



Climate Change and Transition to a Green Economy for Sustainable Development: Study of Pilot Projects and Policies in Algeria and Uzbekistan

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Abstract

The phenomenon of climate change in the world has driven the transition towards a green economy by urging States and Governments to establish best practices to make the best use of the potential of a green economy for the benefit of each region. The purpose of this study is to highlight the various policies and measures taken by the States of Algeria and Uzbekistan to address the climate challenges and to transform into a green economy for sustainable development. Algeria and Uzbekistan are leading models in this area in Africa and the Central Asian region.

Keywords: *Climate changes - Green Economy-Sustainable Development – Algeria- Uzbekistan.*

JEL Classification : Q01; Q5; O13; O44; O5.

Introduction

The Agenda of the 2030 Sustainable Development Goals and the Paris Climate Compact are key turning points in driving global action to promote the transition to a green economy and address climate change. Their implementation has contributed to the growth of environmental awareness and the integration of sustainability into all sectors and activities of life. On this basis, new investment products and environment- and climate-friendly tools have been developed by many Governments around the world, such as Algeria and Uzbekistan. Algeria has adopted green economy policies to meet environmental challenges and as an alternative to the black economy, especially since United Nations reports have classified it as a hot spot for global warming in the Mediterranean region compared to the global average. Algeria has developed a set of mechanisms, enacted numerous laws and established several bodies and institutions that protect the environment and contribute to financing green economy investment projects.

Algeria is one of the first African countries to meet the challenges facing the African continent in the area of the green economy, assess the financial and technological support needs of the African continent and train human resources for the creation of wealth and the preservation of natural resources. It has also examined ways of eradicating poverty by creating jobs in the green economy, health, waste management and environmental balance.

The study also addresses the State policy of Uzbekistan on the green economy in the Central Asian region, as a successful model for environmental sustainability, with Uzbekistan taking concerted measures for adaptation and mitigation of climate change. The Government had identified environmental protection as one of the priorities of State policy and had strengthened the institutional framework in that area in the light of climate threats, and the State of Uzbekistan was endeavoring to reduce emissions and achieve environmental sustainability by integrating the green economy, pursuing carbon-free development and developing modern environmental and ecological technology. As one of the best performers in Central Asia, the Uzbek Government has adopted long-term strategies aimed at ensuring environmental integrity, rational use of natural resources and the introduction of new environmentally friendly techniques in various sectors of the economy, especially after being classified as one of the world 's most energy-intensive countries, which have made significant strides in reducing the overall energy intensity, improving the efficiency of energy use and reducing the economic, environmental and social costs of the energy sector.

The objective of this study is to highlight two pilot models in the green economy in Africa and the Central Asian region by answering the following question: **What are the main milestones of the pilot projects and policies supporting the transition to a green economy for sustainable development in the States of Algeria and Uzbekistan?**

1. Definition of a green economy

The green economy is the result of the improvement of the economic situation while reducing environmental risks and the scarcity of environmental life, which improves the equality and social well-being of human beings. The green economy is a model of economic development based on sustainable development and knowledge of the environmental economy. It is a type of organized way to create a society and a clean environment that will raise the economic level and move society towards a better life, and preserve the balance of the environment from all forms of environmental diversity. UNEP has developed a practical definition, defining a green economy as one that improves human well-being and social equity, while at the same time significantly reducing environmental risks [9].

This is done by promoting the use of renewable energies and the commitment to ensure a citizen's living framework that respects the requirements of sustainable development and environmental conservation, both of which aim to adopt a new economic model outside the burning and associated circular industries, as it is considered to be a future economy and one of the means to achieve sustainable development.

2. Overview of the world's green economy and sustainable development

According to UNDP estimates, there is an annual gap of \$2.5 trillion needed to achieve sustainable development goals, while the application of renewable energy

solutions requires additional net investments of \$1.4 trillion, or approximately \$100 billion per year on average between 2016 (with sustainable development targets adopted) and 2030, according to IRINA, on the other hand, a recent report by the Global Commission on Economics and Climate highlights that a shift to a sustainable low-carbon approach to growth could lead to an economic boom of \$26 trillion until 2030 and help to provide more than 65 million new jobs [5].

3. Start-ups as a support for the transformation of the green economy:

Start-ups and new businesses are the primary market players in developing and commercializing revolutionary sustainable inventions, while existing businesses often dominate the total innovation market. This suggests that design and environmental regulation should pay close attention to “green” start-ups that create and enforce goods or services that support the objectives of a green economy [6].

Start-ups are active in various key sectors of the green economy, such as renewable energies, sustainable farming, energy efficiency, lactation, waste management and other innovative and labor-generating fields. The results of a report by the International Labour Organization (ILO) in 2018, which projected the creation of some 24 million green jobs on the 2030 horizon, are being reported as a result of the increase in emerging institutions in the areas of sustainable development in the world [11].

The criteria for innovation in this area are the innovation of service or product, the potential for growth, the ability to expand the project, its environmental impact, the attraction of the project and the potential for partnership and cooperation, which will allow these institutions to enter into national and international markets and improve their managerial and entrepreneurial competencies; thus creating a new category of young university contractors for sustainable development goals and innovation [7].

The goal of the transition to a green economy is in line with initiatives that have launched support for start-ups and youth employment, poverty alleviation and unemployment. Governments should develop programs to ensure employment opportunities for young people in the context of achieving sustainable development goals such as increased access to electricity, clean drinking water, sanitation, transport, health care and other basic services. They should also encourage entrepreneurship, especially in green start-ups. The entrepreneurship process is conducive to participation in economic and social activity and facilitates the process of upward mobility between social strata. It affects innovation and provides marginalized and disadvantaged groups with opportunities to participate [18].

Promoting entrepreneurship also means eradicating the culture of dependency and encouraging active participation in the radical social and economic transformations resulting from the transition to a low-carbon economy. Entrepreneurship contributes to enhancing competitiveness and productivity through new ideas and innovations that enter the market, being adopted by new enterprises and abandoning less productive ideas, particularly in knowledge-based sectors [10].

4. Algeria’s transition to a green economy to cope with the consequences of climate change

Climate change is one of the major challenges of this era. The first scientific report on climate and environmental change on average in 2020 confirmed that the Mediterranean region is a hotspot for global warming and warming 20% faster than the

global average. At this level, the efforts of the Algerian State are reflected in the Government 's plan of action in the area of energy transfer and the green economy, which concerns a number of sectors, including renewable energies, energy efficiency, green industry, transport, construction, lighting and so on. In recent years, Algeria has taken important measures to move strategically to a green economy, to protect the environment and to improve the business climate in order to move closer to the objectives of economic development and sustainable development. The Algerian Government has set special "green» targets to be achieved, including the launching of the first green enterprise incubator in the capital. The Algerian Government has also recruited all public authorities and competent bodies in the area of energy efficiency and the transition to a green economy that is less polluting, such as the National Fund for Energy [20].

It is also working to consolidate best practices for the optimal utilization of the potential of the green economy for the benefit of each region, through the adoption of an appropriate legal and regulatory framework, government incentives, and the enhancement of capacities and the development of competencies from green human resources for the benefit of all stakeholders. Algeria is also one of the leading countries in green entrepreneurship in the context of Algeria 's considerable efforts to develop the sector of start-ups, small and medium-sized enterprises, particularly green enterprises, and to provide green jobs for men and women.

Next, we will review the most important policies and pilot projects in Algeria for green sustainability and the transition to a green economy.

5. The State's efforts to move towards a green economy to preserve the environment in Algeria

The Algerian State attaches great importance to the green economy by implementing a number of programs and projects in this area. It has begun to focus on this type of economy as one of the main important ways in the comprehensive development plans that take place across the national territory, taking into account the economic and environmental priorities of the State, aimed at laying the foundations for energy and environmental transformation in our country. The following projects can be monitored [8]:

5.1. Renewable Energy Development Program in Algeria (2011-2030)

The Government has launched a program for the development of renewable energies, based on the provision of some 2,000 MW of renewable sources between 2011 and 2030, an effort that Algeria is trying to achieve ahead of schedule. In order to improve services and infrastructure, a number of policies have been put in place to develop renewable energies within legal frameworks and regulatory texts. The first ministry has given priority to scientific research, including the Centre for the Development of Renewable Energy, the Solar Energy Equipment Development Unit, the Renewable Applied Research Unit, the Algerian Renewable Energy Institute and the Renewable Energy Research Unit in the desert lands.

5.2. Sustainable transport in Algeria

The transport and communications sector, particularly road transport, is one of the most important sources of pollution that Algeria is experiencing, given the amount of emissions that it has generated. In order to address this environmental problem, a large

number of projects have been completed, and others are in the process of being completed, including the 1216 km east-west road, which aims to reduce emissions from air pollution .

5.3. Biological production in Algeria

The new peasant policy seeks to upgrade the green economy in order to rationalize the management of human resources. It also urges the need to rely on bio-farming. Algeria has worked to bring farming out of social character, into scientific character, in accordance with a modern view, and to create a new people in all states.

5.4. A new investment law

Algeria has given great impetus to renewable investments in waste management and recycling, which are critical to the preservation of the environment and the optimum use of resources.

5.5. Green Dam Rehabilitation Project

The focal point to combat desertification and restore the green dam was installed in October 2021. The green belt is part of Algeria's international commitments, particularly with regard to the sustainable development goals of reducing greenhouse gas emissions.

5.6. Production of green hydrogen

Algeria launched the production of green hydrogen as part of its renewable energy sector development program, where it will present its products to European countries within the framework of a future economic partnership.

5.7. Recycling and re-regimenting of waste

The environmental sector has developed a national strategy for integrated waste management of 2035 horizons, which aims to promote waste recycling and investor guidance.

5.8. Water and Environment Support (WES) Project funded by the European Union 2021

WES is a regional project for the countries of North Africa and the Middle East aimed at protecting the environment and improving the management of scarce water resources in the Mediterranean basin by addressing problems that prevent protection from pollution and rational use of water.

This project is part of the scientific cooperation established between the WES project and the National Observatory of Environmental Compositions and the University of Boumerdas, which is expected to develop a network on the green and tropical economy, as it is closely linked to sustainable consumption and production. In this context, the project offered a university course for "Composition of Components" on green entrepreneurship and circular economy, starting with university professors and students at the Faculty of Technology (the Methods Engineering and Environmental Engineering Sections) at the University of Boumerdas, as a model educational institution.

5.9. Agreement establishing a cooperation project entitled "Program to support Algeria's transition to a green and tropical economy" by the Ministry of Industry with

the United Nations Industrial Development Organization (UNIDO) and the French Development Agency 2022

This program, funded by the European Union Commission with a financial envelope of 20 million euros, aims to stimulate the supply and demand of sustainable consumption and production patterns as well as clean production and resource efficiency through the strengthening of the institutional framework and the acquisition of national expertise to create the conditions for mainstreaming these patterns. The program 's implementation lasts four years through the implementation of four main themes: strengthening the institutional framework and tools to promote sustainable consumption and production as well as clean production and resource efficiency, as well as stimulating demand by small and medium-sized enterprises. The program also aims to develop the supply of services and tools for sustainable consumption and production instruments, clean production and resource efficiency, and to prepare funding plans to finance investments made by program organizations [3].

5.10. Algerian-American Forum on the Green Economy 2022

This forum is about appreciating a "win-win" partnership between Algeria and the United States, which will allow Algeria to succeed in its energy transition strategy and achieve the goals set for 2035. The purpose of this forum is to exchange experiences and knowledge among the two countries ' clients active in the field of the green economy. It brought together experts and officials of Algerian and American institutions, as well as officials of the ministries of energy, mines, energy transport, renewable energies and enterprises and economic operators from the two countries, who discussed three main areas of the environment: waste, renewable energy, flexible infrastructure and agriculture. During this forum, experts stressed the need to mobilize small and medium-sized enterprises and emerging enterprises to screen and retrieve waste, while exchanging experiences between the two countries ' clients in the field of the green and circular economy.

5.11. "Algeria Venture" 2023

In cooperation with the International Labour Organization (ILO) office in Algeria, the public accelerator of emerging enterprises has launched an accelerated program for emerging institutions in the green economy and sustainable development. This program is part of Algeria's efforts to achieve the goals of sustainable development and to create a new category of young university contractors for sustainable development and innovation. Algeria is a leading country in green entrepreneurship and is the number one in Africa in terms of sustainable development goals. Among the emerging institutions involved in this program are IRWISE, which specializes in smart irrigation, BASSIR, which is active in detecting and controlling forest fires thanks to artificial intelligence, and Babylon Gardens, which operate in the field of soilless agriculture, water, fish farming and plants in the same environment [3].

5.12. Algeria-Germany: Bilateral experimental project for production of green hydrogen in Arzew 2024

The Minister of Energy and Mines announced the preparation of an experimental project between Algeria and Germany for the production of green hydrogen in Arzew (Oran), as part of the action plan in this field between the two countries.

6. Environment and sustainable development challenges in Uzbekistan:

For Uzbekistan, GDP growth in 2020 was all but erased and poverty levels increased for the first time in two decades. by “building forward better,” towards the development of a “green economy.” It provides an overview of green recovery and economy principles and key sectors which have the potential for ‘greening’ - including energy, agriculture, industry, waste, water resources, urban development (with a focus on housing and construction), transport and finance - and suggests a set of priority directions and policy measures for discussion.

Its investment decisions and actions over the next three to five years aim to define a long-term development trajectory which will build the resilience of the country to future threats, including climatic and non-climatic shocks. Adoption of the “Strategy for the transition of the Republic of Uzbekistan to a Green Economy in the period of 2019-2030” recognized green economy as a key strategic area for long-term sustainable development and identified priority areas for 'greening'. The COVID-19 pandemic has significantly slowed or contracted economic growth for most countries and halted, or in some cases significantly reversed, progress on the 2030 Agenda for Sustainable Development. While the country’s 2017-2021 Action Strategy sets out a clear vision for Uzbekistan’s development, including specific sectoral plans in energy, industry, and agriculture, much more is needed to achieve ‘greening’ of these sectors [17].

Uzbekistan faces significant climate change challenges, with 80% of its land consisting of grasslands and deserts. Since the 1950s, the country's average temperature has risen at twice the global rate. Without effective adaptation, environmental degradation and resource depletion will weaken economic sectors such as water-dependent hydroelectric power, agriculture, and tourism.

Recognizing the urgency of sustainable development, Uzbek authorities aim to prioritize the transition to a green economy in their upcoming development strategy. To support this initiative, they have sought assistance from AFD in planning, financing, and executing the necessary measures [2].

7. Sustainable development indicators in Uzbekistan

Uzbekistan maintains one of Central Asia’s strongest economies, driven by remittances, energy production, mining, and agriculture. Ongoing reforms aim to create a more open, market-driven economy with a focus on boosting agricultural exports and enhancing the productivity of family farms. In 2022, Uzbekistan reinforced its commitment to sustainable development by adopting an updated Council of Ministers resolution. This measure accelerates the country’s efforts to achieve national sustainable development goals by 2030. Uzbekistan remains dedicated to the global agenda through comprehensive partnerships with all United Nations member states to implement its 16 national sustainability objectives [2].

Uzbekistan's government has set national sustainable development goals for 2030 and introduced an action plan for their implementation from 2022 to 2026. These initiatives, along with the country's broader development strategies, are driving progress toward sustainability objectives. The adoption of the Strategy for the Sustainable Development of Uzbekistan (2022-2026) marks a significant milestone, representing both a continuation of previous reforms and a decisive step toward long-term national growth.

All measures taken over the previous period were aimed at establishing dialogue with the population. This strategy has taken into account all existing issues, as reflected in

them by those urgent tasks for which solutions are awaited. The citizens of the country were actively involved in the preparation of this document. It is therefore no exaggeration to say that this historic document has been written by the people.

In this sense, the name of the first trend is symbolic in this way: the building of the popular State by guaranteeing the interests of the individual and the continued development of a free civil society. The strategy includes 12 objectives and 42 tasks that distinguish aspects of the targeted plans [13].

To ensure systematic progress toward sustainable development goals, the Government of Uzbekistan has established a special coordinating council, including a parliamentary committee responsible for monitoring the implementation of national targets through 2030.

This framework aligns sustainability objectives with the country's economic, social, and environmental strategies, integrating them into national and regional development plans through well-defined roadmaps and policies.

7.1. Uzbekistan's Climate Change Policy

Uzbekistan has taken consistent measures to adapt and mitigate the effects of climate change. The Government has identified environmental protection as one of the priorities of State policy and has strengthened the institutional framework in this area. The State Commission for Ecology and Environmental Protection and the Centre for Hydrometeorology Services have been completely reformed, and the State Forestry Commission has been established. Long-term strategies have also been adopted to ensure environmental integrity, rational use of natural resources and the introduction of new environmentally friendly techniques in various sectors of the economy. These include the concepts of environmental protection up to 2030, the development of water management for 2020-2030, the strategies for the Republic's transition to a green economy for 2019-2030, and solid household waste for 2019-2028[14]. Uzbekistan is gradually shifting toward a green economy as a key part of its climate strategy. Efforts focus on improving energy efficiency, reducing reliance on hydrocarbons, and expanding renewable energy sources. By 2030, the government aims to double energy efficiency and lower the carbon intensity of GDP. To meet growing energy demands, Uzbekistan plans to increase the share of renewables in electricity production from 10% to 25%. In late 2022, the country adopted a green economy and growth program targeting 2030. Additionally, the government has outlined plans to phase out coal, natural gas, and petroleum-based fuels by 2050 to achieve carbon neutrality. Under this program, renewable energy is expected to account for around 30% of total electricity generation by 2030. The country aims to commission wind power plants (WPPs) with a combined capacity of at least 5,000 MW and solar photovoltaic power plants (SPPs) totaling 7,000 [15].

In this regard, the issue of awareness of the population as consumers about the relevance of diversification of energy consumption, advantages and disadvantages of alternative energy sources is relevant. At the same time, the main focus is on solar energy. According to experts, Uzbekistan has the capacity to generate 600 billion kilowatts through the construction of solar power plants. This is eight times more than the Republic needs today. By 2025, in collaboration with global companies (source, Total, Skaling Solar, Kleber, etc.), they launched solar and wind power stations with a total capacity of 2,900 megawatts. In August 2021, the first 100-megawatt solar power station was launched in the

Navoi area. In the face of climate threats, the State of Uzbekistan seeks to reduce emissions and achieve environmental sustainability by integrating the green economy, pursuing carbon-free development and developing modern environmental and ecological technology. Officials from the State of Uzbekistan confirm their country's commitment to reduce greenhouse emissions by 35% by 2035 under the Paris Agreement, with a large-scale program adopted to rely on renewable sources by 2026, renewable energy increased by millions of tons by 2030, and renewable energy will soon account for 25% [12].

Also, to start planting 2 million trees annually to increase the green surface in Uzbekistan to 30%, as well as water efficiency and the use of water conservation technologies, noting the planting of about 1.7 million tree units on the bottom of the Ural River.

At the same time, in 2023, 4 solar photovoltaic power plants with a total capacity of 1,097 MW in Samarkand, Jizzakh, Navoi and Surkhandarya regions and in the Republic of Karakalpakstan, Bukhara (Gijduvan and Peshku) and Navoi regions, 4 wind power plants with a total capacity of 1,600 MW will begin to generate "green" energy. In recent years, solar photovoltaic installations with a total capacity of 3.0 kW were installed at "UzSungwoo" LLC, 8.0 kW at Kokand JSC and Baghdad Grain Products, 8 solar water-heating collectors with a capacity of 0.056 Gcal at the Northern-Sukh underground gas storage facility in Rishtan area were launched [13].

7.2. Programs to support the transformation of the green economy in Uzbekistan

The European Commission allocated approximately 35 million euros to Uzbekistan to support agricultural reforms, the transition to a green economy and the regulation of legislation in 2022. The press service of the European Union delegation in Uzbekistan indicates that funds will be allocated as part of the Multi-year Indicative Programme (MIP) for 2021-2027. According to the spokesperson for the press service, the European Union allocated Euro 76 million to Uzbekistan for the period 2021-2024 as part of the international investment programme. Additional funds for human rights support (initial allocation of Euro 3.6 million for 2021-2024) and for civil society organizations (Euro 3.4 million for 2021-2024). The International Investment Program 2021-2027 contains three main priorities: effective governance and digital transformation; inclusive, digital and green growth; and development of the environment-friendly agro-food sector. Programme priorities focus on budget support for agrarian reform and knowledge transfer through technical assistance or partnership projects with EU member States [4].

8. Uzbekistan's international cooperation to jointly overcome the negative consequences of climate change

Uzbekistan has become an active participant in the global environmental agenda, having acceded to and ratified a number of relevant international conventions and protocols in the field of environmental protection. An important event was Uzbekistan's accession (2017) to the United Nations Climate Convention in Paris, under which the State committed itself to reducing greenhouse gas emissions by 10 per cent by 2030 compared to 2010. To achieve this goal, a national low-carbon development strategy has been developed and Uzbekistan is considering achieving carbon neutrality by 2050. The Ministry of Energy and the Ministry of Investment, Industry and Trade of Uzbekistan have also signed a new implementation agreement with the Abu Dhabi Future Energy Company (MASADAR) to develop a 2 GW wind power plant project. The Convention also includes

the deployment of 1150 MW energy storage systems as part of five existing MASCAR projects in Uzbekistan [16].

ACWA Power, the world's largest private water desalination company, leader in energy transition and first mover into green hydrogen, and the Ministry of Energy of Uzbekistan signed in 2023 a 25-year energy purchase agreement and an investment agreement with a total value of US\$ 1.2 billion to develop, build and operate a gas-cycle gas plant with a production capacity of up to 1,500 megawatts. JSCN is the sole buyer of energy for the project's productivity. The station will be located in the city of Shirin in the Serdarya area and will be developed in accordance with a building/ ownership/ operation/ transfer agreement, with ACWA Power leading the construction, engineering, operation and maintenance of the plant [1].

9. Uzbekistan's Ecosystem for Technology Start-ups

Start-ups in Uzbekistan grow within an ecosystem shaped by national, regional, and international factors. As the economy becomes more open and integrated globally, key elements such as access to finance, skilled professionals, digital infrastructure, and supportive government policies influence their success.

A strong market for goods and services is essential for start-up development. Recent policy frameworks reflect this understanding. The Strategy for the Transition to a Green Economy (2019-2030) includes circular economy indicators as a core component. Additionally, the Strategy for Innovative Development (2022-2026) focuses on building an innovation ecosystem that connects industries, regions, and academic institutions to drive long-term growth [4].

Uzbekistan has taken several steps to implement the recommendations contained in the Review and recorded strong progress, becoming one of the top three innovation economies in Central and Southern Asia according to the 2022 WIPO Global Innovation Index. In 2023, the Government requested follow-up capacity building to spur further implementation. Innovation for the green and circular transition was highlighted as a topic of particular interest [19].

Conclusion

Climate change and the transition to a green economy represent one of the most pressing challenges facing developing countries, particularly those seeking to balance the imperatives of economic growth with the urgent need for environmental protection. In this context, Algeria and Uzbekistan offer two distinct yet intersecting models of policy approaches and pilot initiatives toward sustainable development. Algeria, with its rentier economy heavily dependent on fossil fuel revenues, stands at a strategic crossroads, where reducing reliance on hydrocarbons has become a developmental necessity. Efforts have been made to launch renewable energy projects, particularly in solar energy, and to build international partnerships aimed at enhancing technical capacity.

However, these efforts often suffer from slow implementation and a lack of coherence between environmental regulations and broader economic strategies. In contrast, Uzbekistan has embarked on a more dynamic energy transition, setting clear targets for emissions reduction and actively attracting foreign investment in renewable energy sectors, notably in solar and wind power. The country's openness to international collaboration reflects a pragmatic understanding of the green economy as an engine for both economic modernization and environmental sustainability.

Despite differences in resources, governance models, and geopolitical contexts, both cases reveal a fundamental truth: transitioning to a green economy is not merely an environmental option but an urgent development strategy. It requires deep restructuring of economic models, fostering technological innovation, and creating regulatory environments that incentivize green investment. The real challenge, however, lies not in policy declarations but in the capacity to ensure effective implementation. Success depends on mobilizing institutions, integrating the private sector, empowering young entrepreneurs, and linking academic innovation to practical, scalable solutions. Without this convergence between vision and action, the transition risks remaining aspirational rather than transformational. Ultimately, achieving sustainable development in Algeria, Uzbekistan, and similar contexts demands more than isolated projects—it requires building an inclusive, resilient, and future-oriented economic system aligned with long-term sustainability goals.

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