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SPECIFIC FEATURES OF LOW-CARBON DEVELOPMENT IN THE ECONOMY OF UZBEKISTAN

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Abstract
Today, every country is suffering from the problem of energy supply. Also, a number of shortcomings in this network are not visible in our country. It is not wrong to say that paying great attention to energy supply and energy production, which is one of the foundations of today's economic systems, is one of the most important tasks of every country. One of the priorities of green economy, green growth and sustainable development is renewable energy. In terms of the negative impact on the atmospheric air, in most cases, the decoupling effect was also revealed. At the same time, in some regions, economic development is accompanied by an increase in atmospheric pollution, which is most obvious when considering the situation in the context of the most common pollutants and main types of economic activity. So, in order to get sustainable growth in the field of electricity production, we should choose the best ways that does not have negative impacts to the air and human well-being. This article focuses mainly on electricity production sectors of Uzbekistan, especially electricity generation from coal, oil and gas sources, electricity generation from low-carbon sources and their annual changes, their share in the gross domestic product of the population and how much per capita is studied by comparison.
Key words: energy, energy supply, green economy, green growth, sustainable development, energy from oil, energy from coal, renewable energy, energy from gas, low-carbon sources.

ОСОБЕННОСТИ НИЗКОУГЛЕРОДНОГО РАЗВИТИЯ ЭКОНОМИКИ УЗБЕКИСТАНА

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Аннотация
Сегодня каждая страна страдает от проблемы энергоснабжения. Не будет ошибкой сказать, что уделение большого внимания энергоснабжению и производству энергии, являющейся одной из основ современных экономических систем, является одной из важнейших задач каждой страны. Одним из приоритетов зеленой экономики, зеленого роста и устойчивого развития являются возобновляемые источники энергии. В плане негативного воздействия на атмосферный воздух в большинстве случаев также выявлялся эффект декаплинга. В то же время в ряде регионов развитие экономики сопровождается увеличением загрязнения атмосферы, что наиболее очевидно при рассмотрении ситуации в разрезе наиболее распространенных загрязнителей и основных видов хозяйственной деятельности. Итак, чтобы получить устойчивый рост в области производства электроэнергии, мы должны выбирать лучшие пути, которые не оказывают негативного воздействия на воздух и самочувствие человека. В данной статье основное внимание уделяется секторам производства электроэнергии в Узбекистане, особенно выработке электроэнергии из угольных, нефтегазовых источников, выработке электроэнергии из низкоуглеродных источников и их ежегодным изменениям, их доле в валовом внутреннем продукте населения и сколько приходится на душу населения.
Ключевые слова: энергия, энергоснабжение, зеленая экономика, зеленый рост, устойчивое развитие, энергия из нефти, энергия из угля, возобновляемая энергия, энергия из газа, низкоуглеродные источники.

O‘ZBEKISTON IQTISODIYOTIDA KAM UGLERODLI RIVOJLANISHNING O‘ZIGA XOS XUSUSIYATLARI

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Annotatsiya
Bugungi kunda har bir davlat energiya ta’minoti muammosidan aziyat chekmoqda. Bugungi iqtisodiy tizimlarning asoslaridan biri bo‘lgan energiya ta’minoti va energiya ishlab chiqarishga katta e’tibor qaratish har bir davlatning eng muhim vazifalaridan biri, desak xato bo‘lmaydi. “Yashil” iqtisodiyot, “yashil” o‘sish va barqaror rivojlanishning ustuvor yo‘nalishlaridan biri qayta tiklanadigan energiya hisoblanadi. Atmosfera havosiga salbiy ta’sir nuqtai nazaridan, ko‘p hollarda “dekampling” samarasi ham aniqlandi. Shu bilan birga, ayrim hududlarda iqtisodiy rivojlanish atmosfera ifloslanishining ortishi bilan birga kuzatiladi, bu eng keng tarqalgan ifloslantiruvchi moddalar va iqtisodiy faoliyatning asosiy turlari negizida vaziyatni ko‘rib chiqishda eng aniq ko‘rinadi. Demak, elektr energiyasi ishlab chiqarish sohasida barqaror o‘sishni ta’minlash uchun biz havo va inson farovonligiga salbiy ta’sir ko’rsatmaydigan eng yaxshi usullarni tanlashimiz kerak. Ushbu maqolada, asosan, O‘zbekistoda elektr energiyasi ishlab chiqarish tarmoqlari, xususan, ko‘mir, neft va gaz, kam uglerodli manbalardan elektr energiyasi ishlab chiqarish va ularning yillik o‘zgarishlari, ularning Yalpi ichki mahsulotidagi ulushi va aholi jon boshiga qancha to‘g‘ri kelishi tahlil qilingan.
Kalit so‘zlar: energiya, energiya ta’minoti, yashil iqtisodiyot, yashil o‘sish, barqaror rivojlanish, neftdan energiya, ko‘mirdan energiya, qayta tiklanadigan energiya, gazdan energiya, kam uglerodli manbalar.

Introduction

The economic processes taking place in our country today are no secret to anyone. It is clear to all of us that the shortcomings of the energy supply have a negative impact on the well-being of the population. To eliminate such problems, a number of reforms are being implemented in the field of energy supply. The main reason for this is that in New Uzbekistan, life is dear, human value is dear. One of the main indicators of the well-being of the population is the availability of sufficient supplies of primary products. One of such primary supplies is electricity. Today, electricity forms the basis of every field, for example, production, education, medicine, population welfare, etc. Considering all this, our honorable president Sh. M. Mirziyoev has signed the decree of "On the state program for the implementation of the development strategy of the new Uzbekistan for 2022-2026 in the year of attention to people and quality education"[2]. One of the priority tasks to be implemented this year is Goal 24: Continuous supply of electricity to the economy and active introduction of "Green Economy" technologies to all sectors, increasing the energy efficiency of the economy by 20% and reducing the amount of harmful gases released into the air by 10% has been passed. This is the main attention given to this field in our country.

In addition, one of the main policies that contains the green economy, green growth and long term sustainable renewable energies is “On the measures to increase the effectiveness of the reforms implemented in the Republic of Uzbekistan to transition to a "green" economy by 2030” [3]. President of the Republic of Uzbekistan Sh. M. Mirziyoev has signed this decree, inside it there is a conception related to the energy consumption and renewable energy. This conception has signed under the Sh. M. Mirziyoev’s decree of “On the measures to increase the effectiveness of the reforms implemented in the Republic of Uzbekistan to transition to a "green" economy by 2030” and named “Transition to a "green" economy and ensuring energy efficiency in industrial sectors conception”. These all means, we have exact way to tackle the problems related to the energy production for the next decade.

Energy supply and energy consumption is main problem for the entire universe. All nations have been trying to get the long-term sustainable energy supply. lobal energy policies and discussions in recent years have been focused on the importance of decarbonizing the energy system and the transition to net zero. The events of the past year have served as a reminder to us all that this transition also needs to take account of the security and affordability of energy. Together these three dimensions of the energy system – security, affordability, and sustainability – make up the energy trilemma. Any successful and enduring energy transition needs to address all three elements of the trilemma. (Energy Outlook 2023 edition) [4]. The many uncertainties surrounding the transition of the global energy system mean that the probability of any one of these scenarios materializing exactly as described is negligible. Moreover, the three scenarios do not provide a comprehensive range of possible paths for the transition ahead. They do, however, span a wide range of possible outcomes and so help to illustrate the key uncertainties surrounding energy markets out to 2050 [5].

According to the Energy Outlook 2023 edition, there are some core believes in terms of energy resources and energy transition hat are common across the main scenarios. These trends help shape core beliefs about how the energy system may evolve

over the next 30 years. Firstly, the carbon budget is running out. Despite the marked increase in government ambitions, CO2 emissions have increased every year since 2015. Secondly, many countries should support the models of energy production which is based on the low carbon emissions. Thirdly, the disruption to global energy supplies by the negative externals increase the importance attached to addressing all three elements of the energy trilemma: security, affordability, and sustainability. Fourthly, the structure of energy demand changes, the transition to a low-carbon world requires a range of other energy sources and technologies, including low-carbon hydrogen, modern bioenergy, and carbon capture, use and storage. Next, Natural declines in existing production sources mean there needs to be continuing upstream investment in oil and natural gas over the next 30 years. Lastly, Low-carbon hydrogen plays a critical role in decarbonizing the energy system, especially in hard-to-abate processes and activities in industry and transport. Low-carbon hydrogen is dominated by green and blue hydrogen, with green hydrogen growing in importance over time. Hydrogen trade is a mix of regional pipelines transporting pure hydrogen and global seaborne trade in hydrogen derivatives. There are many priorities have been mentioned inside it, but we have given the most important parts.

Having studied the above world experience and their forecasts for the next 30 years, as well as studying the actual work being carried out in our country on the transition to new sectors of electricity production, in this article, the production of electricity through various sectors of Uzbekistan We tried to learn. We compared the existing fields of electricity production through comparative comparison methods and tried to mention the necessary proposals and considerations.

Methods

This article mainly used the "Comparative analysis" method to compare the data found and highlight their importance. Secondly, in the case of studying the priority tasks of introducing new directions in the field of energy saving and energy supply in our country and applying them to Uzbekistan, some base comparisons with different years has been made.

Results and discussions

As global GDP and population growth have aggravated environmental problems and raised awareness of energy resource limitations, many countries have made the transition to sustainable development their main goal. Intergovernmental Panel on Climate Change (IPCC) research shows that raising the CO2 price to USD 50 per tonne of carbon dioxide (/tCO2) emitted into the atmosphere and expanding the use of RESs would help reduce CO2 emissions 38% by 2030, and 70% by 2050 [6].

Although the energy intensity of Uzbekistan's GDP has been declining in recent years, this indicator remains much higher than that of developed countries. Average global energy intensity of GDP is currently 240 kilograms of oil equivalent (kgoe)/USD 1 000. However, the energy intensity of Uzbekistan's GDP is almost four times higher than the European Union’s and twice the world average. As a result, Uzbekistan is one of a group of countries with rather high levels of CO2 emissions per unit of GDP. Releasing this condition, we should change our behavior towards the production of energy resources. There are mainly types of energy production, first one is electricity generation from fossil fuels, electricity generation from coal, oil and gas sources combined. Second one is electricity generation from low-carbon sources, low-carbon electricity is the sum of

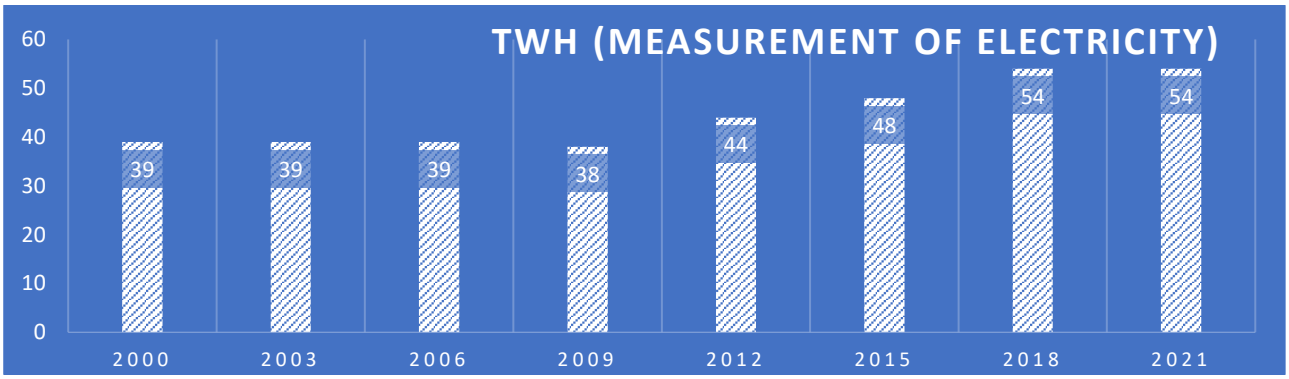
electricity generation from nuclear and renewable sources. Renewable sources include hydropower, solar, wind, geothermal, bioenergy, wave and tidal. Now we will pay attention each of them one by one.

Electricity generation from fossil fuels, electricity generation from coal, oil and gas sources combined. As a combination of all types of fossil fuel energy production, we have gathered these dates. In 2000, our country had a power to produce 39 TWh (terawatt-hour (TWh). It is also equal to 1,000,000 megawatt-hours (MWh) or 1,000,000,000 kilowatt-hours (kWh) **[7]**. Terawatt-hours are used in measuring quantities of electricity or heat produced.) electricity. Its absolute change in 2021 was +16 TWh, and it reached at 54 TWh in this year. On the table one and graph one, we can look through these absolute changes year by year, from 2000 to 2021.

Table 1.

Electricity production from fossil fuels from 2000 to 2021 years.

Electricity production from fossil fuels from 2000 to 2021 years.								
Years	2000	2003	2006	2009	2012	2015	2018	2021
TWh (Measurement of Electricity)	39	39	39	38	44	48	54	54



Graph 1. Histogram of the electricity production from fossil fuels from 2000 to 2021 years

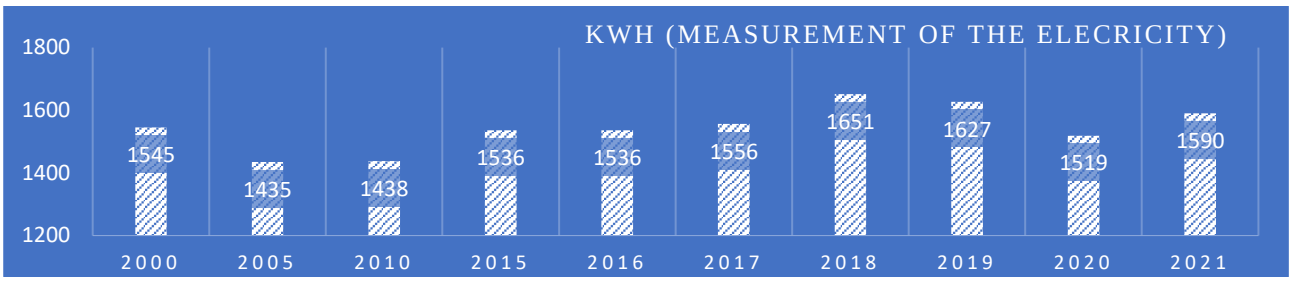
These tables and graphs are created by the author with using the online data. Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Yearly Electricity Data (2023); Our World in Data based on Ember's, European Electricity Review (2022), OurWorldInData.org/energy • CC BY [8]

The above table and graph illustrate that electricity production has been a fluctuated trend. But, recant years there is a stable increase. There is an increase but is it enough for our country. By this word I mean that our population also increased dramatically, from 2000 to 2021. In the second table and histogram we have paid attention in the per capita electricity production from fossil fuels, electricity from fossil fuels is the sum of electricity generation from coal, gas, oil.

Table 2.

Per capita electricity production from fossil fuels from 2000 to 2021y.

Per capita electricity production from fossil fuels from 2000 to 2021										
Years	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021
kWh	1545	1435	1438	1536	1536	1556	1651	1627	1519	1590



Graph 2. Histogram of Per capita electricity production from fossil fuels from 2000 to 2021y.

These tables and graphs are created by the author with using the online data. Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Yearly Electricity Data (2023); Our World in Data based on Ember's, European Electricity Review (2022), OurWorldInData.org/energy • CC BY [9]

These measurements based on the electricity production from the fossil fuels annual and per capita from 2000 to 2021. On the one hand, we should pay attention that last 5 years in Uzbekistan there were a stable increase in the production of electricity from the fossil fuels, but on the other hand per capita electricity production were not increased stably, it was fluctuated. The reasons for this fluctuation are: the first one more electricity was exported, the secondly demographic conditions of Uzbekistan were increased in these years, thirdly populations of Uzbekistan increased dramatically at these years. On the graphs above, we have shared the electricity production from fossil fuels, from 2000 to 2021y. It is easy to catch that every year in percentage there were an increase in the fossil fuel electricity production in the last 5 years. In 2015, it was 86,17%, this means that from the total 100% electricity production this percentage of electricity is produced from the fossil fuels. These indicators were 91,05% and 91,54% in the given last 2020 and 2021 years respectively.

The second type of electricity production which is widely used in most developed countries is low-carbon electricity production. Low-carbon electricity is the sum of electricity generation from nuclear and renewable sources.

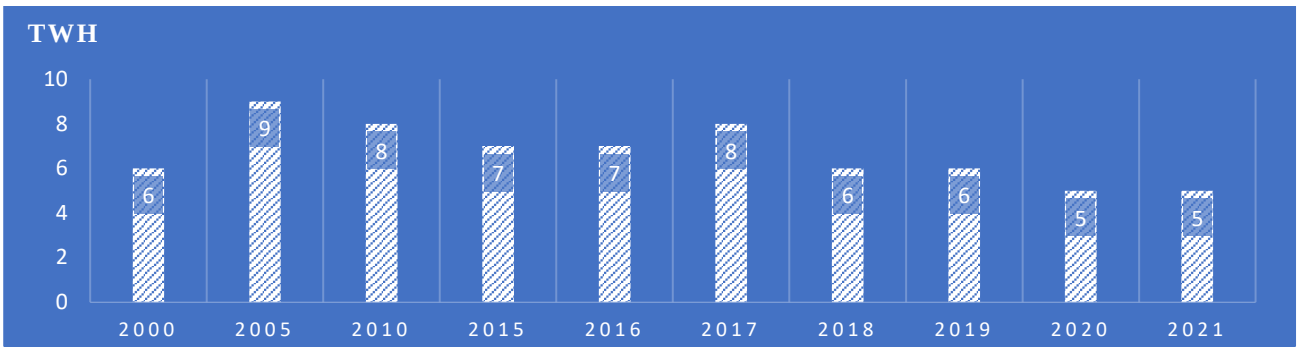
Renewable sources include hydropower, solar, wind, geothermal, bioenergy, wave and tidal. There is no need to pay attention foe nuclear energy in Uzbekistan, the reason for this is that, there is no nuclear power stations in Uzbekistan. We have paid our full attention to the renewable energy production. In the above table, we have tried to demonstrate the annual low carbon electricity production from 2000 to 2021. Histogram which is given in the below graph four also show the annual low carbon electricity production.

Table 3.

Annual low carbon electricity production from 2000 to 2021y.

Annual low carbon electricity production from 2000 to 2021y										
Years	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021
TWh	6	9	8	7	7	8	6	6	5	5

These tables and graphs are created by the author with using the online data. Source: Our World in Data based on BP Statistical Review of World Energy (2022); Our World in Data based on Ember's Yearly Electricity Data (2023); Our World in Data based on Ember's, European Electricity Review (2022), OurWorldInData.org/energy • CC BY [11]



Graph 3. Histogram Annual low carbon electricity production from 2000 to 2021y.

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Now let's look at deeply why low carbon electricity production has a stable decrease year by year, but nowadays have given great attentions to this field to increase its importance in the electricity production industries. The reason for this all our attention is given to the renewable energy resources, but this resource does not include them.

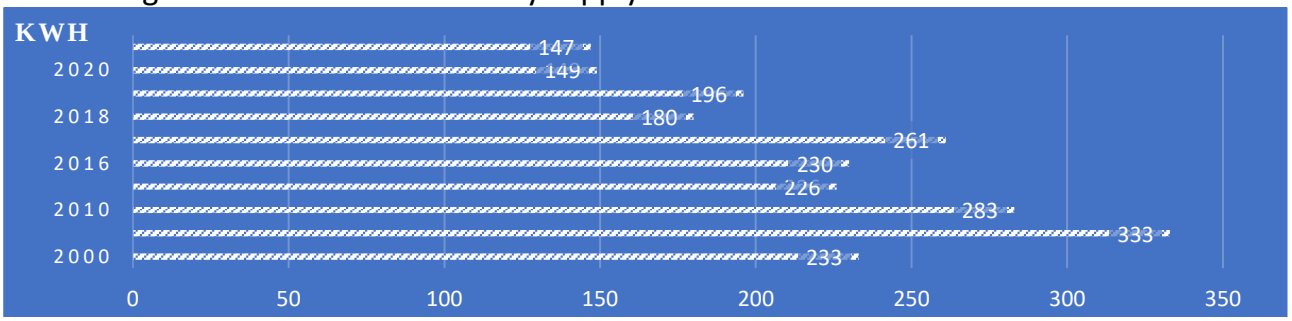
Table 4.

Low carbon electricity production for per capita from 2000 to 2021y.

Table 4. Low carbon electricity production for per capita from 2000 to 2021y										
Years	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021
kWh	233	333	283	226	230	261	180	196	149	147

It is not hard to understand that, electricity production is based on the fossil fuel energies in Uzbekistan, but low carbon electricity production is also exist and we are trying to increase its importance in Uzbekistan. In the following table we can see the low carbon electricity production for per capita.

The data are based on gross generation and not accounting for cross-border electricity supply. 'Input-equivalent' energy is the amount of fuel that would be required by thermal power stations to generate the reported electricity output. Details on thermal efficiency assumptions are available online Renewable power is based on gross generation from renewable sources including wind, geothermal, solar, biomass and waste, and not accounting for cross-border electricity supply.



Graph 4. Histogram Annual low carbon electricity production from 2000 to 2021y.

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Wind and solar energy investment requirements are based on the capital expenditure costs associated with the deployment profiles of each technology in each scenario. Wind and solar deployment profiles include both renewable power capacity for end-use and for green hydrogen production. The deployment profiles also consider the potential impact of curtailment. Capital expenditure costs are assigned to each scenario based on their historical values and estimated future evolution. They are differentiated by technology, region and scenario using a combination of internal bp estimates and external benchmarking. The capital expenditure figures do not include the incremental wider system integration costs associated with wind and solar deployment.

Conclusion

To sum up, it is important that we should increase the importance of low carbon electricity production in Uzbekistan. Mostly as all nations, we should set our priority production in terms of energy in the form of renewable energies. To tackle this, I have these recommendations:

First of all, we should create ample opportunities for the people of our country to use solar panels, which are a renewable energy source. Today, such work is being carried out rapidly, as stated in the 24th priority task of the priority tasks set for 2023 "Development and introduction of an addressable program for the installation of renewable energy sources by state bodies and organizations, local governments in 2023" [14]. It is envisaged to create sufficient conditions for the installation of solar panels. As a clear practical proof of this, we can mention the solar panels installed on the territory of the Tashkent State University of Economics.

Secondly, I propose the establishment of solar power plants in undeveloped abandoned areas, which in turn will help solve a number of problems facing our country. For example, it will lead to the creation of green jobs, the importance of solar panels will increase significantly in the field of energy production, and it should be noted that it is also possible to benefit from unused abandoned areas.

Thirdly, construction of wind power plants in the case of rational use of mountainous areas of our country. This issue is reflected in our country's annual priority for the transition to a green economy. By 2026, the task of increasing the production of electricity by an additional 30 billion kWh to a total of 104 billion kWh is set as the highest goal [15].

European countries are facing hardships in terms of getting electricity from other countries, most of them has been bought from Russia. Now, Russia is not selling energies to the Europe. This means that dependance for one country is not good in any fields. By realizing this, we should increase our energy supply ourselves. It is true, in the entire world most of the energy is taken from the fossil fuels, but one day they will over. Our energy production also based on the fossil fuels in terms of energy, but now it is time to change the direction towards the renewable energy production, such as solar panels, hydropower and wind. Our country has all facilities to establish all types of renewable energy resources.

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