was ready to invest in gas infrastructure in its neighborhood, especially in a reliable project like the Southern Gas Corridor. The World Bank, the European Bank for Reconstruction and Development, the Asian Development Bank, the European Investment Bank, and the Asian Infrastructure and Investment Bank, which contributed to the Southern Gas Corridor project, are also interested in supporting the expansion of the corridor's infrastructure. If there is a demand for natural gas and the infrastructure of the Southern Gas Corridor will be expanded, the attraction of additional sources of natural gas becomes relevant in parallel. In this sense, Azerbaijan's "Absheron", "Babek", "Umid" fields, as well as large "blue fuel" reserves in the deep part of "Azeri-Chirag-Gunashli" create additional opportunities. At the same time, the prospect of Azerbaijan buying gas from Turkmenistan with a swap agreement and the "Dostlug" field can also play a role in meeting the growing additional demand of the Southern Gas Corridor. Meanwhile, according to the "green energy" policy implemented by Azerbaijan, it is possible to export natural gas volumes to the Southern Gas Corridor. To note that Azerbaijan is able to export electricity not only through the export of natural gas, but also through the Zangezur Corridor and power lines connecting Central Europe with our region through the bottom of the Black Sea. Unlike "energy nationalism" and the forces that use energy as a "weapon", Azerbaijan plays an important role in the process of energy transition and energy security of Europe.

Approaches to the global climate problem and green development are also different. For example, on one side of the world, while the European Union is considering zeroing greenhouse gas emissions by 2050, or California, the world's fifth largest economy, has announced a transition to 100 percent clean electricity along with other US states, large countries such as India and Nigeria show poor environmental performance. The Yale University Center for Environmental Law and Policy and the Center for International Geoscience Information Network at the Columbia University Earth Institute, which calculate the Environmental Performance Index, concluded that economic opportunity is critical to the success of

environmental policy. Paradoxically, economic development, especially with industrialization and urbanization, leads to environmental pollution. Therefore, finding the "golden mean" between sustainable development and economic security goes through "good governance". From this point of view, this book analyzes the implementation of the process of double-digit industrialization in the non-oil sector in Azerbaijan in accordance with the requirements of the Fourth Industrial Revolution.

Globally, the demand for electricity in transportation and heating and cooling is increasing. The use of renewable sources, including wind and solar energy, to meet the demand for electricity is expanding, while the possibilities of energy storage are increasing. Given the carbon emission potential of the growing energy demand of the shipping, aviation, steel and chemical industries, there is a need for greater use of renewable sources, such as environmentally friendly hydrogen fuel. As a result, efficiency is one of the lowest-cost ways to solve energy supply problems and reduce emissions in this way. Only 33% of the global primary energy consumed is converted into useful energy, and the rest is simply lost during production, transit, distribution and consumption. Optimizing both sectoral and cross-sectoral activities is essential to ensure efficiency.

It is advisable to implement the fight against global climate change and the construction of a green economy based on a strict strategy, as well as to keep away from the influence of geostrategic, geopolitical and geoeconomic games. A mutual influence is observed between the change of world energy geopolitics and the acceleration of green development. Thus, the creation of the OPEC+ organization, the transformation of the largest energy consumer, the United States, from a net energy importer to a net exporter, the development of clean energy technologies and the use of alternative sources, the pandemic, the widespread use of shale oil and gas resources are reshaping the energy map. Although, unlike oil and gas, alternative energy sources are more widespread, but the same cannot be said about ecologically clean energy technologies. For example, China is becoming a technology hub by taking the lead in the production of solar panels, wind turbines and batteries for electric cars, adding a new color to energy geopolitics. The development of renewable energy sources affects the global

geo-economy by increasing the demand for materials such as lithium and cobalt. Once, a consortium of oil exporters - OPEC - was created to regulate the energy market, now the Global Battery Alliance (GBA) was formed to support the battery value chain.

It is possible to reshape the market by implementing clean technologies and driving innovation. Policymakers can shape the right messages by eliminating traditional fuel subsidies, strengthening the fight against energy poverty, creating carbon pricing schemes, and leveraging existing technologies. The cost of solar and wind energy technologies is falling, and a similar development trajectory is expected for lithium-ion battery technology. At the same time, clean technologies should be developed in the field of transmission, distribution and consumption of the obtained energy. Hydrogen-based technical solutions, clean hydrogen production and production infrastructure should be expanded. Another technology for solving the climate problem is carbon capture, utilization and storage (CCUS).

More than \$50 trillion in investment will be needed by 2035 to reduce emissions in existing infrastructure and meet growing energy demand. There is currently a gap of hundreds of billions of dollars between existing investments and the amount of investment required to green the energy sector. In addition, the International Energy Agency reports that the COVID-19 pandemic has caused the largest drop in global energy investment in history: In 2020 alone, investments in the energy sector fell by 20% compared to the previous year. Bridging this gap requires innovation in both financial and public policy terms. New mechanisms in the financial industry are increasing investment opportunities in cleaner energy infrastructure. For example, "mixed capital" vehicles, which bring together investors with different social and financial return expectations, open up new opportunities. In addition, "green bonds" and tax credits can also be considered as new financing mechanisms.

Environmental, social, and governance (ESG) criteria are the main approach for socially responsible investors in the green economy. On the basis of ESG, the company is perceived as a conservationist, regulates relations with employees, suppliers, customers and the community, while ensuring the accountability and transparency of the company. In this sense, ESG creates a link

between the green economy and stakeholder capitalism. Accepting ESG as a value ensures the same approach at all stages of the economy - production, distribution, exchange and consumption. Even concepts such as socially responsible investment and Sustainability Impact Investing (IFSI) emerged based on ESG. In addition to new financial mechanisms, investors are increasingly seeking disclosure of environmental and social governance (ESG) risks and are taking steps to quantify whether their investments are aligned with ESG goals. Such an approach encourages private investment in clean energy infrastructure and creates industry-wide cooperation to reduce emissions. In this sense, public policy plays an important role in promoting private capital. Because uncertainty in public policy and the market increases costs and reduces efficiency. The state is trying to facilitate access to capital and eliminate the risks of such projects within the regulatory framework created by the state. The state also uses market mechanisms, such as auctions, to increase competition while encouraging innovation and driving cost reductions. Public-private partnerships are another tool for private business to contribute to green economic growth: it de-risks the private sector, provides incentives and, most importantly, provides policy guarantees.

The book explains the green economy based on a multidisciplinary and multidimensional approach. First of all, the authors tried to determine the main line of development of "green economy" in Azerbaijan by analyzing global trends and perspectives. In 2020, the level of self-sufficiency in energy is 364%, and energy dependence is a negative sign of 254.5%. Azerbaijan has been known as an energy country for many centuries. It should be taken into account that the potential power of renewable energy in the liberated territories of Azerbaijan alone exceeds 10,000 megawatts, and the total technical potential of wind energy in the Azerbaijani sector of the Caspian Sea exceeds 150 gigawatts. In this sense, Azerbaijan has more fertile conditions for energy transfer. On the other hand, a new institutional framework, environmentally friendly technologies, human capital and, most importantly, "greening" in thinking are considered the main priority directions for the development of the green economy.

The first part of the monograph consists of two chapters. Chapter

It is titled "Climate Change and Sustainable Development: Environmental Limits to Economic Development." In the first paragraph of this chapter, the phenomenon of climate change in modern times is investigated and the current situation is analyzed. Here is information about the future period and forecasts in the context of climate change. In the second paragraph mainly "green economy" discusses the role of the concept in the context of sustainable development issues, as well as examines the theoretical conceptual foundations of this field. In the section, concepts are given about the output model of economic activity results, the eco-economic efficiency coefficient, the ecologically sustainable maximum and optimum limits of economic expansion, and the hierarchy of demands. Economic expansion of the level of sustainable economic prosperity a theoretical analysis of the maximum and optimal levels is carried out and information is given on the Real Development Indicator used for the assessment of the general well-being level. In the third paragraph, climate change and other environmental problems are considered as a problem of externalities within the framework of economic science, and the economic reasons at the root of these problems are analyzed.

The section discusses two directions of eco-economic regulation: administrative control and economic promotion policy. In addition, the analysis of regulatory instruments in these areas presented. As regulatory instruments, instruments such as direct regulation, Pigou taxes and subsidies, and environmental permits are analyzed and their negative and positive characteristics are examined.

Chapter II is called "Green economy for green cities". The first paragraph of this chapter examines the relationship between the urbanization process and environmental problems such as climate change and presents statistics on the role of cities in this process. Here, the issues of "green urbanization" are touched upon and information is given about the lack of a single concept in this matter. Concepts related to different "starting points", primary structural elements and driving forces are explained in the "green transformation" issues. The section provides information on energy, transportation, residential infrastructure, water and sanitation services, and sustainable consumption chain components, which are

considered to be component elements in building "green cities".

The second paragraph covers the issues of decarbonization in the constituent elements presented in the previous sections and analyzes the experiences of different countries. Emphasis is placed on the application of technologies that serve "green goals" in the structural structure of buildings, building services, and energy supply components of buildings, especially in the construction sector. Low and zero emissions for the transport sector concepts of zones are analyzed and international experience in this field is studied.

Finally, as the last sector, the issues of waste management are analyzed, and in this direction, the 3R principle, low-emission waste landfills, and thermal treatment of waste are analyzed. Finally, in this part, the analysis of indicators used in the evaluation of "green cities" is conducted and the methodologies used in different countries are analyzed.

Chapter I of the second part of the monograph is entitled "Energy efficiency: The world in search of alternatives", where the energy consumption of mankind is statistically analyzed. During the analysis, carbon-based energy sources with a high share in energy consumption were investigated and environmental tensions caused by their intensive use were analyzed. In the second part of the section, the concept of "energy efficiency" was touched upon, and the benefits of energy efficiency were emphasized in order to restructure world energy consumption in a way that would have less impact on the environment. The third part analyzed the trends in energy consumption of alternative energy sources, discussed different alternative energy sources such as hydropower, biomass, geothermal energy, solar energy and wind energy and their applications in different countries. Finally, in the fourth section, the socio-economic benefits of the transition to the use of alternative energy were examined.

Chapter II of this section is devoted to "green finance".

The need for the emergence of "finance", the analysis of "green finance" in various directions, and the current obstacles in front of "green finance", consists of four parts. The first part of the section discusses the importance of financing in the implementation of any project, the imbalance of cost-benefit elements in environmental projects and technologies, and the role of financing in creating this balance.

In the last paragraph of this chapter, the financial sector tools supporting the development of the "green economy" are explained under 4 headings: retail finance, corporate "green investments", asset and fund management, and "green insurance". Under each sub-heading, the "green finance" tools and mechanisms included in this field are discussed, with general information about the respective fields. Thus, in the field of "retail finance" "green loans", "green mortgage" loans, "green car loans", debit and credit cards; "green bonds" in the field of "corporate green investments", "green securitization", "green leasing", "green public funds" in the field of "assets and funds management", carbon funds and the EU initiative "JUST Transition Fund", "Green insurance" vehicle, home insurances and carbon insurances were analyzed. While analyzing each financial instrument, its role in "green decision-making" was investigated. In the fourth part, the main challenges facing "green financing" were examined.

The third section of the monograph consists of three chapters. The first chapter of this section discusses the current situation and prospects of the "green economy" in Azerbaijan. Here, the opportunities for the development of the "green economy" in Azerbaijan are examined, the current situation of the use of alternative energy sources is evaluated, and information is provided about the prospects. We also have a large "green energy" potential in the Caspian Sea. According to preliminary studies, the total technical potential of wind energy in the part of the Caspian Sea belonging to Azerbaijan is 157 GW. The export of electricity from this potential in the sea, as well as the production of "green hydrogen" are prospects that will add value to the country's economy. In addition, full information is given on the work done in the direction of the transformation of the territories freed from occupation into a "green energy" zone. It is noted that the President of the Republic of Azerbaijan, Mr. Ilham Aliyev, declared the liberated Karabakh and Eastern Zangezur a "green energy" zone. The approved potential of the exempted areas is 7,200 megawatts of solar and 2,000 megawatts of wind energy. Work is underway to build a 240-megawatt solar power plant in Jabrayil and Zangilan regions. The second chapter of this section is devoted to the "Green budget" framework and its application in Azerbaijan. Here, the integration of climate change into the budget policy, the legal and institutional

framework of the fight against climate change in Azerbaijan, the financing of climate-related activities, and the implementation of the "Green Budget" framework were discussed in detail. In addition, in the mentioned section of the monograph, important points such as determining the financial needs for combating the problem faced by Azerbaijan as a country exposed to the negative effects of climate change, effective mobilization of financial resources in this area, and establishing a monitoring, evaluation and accountability system were touched upon.

The third chapter of this section, called "Agriculture and green growth", examines the role of agriculture in development and discusses the existing theoretical foundations in this field. Based on statistical data, the role of the agricultural field in the development of our country is determined, and information is provided about the expected dynamics in this field. In addition, the present part presents a study on the future prospects of the innovative global trends related to "green development" in the agricultural sector. The world experience of "smart" village concepts, which are currently widely discussed within the framework of "green development policy" at the global level, as well as the experience of Azerbaijan, are examined in this part of the book. The second part of the section discusses the strengths and weaknesses of policy instruments used to support green development in agriculture.

Giving the book to readers for discussion, we are unanimous on one issue: The most important thing is the formation of green thinking. We hope that this book will be useful for decision-makers, scientists, students and the general public in the development of "green economy" by contributing to the formation of green thinking and lifestyle!