**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL**

# AN ASSESSMENT OF UZBEKISTAN'S PROGRESS TOWARDS GREEN ECONOMY

**M.Sc. THESIS**

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**Department of Management**

**Management Programme**

**JUNE 2024**

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**ISTANBUL TEKNİK ÜNİVERSİTESİ ★ LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ**

# ÖZBEKİSTAN'IN YEŞİL EKONOMİYE YÖNDE GELİŞİMİNİN BİR DEĞERLENDİRİLMESİ

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***To my lovely family,***

## FOREWORD

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June 2024

Dinara ADKHAMOVA
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## ABBREVIATIONS

| | |
|---|---|
| **ADB** | Asian Development Bank |
| **BRI** | Belt and Road Initiative |
| **BREEAM** | Building Research Establishment Environmental Assessment Methodology |
| **CBAM** | Carbon Border Adjustment Mechanism |
| **CDM** | Clean Development Mechanism |
| **CEAP** | Circular Economy Action Plan |
| **CIS** | Commonwealth of Independent States |
| **CoM** | Cabinet of Ministers |
| **CO2-eq** | Carbon Dioxide Equivalent |
| **DP** | Decree of the President |
| **ECI** | Economic Complexity Index |
| **ECA** | Europe and Central Asia |
| **EGD** | European Green Deal |
| **EPI** | Environmental Performance Index |
| **EPCA** | Enhanced Partnership and Cooperation Agreement |
| **ERBD** | European Bank for Reconstruction and Development |
| **ESG** | Environmental, Social, and Governance |
| **ETS** | Emission Trading System |
| **EU** | European Union |
| **FOLU** | Food and Land Use |
| **GDP** | Gross Domestic Product |
| **GEC** | Green Economy Coalition |
| **GGGI** | Global Green Growth Institute |
| **GHG** | Greenhouse Gases |
| **GIP** | Green Investment Principles |
| **GW** | Gigawatt |
| **HS** | Harmonized System |
| **ICT** | Information and communication technology |
| **ILO** | International Labour Organization |
| **IMF** | International Monetary Fund |
| **INDC** | Intended Nationally Determined Contributions |

| | |
|---|---|
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IPPU** | Industrial Processes and Product Use |
| **IUCN** | International Union for Conservation of Nature |
| **kWh** | Kilowatt-hour |
| **LEED** | Leadership in Energy and Environmental Design |
| **LTS** | Long Term Decarbonization Strategy |
| **LULUCF** | Land Use, Land-Use Change, and Forestry |
| **MEF** | Ministry of Economy and Finance |
| **MS Excel** | Microsoft Excel |
| **MSW** | Municipal Solid Waste |
| **NDC** | Nationally Determined Contributions |
| **OECD** | Organisation for Economic Co-operation and Development |
| **Oliy Majlis** | Parliament of Uzbekistan |
| **PCA** | Partnership and Cooperation Agreement |
| **PM2.5** | Particulate Matter 2.5 (fine particles) |
| **PP** | Presidential Resolution |
| **RES** | Renewable Energy Sources |
| **SDGs** | Sustainable Development Goals |
| **SMEs** | Small and Medium-sized Enterprises |
| **SWOT** | Strengths, Weaknesses, Opportunities, Threats |
| **TFC** | Total Final Consumption |
| **UMIC** | Upper Middle-Income Country |
| **UN** | United Nations |
| **UNCCC** | UN Framework Convention on Climate Change |
| **UNDESA** | United Nations Department of Economic and Social Affairs |
| **UNDP** | United Nations Development Programme |
| **UNEP** | United Nations Environment Programme |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **USD** | United States Dollar |
| **VAT** | Value Added Tax |
| **VNR** | Voluntary National Reviews |
| **WCS** | World Conservation Strategy |
| **WITS** | World Integrated Trade Solution |
| **WWF** | World Wildlife Fund |

## SYMBOLS

| | |
|---|---|
| **CO2-eq** | Carbon Dioxide Equivalent |
| **CO2** | Carbon Dioxide |
| **%** | Percentage |
| **€** | Euro (Currency) |
| **$** | United States Dollar (Currency) |
| **GW** | Gigawatt (Unit of Power) |
| **Gg** | Gigagrams (1 Gg = 1 million kilograms) |
| **USD** | United States Dollar (Currency) |

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**AN ASSESSMENT OF UZBEKISTAN'S PROGRESS TOWARDS GREEN ECONOMY**

## SUMMARY

Today, at a critical moment marked by environmental challenges, population growth and rapid urbanization, Uzbekistan faces significant pressure to address emissions intensity and other sustainability issues. According to Norkulov et al. (2022), the country's emission intensity is more than double that of Central Asia, six times the global average, and eighteen times the ECA regional average. This highlights the need to prioritize sustainable practices and mitigate climate change. The transition to a green economy is critical because it promotes the responsible use of resources and the reduction of emissions. This shift not only aligns with global sustainable development goals, but also offers opportunities for economic growth and resilience to environmental risks. Ensuring sustainable development can pave the way to a greener and more prosperous future.

The green economy offers a compelling framework for achieving economic growth while preserving the environment and fostering social inclusivity. In Uzbekistan, over the last five years, the momentum towards transitioning to a green economy to harmonize economic, environmental, and social goals has surged among policymakers, shaping national development agendas. Despite this, research has yet to produce a systematic and comprehensive assessment of the evidence of a green economy transition in Uzbekistan.

This thesis offers a comprehensive analysis of Uzbekistan's journey towards greening its economy. The purpose of this thesis is to contribute to the literature on green economy transitions by offering insights into Uzbekistan's experiences, challenges, and opportunities. By doing so, it aims to inform decision-making processes and guide actions towards achieving sustainable development goals in Uzbekistan.

Moreover, this work explores the complex relationship between green economic development and key international sustainability and climate initiatives such as the Paris Agreement and the SDGs. It recognizes the dual nature of this relationship, with international commitments driving the development of a green economy and a green economy helping to deliver on those commitments. By assessing Uzbekistan's compliance with international obligations, the study identifies current achievements and challenges, suggesting ways to improve aspects of the green economy. It also deepens the impact of important initiatives such as the European Green Deal and the Belt and Road Initiative on the country's green transition. This selection is based on their direct relevance to the thesis topic, their global and regional significance in shaping sustainable development agendas, as well as their two-way implications for Uzbekistan, such as the transformative potential of EGD in EU partner countries and the implications of the BRI for sustainable development led by China, one of Uzbekistan’s main partners. The purpose of this analysis is to provide valuable

information on the implications and potential impact of these initiatives on the transition to a green economy in Uzbekistan.

Methodologically, the thesis employs a SWOT analysis, integrating both qualitative and quantitative data collected through comprehensive desk reviews of relevant literature, reports from state and international organizations, strategic documents, and news articles. This approach allows for a holistic understanding of Uzbekistan's current situation and facilitates the formulation of targeted recommendations.

This work concludes that the green economy model is of great importance for Uzbekistan, helping the country meet international sustainable development commitments such as the SDGs and the Paris Agreement. The transition to sustainable development not only brings Uzbekistan into line with the strict environmental standards of initiatives such as the European Green Deal, but also improves its global competitiveness. However, while investments in the Belt and Road Initiative can strengthen renewable energy infrastructure, the risk of fossil fuel projects, under this intiative, and potential inadequate environmental assessments threaten Uzbekistan's shift away from carbon-intensive sources. Moreover, over-reliance on Chinese participation may hamper the development of domestic green industries and hinder economic self-sufficiency.

Uzbekistan has made significant strides in transitioning towards a green economy, evident through the adoption of comprehensive policies and strategies spanning various sectors. Despite challenges, Uzbekistan demonstrates a strong commitment to sustainability, aiming to align its economic growth with environmental priorities while almost meeting international sustainability commitments. SWOT analysis revealed that Uzbekistan's transition to a green economy is supported by strengths such as sustained economic growth, abundant natural resources, and a strong commitment to environmental sustainability. However, weaknesses such as governance challenges, limited private sector engagement, and infrastructure gaps hinder progress. Opportunities lie in international collaboration, demographic advantages, and financial instruments like green bonds, while threats include risks related to labor market transformation, upfront costs of renewable energy adoption, poor policy implementation, and vulnerability to global shifts away from fossil fuels.

To address challenges and take advantage of opportunities, the thesis presents a set of priority areas and recommendations. These include enhancing governance and regulatory frameworks, strengthening capacity building and human development, fostering private sector engagement, promoting sustainable urbanization and infrastructure development, embracing circular economy principles, improving the financial sector with green tools, and enhancing monitoring and data management.

# ÖZBEKİSTAN'IN YEŞİL EKONOMİYE YÖNDE GELİŞİMİNİN BİR DEĞERLENDİRİLMESİ

## ÖZET

Günümüzde çevresel zorluklar, nüfus artışı ve hızlı kentleşmenin damgasını vurduğu kritik bir anda Özbekistan, emisyon yoğunluğu ve diğer sürdürülebilirlik konularını ele alma konusunda ciddi bir baskıyla karşı karşıya. Norkulov v.d. 2022)'ye göre, ülkenin emisyon yoğunluğu Orta Asya'nın iki katından fazla, küresel ortalamanın altı katı ve ECA bölgesel ortalamasının on sekiz katıdır. Bu, sürdürülebilir uygulamalara öncelik verilmesi ve iklim değişikliğinin azaltılması ihtiyacını vurgulamaktadır. Yeşil ekonomiye geçiş kritik öneme sahiptir çünkü kaynakların sorumlu kullanımını ve emisyonların azaltılmasını teşvik etmektedir. Bu değişim yalnızca küresel sürdürülebilir kalkınma hedefleriyle uyumlu olmakla kalmıyor, aynı zamanda ekonomik büyüme ve çevresel risklere karşı dayanıklılık için fırsatlar da sunuyor. Sürdürülebilir kalkınmanın sağlanması, daha yeşil ve daha müreffeh bir geleceğe giden yolu açabilir.

Yeşil ekonomi, çevreyi korurken ve sosyal kapsayıcılığı teşvik ederken ekonomik büyümeyi başarmak için ilgi çekici bir çerçeve sunar. Özbekistan'da son beş yılda politika yapıcılar arasında ekonomik, çevresel ve sosyal hedefleri uyumlu hale getirmek için yeşil ekonomiye geçişe yönelik ivme arttı ve ulusal kalkınma gündemleri şekillendi. Buna rağmen araştırmalar Özbekistan'da yeşil ekonomiye geçişin kanıtlarına ilişkin sistematik ve kapsamlı bir değerlendirmeyi henüz ortaya koymuş değil.

Bu tez, Özbekistan'ın ekonomisini yeşilleştirme yolculuğunun kapsamlı bir analizini sunmaktadır. Bu tezin amacı, Özbekistan'ın deneyimleri, zorlukları ve fırsatları hakkında bilgi sunarak yeşil ekonomiye geçiş literatürüne katkıda bulunmaktır. Bunu yaparak, Özbekistan'da sürdürülebilir kalkınma hedeflerine ulaşmaya yönelik karar alma süreçlerini bilgilendirmeyi ve eylemlere rehberlik etmeyi amaçlamaktadır.

Ayrıca bu çalışma, yeşil ekonomik kalkınma ile Paris Anlaşması ve Sürdürülebilir Kalkınma Hedefleri gibi temel uluslararası sürdürülebilirlik ve iklim girişimleri arasındaki karmaşık ilişkiyi araştırıyor. Yeşil bir ekonominin gelişimini yönlendiren uluslararası taahhütler ve bu taahhütlerin yerine getirilmesine yardımcı olan yeşil ekonomi ilişkisinin ikili doğasının farkındadır. Özbekistan'ın uluslararası yükümlülüklere uyumunu değerlendiren çalışma, mevcut başarıları ve zorlukları tanımlayarak yeşil ekonominin çeşitli yönlerini iyileştirmenin yollarını öneriyor. Aynı zamanda Avrupa Yeşil Mutabakatı (AYM) ve Kuşak ve Yol Girişimi (KYG) gibi önemli girişimlerin ülkenin yeşil dönüşümü üzerindeki etkisine odaklanıyor. Bu seçim, bunların tez konusuyla doğrudan ilgisine, sürdürülebilir kalkınma gündemlerini şekillendirmedeki küresel ve bölgesel önemine ve ayrıca AYM'nin AB ile ortak ilişkilerde bulunan ülkelerdeki dönüştürücü potansiyeli ve Özbekistan'ın ana ortaklarından biri olan Çin'in liderliğindeki sürdürülebilir kalkınma için KYG'nin olası etkilerine dayanmaktadır. Bu analizin amacı, bu girişimlerin Özbekistan'da yeşil ekonomiye geçiş üzerindeki etkileri ve potansiyel etkileri hakkında değerli bilgiler sağlamaktır.

Metodolojik olarak tez, ilgili literatürün kapsamlı masa incelemeleri, devlet ve uluslararası kuruluşların raporları, stratejik belgeler ve haber makaleleri aracılığıyla toplanan hem niteliksel hem de niceliksel verileri birleştiren bir SWOT analizi kullanmaktadır. SWOT analizinin belirli bileşenlerini belirlemeye yönelik sistematik yaklaşım, öncelikle uluslararası örgütlerden ve hükümet raporlarından gelen yüksek kaliteli yayınların incelenmesini içeriyordu. Faktörler, 2019-2024 dönemindeki bu incelenen belgelerde sık sık bahsedilmeleri temelinde seçildi. Dünya Bankası, BM, OECD ve benzeri kuruluşlar tarafından yapılan yayınlar, çoğu Özbekistan'daki yeşil ekonomi gelişiminden sorumlu kilit kamu kurumlarının katılımı veya doğrulamasıyla geliştirildiği için yüksek kaliteli olarak kabul edildi. Ek olarak, bu yaklaşım web'de bulunan saygın haber makaleleri aracılığıyla doğrulamayı içeriyordu. Bir faktör bu güvenilir kaynaklar tarafından sık sık alıntılanmış ve onaylanmışsa, analize dahil edildi. SWOT analizi ayrıca uluslararası taahhütlerin, girişimlerin, ülke çapındaki stratejilerin/belgelerin ve sektör politika analizinin analizi sonucunda belirlenen faktörleri de içeriyordu. Analiz, politikaların, makalelerin, yüksek kaliteli yayınların ve diğer ilgili belgelerin kapsamlı bir incelemesini içeriyordu. Bu kapsamlı yaklaşım, SWOT analizinin çok yönlü olmasını ve güvenilir kaynakları yansıtmasını sağladı.

Ülkedeki mevcut duruma gelince, yeşil kalkınmanın yörüngesi, stratejik belgelerin kabul edilmesi ve iddialı hedeflerin belirlenmesi yoluyla eşi benzeri görülmemiş bir ivme kazanmış ve sürdürülebilir büyümeye yönelik güçlü bir kararlılık ortaya koymuştur. Yeşil Strateji 2019-2030 ve Yeşil Strateji Eylem Planı 2030 gibi girişimler, enerjiden tarıma ve ulaştırmaya kadar sektörleri kapsayan yeşil bir ekonomiye geçiş için kapsamlı çerçeveler ortaya koydu. Ayrıca, iklim değişikliği hedeflerinin 2022-2026 Yeni Özbekistan Kalkınma Stratejisi ve Özbekistan- 2030 Stratejisi gibi üst düzey stratejik belgelere entegrasyonu, ulusal kalkınma hedeflerinin çevresel önceliklerle uyumlu hale getirilmesine yönelik bütünsel bir yaklaşımı yansıtmaktadır. Bununla birlikte, belirlenen son tarihlerin karşılanmasında gecikmeler ve özellikle yüksek emisyonlarla karakterize edilen alanlarda daha ayrıntılı ve kapsayıcı sektör politikalarına duyulan ihtiyaç gibi süregelen zorluklar nedeniyle, politika geliştirmede iyileştirme için hala yer vardır. Ayrıca, daha fazla detaylandırmayı gerektirebilecek hedeflerden kaynaklanan, zaman zaman ölçülebilirlik konusunda netlikten veya belirtilen hedeflere ulaşmak için açıkça ana hatları çizilen bir metodolojiden yoksun olan zorluklar da vardır. İvmeyi sürdürmek için, bu çok yönlü zorlukları kapsamlı bir şekilde ele almak ve yeşil kalkınma girişimlerinin etkili bir şekilde uygulanmasını sağlamak için izleme mekanizmalarını güçlendirmek çok önemlidir.

Bu çalışma, yeşil ekonomi modelinin Özbekistan için büyük önem taşıdığı ve ülkenin Sürdürülebilir Kalkınma Hedefleri ve Paris Anlaşması gibi uluslararası sürdürülebilir kalkınma taahhütlerini karşılamasına yardımcı olduğu sonucuna varmaktadır. Sürdürülebilir kalkınmaya geçiş, Özbekistan'ı yalnızca Avrupa Yeşil Mutabakatı gibi girişimlerin katı çevre standartlarına uygun hale getirmekle kalmıyor, aynı zamanda küresel rekabet gücünü de artırıyor. Ancak Kuşak ve Yol Girişimi altında yapılan yatırımlar yenilenebilir enerji altyapısını güçlendirebilirken, bu girişim kapsamındaki fosil yakıt projelerinin riski ve potansiyel olarak yetersiz kalabilecek çevresel etki değerlendirmeleri, Özbekistan'ın karbon yoğun kaynaklardan uzaklaşmasını tehdit ediyor. Dahası, Çin'in katılımına aşırı güven, yerel yeşil endüstrilerin gelişimini engelleyebilir ve ekonomik olarak kendi kendine yeterliliği engelleyebilir.

Tez, Özbekistan'ın çeşitli sektörleri kapsayan kapsamlı politika ve stratejilerin benimsenmesi yoluyla yeşil bir ekonomiye geçişte önemli ilerlemeler kaydettiği sonucuna varmaktadır. Zorluklara rağmen Özbekistan, uluslararası sürdürülebilirlik taahhütlerini neredeyse yerine getirirken ekonomik büyümesini çevresel önceliklerle uyumlu hale getirmeyi hedefleyerek sürdürülebilirliğe güçlü bir bağlılık gösteriyor. SWOT analizi, Özbekistan'ın yeşil ekonomiye geçişinin sürdürülebilir ekonomik büyüme, bol doğal kaynaklar ve çevresel sürdürülebilirliğe güçlü bağlılık gibi güçlü yönlerle desteklendiğini ortaya çıkarmaktadır. Ancak yönetişim zorlukları, sınırlı özel sektör katılımı ve altyapı boşlukları gibi zayıflıklar ilerlemeyi engellemektedir. Fırsatlar uluslararası işbirliği, demografik avantajlar ve yeşil tahviller gibi finansal araçlarda yatarken, tehditler arasında işgücü piyasasının dönüşümüyle ilgili riskler, yenilenebilir enerjinin benimsenmesinin ön maliyetleri, zayıf politika uygulaması ve fosil yakıtlardan küresel uzaklaşmalara karşı hassasiyet yer alıyor.

Tez, zorlukların üstesinden gelmek ve fırsatlardan yararlanmak için bir dizi öncelikli alan ve öneri sunmaktadır. Bunlar arasında yönetişim ve düzenleyici çerçevelerin güçlendirilmesi, kapasite geliştirmenin ve insani gelişmenin güçlendirilmesi, özel sektör katılımının teşvik edilmesi, sürdürülebilir kentleşmenin ve altyapı gelişiminin teşvik edilmesi, döngüsel ekonomi ilkelerinin benimsenmesi, finans sektörünün yeşil araçlarla iyileştirilmesi ve izleme ve veri yönetiminin geliştirilmesi yer alıyor.

# 1. INTRODUCTION

## 1.1 Background

### 1.1.1 Post-independence development

Uzbekistan's geographical position places it in the heart of Central Asia. It shares borders with several neighboring countries: Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, and Turkmenistan. (Figure 1.1) The country is a “double landlocked” , such as no other country in the world, except Liechtenstein (Worldpopulationreview, 2024). Early economy, environmental commitments and Uzbekistan’s post-independence development was led by the first president Islam Karimov until his death in September 2016.

Figure 1. 1 : Uzbekistan Map (World Atlas, 2024).

According to Akimov (2015), the Uzbek economy of Karimov’s period was characterized by closeness and tight management. On the one hand, this delayed the development of a market economy and led to exessive centralization of power (Ruzivev, 2021), on the other hand, it insulated the economy from the global financial crisis of 2007-2008.

Early years of independence, marked by a contraction in all sectors, particularly a severe decline in the industrial sector (almost a 40% decline), prompted strategic shifts in economic policies. The government's focus on food security and reallocation of land for agricultural purposes played a role in diminishing the industrial sector's contribution to GDP. However, in the subsequent years (2004–2016), Uzbekistan demonstrated a remarkable recovery and growth (Figure 1.2, Figure 1.3). It experienced robust growth during the 2000s due to favorable conditions for export revenue and remittances from exported labor (Bondarenko, 2021). The industrial sector rebounded, outpacing the agricultural sector, and services gained prominence in the overall economic landscape. The country's diversification efforts led to a more balanced economic structure by 2016, with the industrial sector accounting for about one-third and services for almost half of economic activity (Figure 1.2).

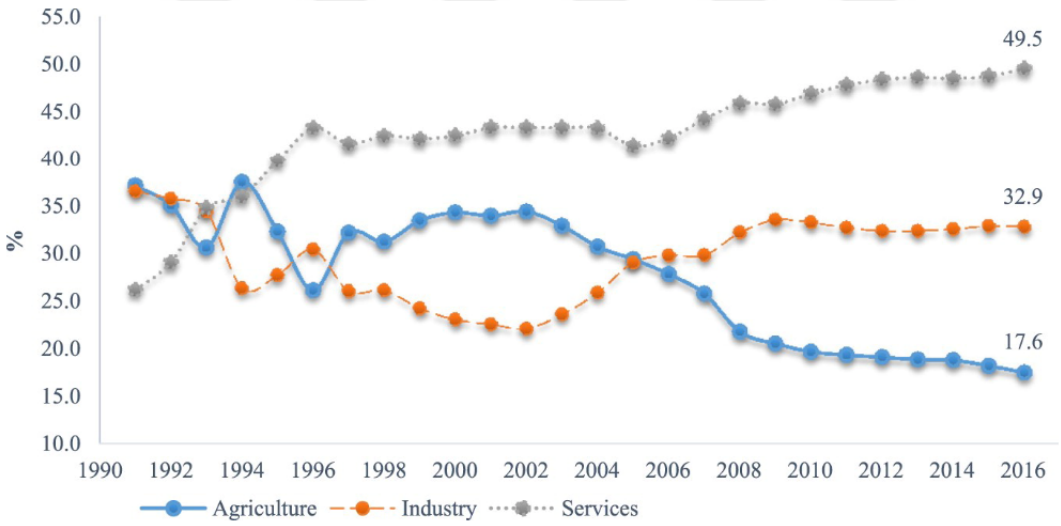



**Figure 1. 2 :** Share of Economic Sectors as % of Uzbekistan's GDP, 1991–2016 (Ruziev, 2021)

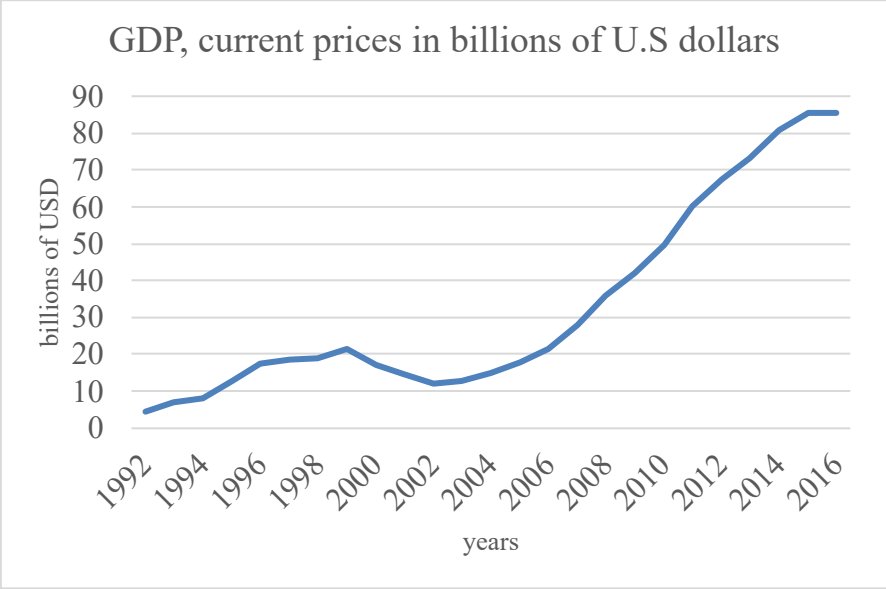



**Figure 1. 3 :** GDP, current prices in billions of U.S dollars (IMF database)

Initially reliant on cotton exports, the country diversified its exports, with energy becoming a dominant component at 39% of all exports in 2012. Import patterns also changed, moving from a focus on consumption goods to investment goods, with machinery accounting for a significant share, rising from 10% in 1992 to 46% in 2012

(Figure 1.4). Thus, in 2004-2016 the country maintained average annual growth rate of over 8%, which is considered impressive by economists (Ruzivev, 2021).

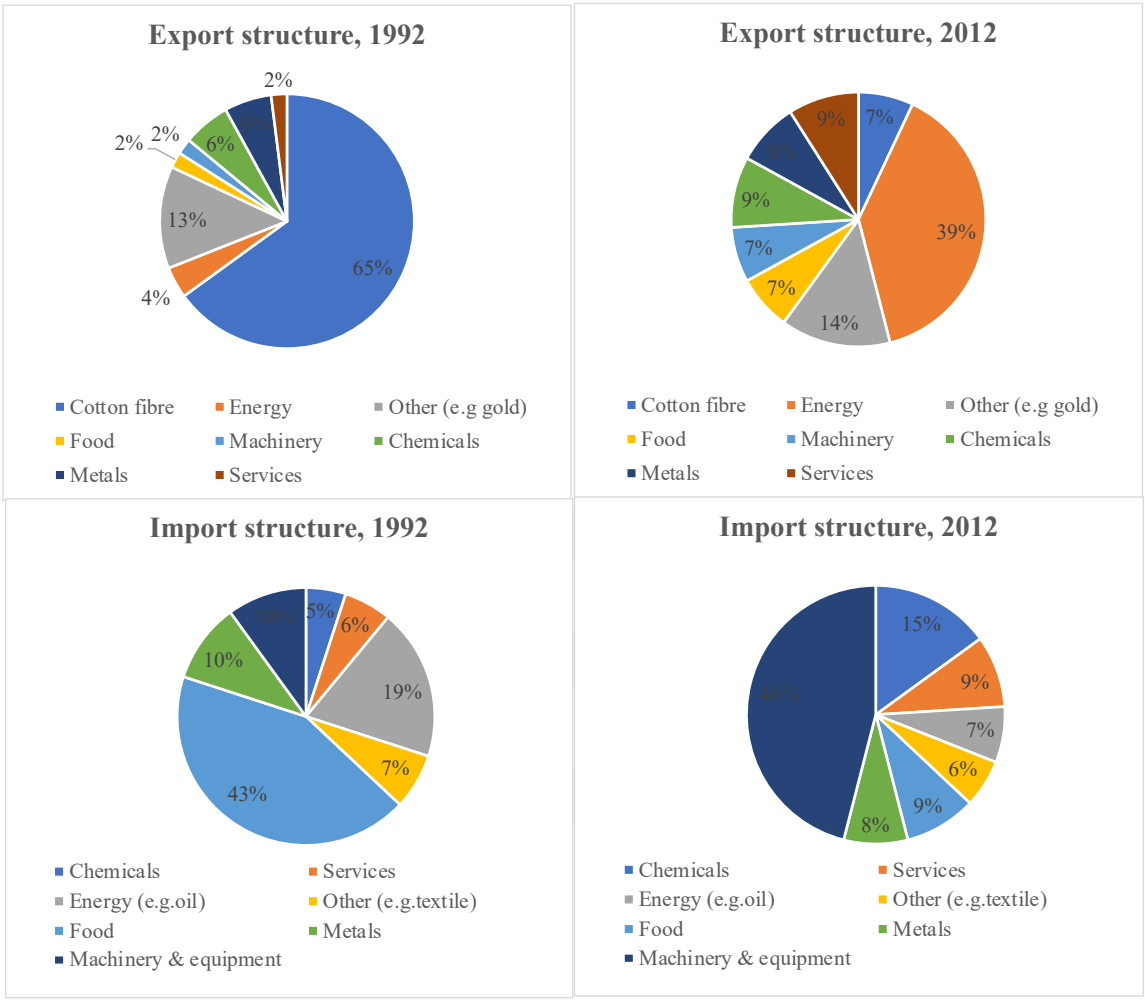



**Figure 1. 4 :** Export and Import structures, 1992-2012 (World Bank, 2013)

### 1.1.2 Early environmental commitments

During Karimov's leadership, significant efforts were made to address climate and environmental concerns. One key milestone was to sign the UN Framework Convention on Climate Change (UNCCC) in 1993, and ratification of the Kyoto Protocol on November 20, 1998. To fulfill obligations under the UNFCCC, GoU submitted:

- the First National Communication, in 1997-1999;
- the Second Phase of the First National Communication, in 2001;
- the Second National Communication, in 2005-2008;
- the Third National Communication was completed, in 2016.

Uzbekistan did not have quantitative obligations under the Kyoto Protocol and the UNCCC, reporting on GHG was one of the main mandatory components. In accordance with the fulfillment of the obligations of the UNFCCC, the country is conducting an inventory of emissions and sinks of greenhouse gases (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan no. 389 dated October 9, 2000). The government adopted a number of documents related to the regulation of actions and implementation of measures in the field of climate change, and significant success was achieved in the implementation of the mechanisms of the Kyoto Protocol. To implement the UNFCCC, more than 30 environmental legislative acts and about 100 regulatory documents were provided. In 2016, the country ranked first among the CIS and Eastern European countries in the number of registered Clean Development Mechanism (CDM) projects. Participation in CDM projects made it possible to attract over $24 million of private foreign investment into the country's budget. A number of industry regulating policies and measures for energy saving and energy efficiency were adopted. Among them there are Law "On Renewable Energy Sources", Presidential Decree PP-2343 "On the Program of Measures to Reduce Energy Intensity, Introduction of Energy-Saving Technologies in the Economic and Social Sectors for 2015-2019" dated 05.05.2015.

According to the inventory results, total GHG emissions excluding absorption in the Land Use, Land-Use Charge and Forestry (LULUCF) sector increased by 13.7% compared to the base year of 1990 and amounted to 205.2 million tCO2 eq. in 2012. However, the total volume of emissions is dominated by carbon dioxide, whose contribution to total emissions in 2012 amounted to 51.4%; and these emissions in the period 1990-2012 decreased by 6.7% (excluding absorption in the LULUCF sector), which is associated with an increase in the share of natural gas in the structure of fuel consumption, with the modernization of energy-intensive industries, the use of more efficient technologies and the renewal of the transport fleet (The Third National Communication was completed, 2016).

Thus, key international agreements related to climate and environment signed/ratified by GoU during I.Karimov include (UNDP, 2023):

- Convention on the protection and use of transboundary watercourses and international lakes (1992)
- The convention on biological diversity (1992)

- United Nations Framework Convention on climate change (1993)
- Convention to combat desertification in those countries experiencing serious drought and desertification (1994)
- Convention on the law of non-navigational uses of international watercourse (1997)
- The Kyoto protocol (1997)
- The Paris Agreement on climate change 2015

### 1.1.3 Modern economic landscape

After the first president passed away, Shavkat Mirziyoyev took over as president following his role as the Prime Minister. Mirziyoyev, who had a significant government career under Karimov, initiated economic reforms in Uzbekistan. These reforms aimed to reduce the state's influence in favor of the private sector and attract substantial foreign investment. Improving the business environment and simplifying public administration were top priorities for Mirziyoyev. The World Bank (2017) recognized Uzbekistan's commendable progress in implementing economic reforms, particularly highlighting the government's significant steps in 2017, such as relaxing currency controls and liberalizing monetary policies, which removed significant barriers to foreign investment and privatization. He initiated an ambitious reform agenda with the goal of modernizing and liberalizing Uzbekistan's economy, simplifying bureaucratic processes, addressing human rights issues, reestablishing connections with the international community, and encouraging greater foreign investment (CRS, 2021; Putz, 2023).

Uzbekistan is currently experiencing rapid economic growth in the Central Asian region, positioning itself as one of the fast-growing countries in terms of GDP. In the region, it follows closely behind Kazakhstan and Turkmenistan in terms of overall GDP, but it takes the lead in to the growth rate of its real GDP, as illustrated in the Figure 1.5. Due to resource extraction for export revenue, including valuable resources like gold, oil, and gas, as well as extensive cotton cultivation, Uzbekistan experienced

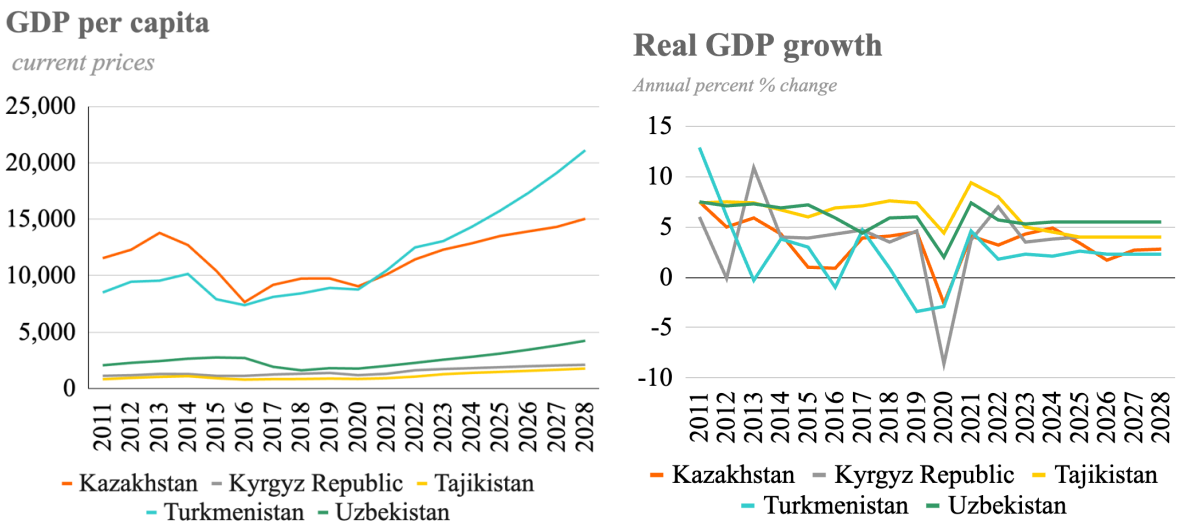



**Figure 1. 5 :** GDP per capita and Real GDP growth, historical view and projections, 2011-2028 (IMF, 2023)

rapid economic growth within Central Asia following the collapse of the Soviet Union, driven by its cautious initiation of economic reforms. As of 2023, Uzbekistan ranks number 43 in the list of countries by population with the largest – 36 million - and at the same time the youngest population in Central Asia with the average age is 27 (Worldmeters, 2024) (Table 1.1). Over 50% of the Uzbek territory is covered by deserts, they are located mainly in the north-west areas and 21% of the territory is mountainous. In 2022, Uzbekistan was the number 70 economy in the world in terms of GDP (current US$) (Worldmeters, 2024-a). As of 2021, the number 81 in total exports, the number 78 in total imports (WITS, 2023-a), the number 143 economy in terms of GDP per capita (current US$) and the number 79 most complex economy according to the Economic Complexity Index (ECI) (OEC, 2023; ECI, 2023).

**Table 1. 1 :** Main macroeconomic data

| Main Macroeconomic Data | | | | | |
|---|---|---|---|---|---|
| | **2019** | **2020** | **2021** | **2022** | **2023** |
| GDP at current prices, *billion USD* | 60,6 | 60,4 | 69,7 | 80,5 | 106,6 |
| GDP growth, *%* | 6.0 | 2.0 | 7.4 | 5.7 | 6.0 |
| GDP per capita, *USD* | 1806.0 | 1767.0 | 1995.0 | 2258.0 | 2520* |
| Population at the beginning of the year, *thousand people* | 33255,5 | 33905,2 | 34558,9 | 35271,3 | 36024,9 |
| Inflation rate (%) | 15.20% | 11.10% | 10.10% | 12.30% | 9.2%* |
| Export of goods and services, *increase, %* | 24.78% | -13.48% | 10.34% | 15.75% | 23.2%* |
| Unemployment rate, *%* | 9 | 10.5 | 9.6 | 8.8 | 8.7* ₾ |

* Estimate

During 2016-2022, significant shifts in export diversification were observed in certain industries (Figure 1.6). Gold exports have experienced slight fluctuations, peaking at 38% in 2020 before falling to 21% by 2022. The share of energy carriers and petroleum products decreased markedly from 19% in 2018 to 4% in 2020, and then stabilized at 6% in 2022. It is evident that the most dominant sectors throughout this period were gold and services. As the statistics for 2023 become accessible through the HS classification, a more detailed analysis of the granular data has been presented.

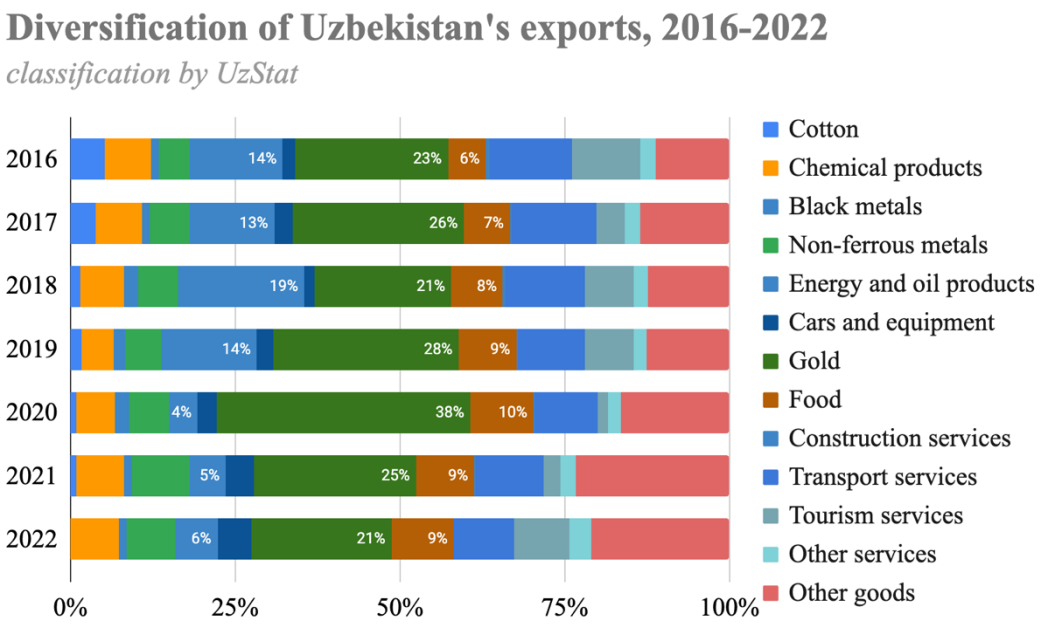



**Figure 1. 6 :** GDP per capita growth, historical view and projections, 2011-2028 (IMF, 2023)

In 2023, overall, in the structure of exports, goods occupy 80.4%, of which industrial goods – 23.6%, food products and live animals – 6.8%, various finished products – 4.9%. In 2023, gold accounted for 37.7% of Uzbekistan's exports by value, while precious metals as a whole account for 38.9% (Figure 1.7). The volume of exports of services amounted to 18.6% of the total volume of trade exports and increased, compared to the same period in 2022, by 33.0%. It includes: transport services (42.9%), tourism (42.1%), telecommunications, computer and information services (6.5%), and other business services (3.9%). Cotton exports, accounting for 5.9% in 2023, have experienced a downward trend in recent years. This is mainly due to reforms undertaken to produce finished goods instead of raw cotton and thus shifting to higher value added goods and services. As a result, items of clothing comprised 4.5% of the export composition, consisting primarily of finished textile goods (41.6%) and yarn (40.3%). Thus, in 2023, 557 types of textile products were exported to 53 countries around the world. Mineral products (gas,petroleum products, electricity) constituted 3.1% of all exports, with moderate decrease compared to 2022 (5.9%) (UzStat, 2023).

Vegetables and inorganic chemical products each constituted 2% of total exports. Lastly, products from the flour and cereal industry made up about 2% of exports. While

there is a diversified range of exports, a notable dependency on several key products is seen. In fact, more than half of the total exports are concentrated in just three categories: metals (gold), services, and cotton (UzStat, 2023; WITS, 2023).

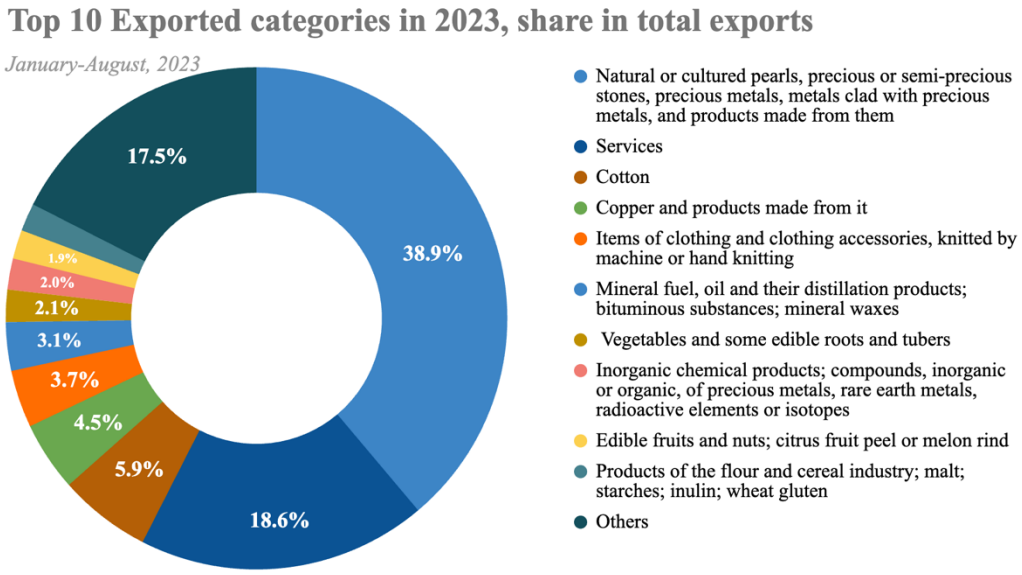



**Figure 1. 7 :** Top 10 exported categories in 2023, HS classification (Uzstat, 2023)

The distribution of GDP across various sectors of an economy provides valuable insights into the structure and composition of that economy. As depicted in Figure 1.8, agriculture, forestry, and fisheries account for the largest share of GDP at nearly 25%, reflecting the importance of the primary sector. Manufacturing industry follows closely behind at 18%. These two sectors together represent a substantial portion of the GDP, indicating the economy's reliance on traditional sectors. Net taxes on products represent 8%, construction, wholesale and retail trade, and real estate activities each account for about 6%. Education and transportation/storage sectors contribute nearly at 5% each. Finally, mining and quarrying make up 4%, signifying a relatively minor presence. The remaining share is made up by other sectors including healthcare, financial services, utilities, ICT, art, management etc., indicating their potential underdevelopment.

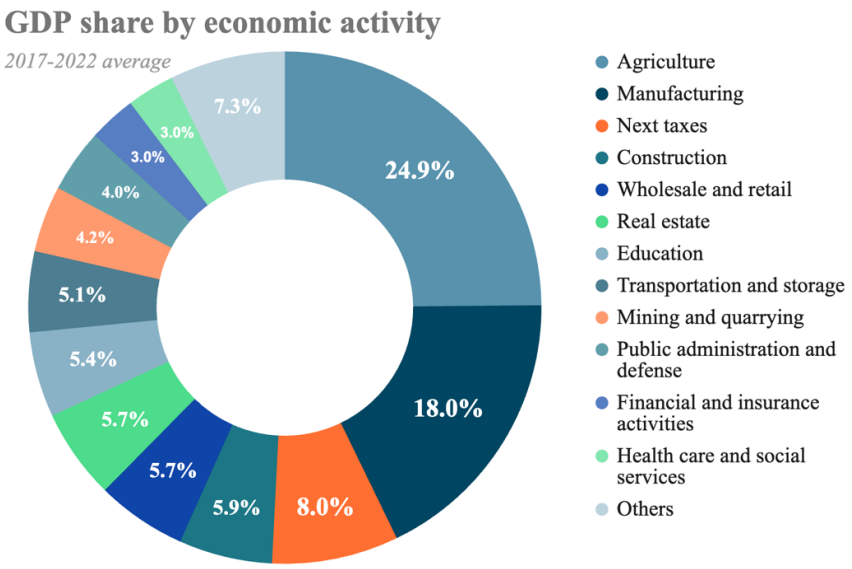



**Figure 1. 8 :** GDP share by economic activities, 2017-2022 average (Uzstat, 2024-c).

Depicted in Figure 1.9, Russia leads as Uzbekistan's top export partner at 16%, followed by China at 13.5%. Turkiye holds an 8.4% share, while Kazakhstan follows closely at 7.2%, Kyrgyzstan, the EU27, Afghanistan, and Tajikistan contribute 5%, 5%, 3.9%, and 2.6% respectively.

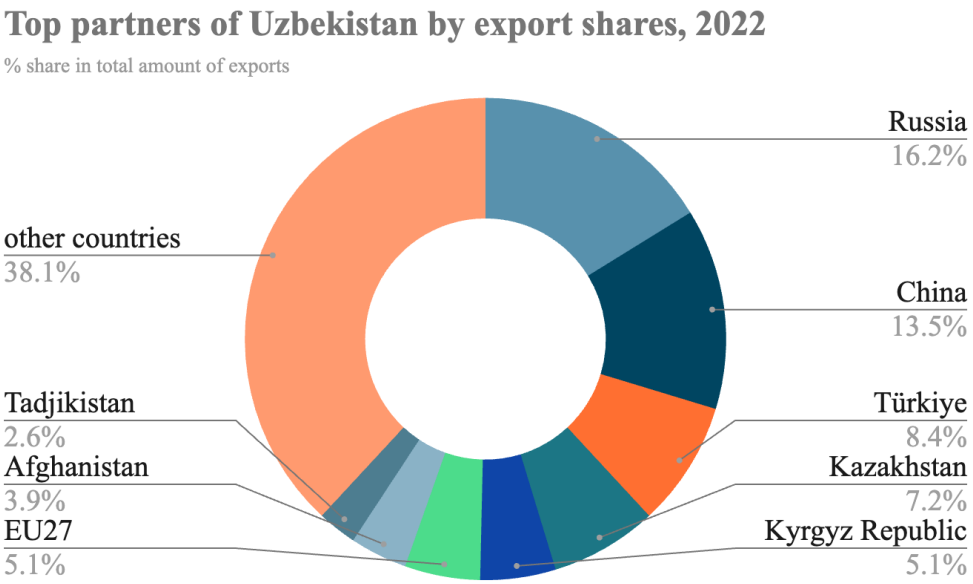



**Figure 1. 9 :** Top partners of Uzbekistan by export shares, 2022 (Uzstat, 2023-a).

In 2022, EU27 held the position of the 6th largest export partner for Uzbekistan, while also ranking as the 4th largest partner when considering total trade, encompassing both

imports and exports. Furthermore, Uzbekistan has experienced a noticeable upward trend in its exports to specific EU member countries, including Latvia, Lithuania, Poland, and Germany, over the past few years.

### 1.2 Drivers for Green Economy

The analysis of the trade-off between environmental and economic growth comprises two main aspects: ensuring environmental sustainability and promoting sustainable economic growth (Arslan et al, 2022). The sources of economic growth that have a significant environmental impact raise concerns about sustainability and the future quality of growth.

Uzbekistan, characterized by its arid climate, faces severe climate change challenges due to a projected rise in average temperatures. The country, spanning 450,000 km2, is predominantly arid, exacerbated by the drying of the Aral Sea. Current climate impacts include droughts, extreme heat, volatile rainfall, and dust storms. The average temperature has increased by 2.9°C from 1950 to 2020, with an additional 1.21 to 1.94°C expected this century (World Bank, 2023). Particularly concerning is the southeast, where heightened temperatures may exacerbate water scarcity and ecological harm. Despite contributing only 0.3% of global CO2 emissions, Uzbekistan stands out as one of the most energy-intensive nations worldwide. Without decarbonization efforts and green economy principles, the country faces economic growth limitations and trade sector constraints as global climate policies take effect (World Bank, 2023).

Beyond climate change, Uzbekistan faces a rising concern in air pollution. In 2019, healthcare expenses stemming from ambient PM2.5 pollution reach 7.3% of GDP (believed to be 6% annually), while PM2.5 exposure is linked to 15% of regional deaths (World Bank, 2022). Major sources of air pollution include residential heating, construction, transport, industry, power generation, agriculture, and dust from municipal activities, and land degradation (UNEC, 2020; Salomova et al, 2022). The ongoing ecological disaster of the Aral Sea, once the world's fourth-largest lake and now completely dried, stems from persistent intensive resource use and poor land

management practices, resulting in continued environmental and developmental challenges.

In addition to a diverse range of other environmental challenges, such as land degradation, soil salinization, deteriorating water quality, wind and water erosion, and declining agricultural productivity, Uzbekistan faces the significant issue of an 80% (UNDP, 2023-a) dependency on external sources for its water supply. This dependency, combined with the country's 34th (Kuzma et al, 2023) ranking in terms of water stress (40-80%), places Uzbekistan in a vulnerable position concerning the potential for water scarcity. Uzbekistan is among the top 20 countries globally in terms of vulnerability to drought, with a significant impact on low-income areas reliant on agriculture, mainly due to reduced river flow, declining precipitation, and rising frequency of droughts leading to desertification in the Karakalpakstan region and the Aral Sea area (World Bank and ADB, 2021).

The frequency of severe weather events is anticipated to rise due to climate change, affecting approximately 61,000 people annually through river flooding and flash flooding. This is based on historical data, with an expected GDP impact of US$181 million. The densely populated areas of Uzbekistan, notably the Ferghana Valley, face highest flood risks. About 34% of Tashkent's main roads, 18% of its schools, and 23% of hospitals are situated in flood-prone zones, with potential urban floods expected to affect roughly 5% of the country's GDP, exacerbated by aged infrastructure, insufficient drainage, neglect of drains, and decreased greenery and pervious surfaces. Morevoer, each year, approximately 1.4 million individuals in Uzbekistan face the consequences of earthquakes and floods, resulting in nearly $3 billion in damages, with the majority of the seismic risk concentrated in the Tashkent and Bukhara regions, where over half of the nation's population resides and 65% of its GDP is generated.
Addressing these challenges necessitates investments in the seismic retrofitting of critical public and private structures, energy, and transportation systems, given that over 20% of the population resides in buildings with high seismic vulnerability (UNDP, 2022).

**Table 1. 2 :** EPI index of Former Soviet States (Environmental Performance Index, 2023)

| Country | EPI Rank | EPI Score | Projected GHG Emissions in 2050 rank | Waste management rank | Air quality rank | Water resources rank |
|---|---|---|---|---|---|---|
| Ukraine | 52 | 49.6 | 82 | 88 | 88 | 68 |
| Belarus | 55 | 48.5 | 127 | 53 | 54 | 37 |
| Armenia | 56 | 48.3 | 60 | 79 | 102 | 96 |
| Moldova | 84 | 42.7 | 55 | 128 | 73 | 81 |
| Kazakhstan | 93 | 40.9 | 155 | 104 | 118 | 53 |
| Georgia | 103 | 39.1 | 70 | 66 | 124 | 42 |
| Azerbaijan | 104 | 38.6 | 115 | 92 | 149 | 100 |
| Uzbekistan | **107** | **38.2** | 140 | 132 | 167 | 141 |
| Russia | 112 | 37.5 | 171 | 104 | 49 | 63 |
| Tajikistan | 117 | 37.1 | 86 | 170 | 176 | 112 |
| Turkmenistan | 118 | 37 | 143 | 57 | 78 | 78 |
| Kyrgyzstan | 126 | 35.7 | 84 | 168 | 140 | 83 |

Depicted in Table 1.2, Uzbekistan, positioned at 107th (out of 180 ranks of countries) in the 2022 Environmental Performance Index (EPI)[1] with a score of 38.2, faces a mixed environmental challenge. Notably, the country's ranks across all selected cateogries (for methodology, refer to Annex B) presented fall outside the top 100. In terms of projected GHG emissions for 2050, the country ranks at 140, indicating a significant challenge in aligning with the global target of achieving zero emissions by that year. Compared to Former Soviet States, Uzbekistan has room to improve in all of these environmental sustainability aspects. By focusing on sustainability and green initiatives, Uzbekistan can work towards a more favorable environmental performance.

As part of global efforts to combat climate change, countries are expected to implement policies favoring low-carbon approaches, leading to a gradual reduction in the global demand for fossil fuels. According to the World Bank (2022-a) analysis of

[1] EPI provides a quantitative basis for the comparison, analysis, and understanding of environmental performance in 180 countries. These countries are scored and ranked based on their environmental performance, utilizing the most recent available data, and the changes in scores over the previous decade are calculated.

carbon-intensive exports, Uzbekistan's GDP and welfare will face significant consequences. Depending on how policy coordination unfolds among Uzbekistan's major export markets, which may include the implementation of border taxes on carbon-intensive products, as much as 40 percent of Uzbekistan's natural gas and petroleum exports could see impacts by 2050.

Due to its increased energy consumption and substantial carbon emissions, Uzbekistan is particularly vulnerable to the impact of worldwide low-carbon regulations and the potential implementation of border adjustment taxes by its primary trading partners. Abundant natural resources in Uzbekistan are being utilized extensively by both the industrial and agricultural sectors, but not in an efficient manner, which is having adverse effects on the environment (World Bank, 2022-a). The country's energy consumption is notably high and heavily reliant on fossil fuels, despite having considerable untapped potential in renewable energy sources such as solar and wind.

With the implementation of carbon border adjustment measures by trade partners, Uzbekistan's carbon-intensive industries may encounter hurdles in accessing main export markets. The global transition towards low-carbon practices could significantly devalue primary export commodities, potentially affecting the country's profits. While Uzbekistan's global emissions contribution is relatively low, the country is among the top energy-intensive economies globally, following larger countries like Russia and Canada, as illustrated in Figure 1.10. This is primarily attributable to its heavy reliance on fossil fuels, particularly natural gas, in its energy mix, aging energy infrastructure, high levels of energy subsidies, and energy-intensive industrial sectors such as cement production.

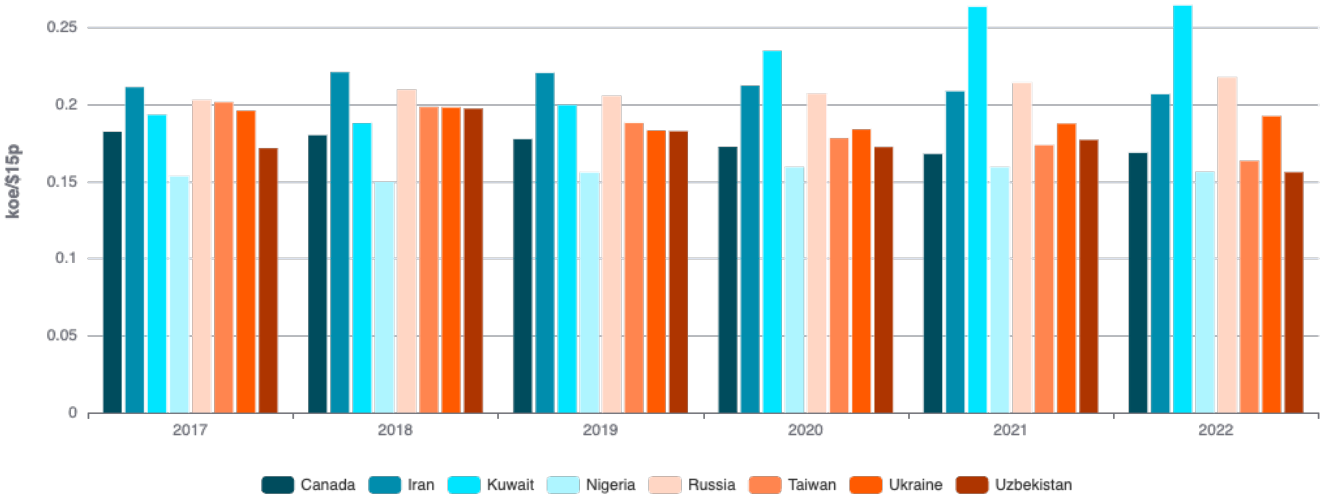
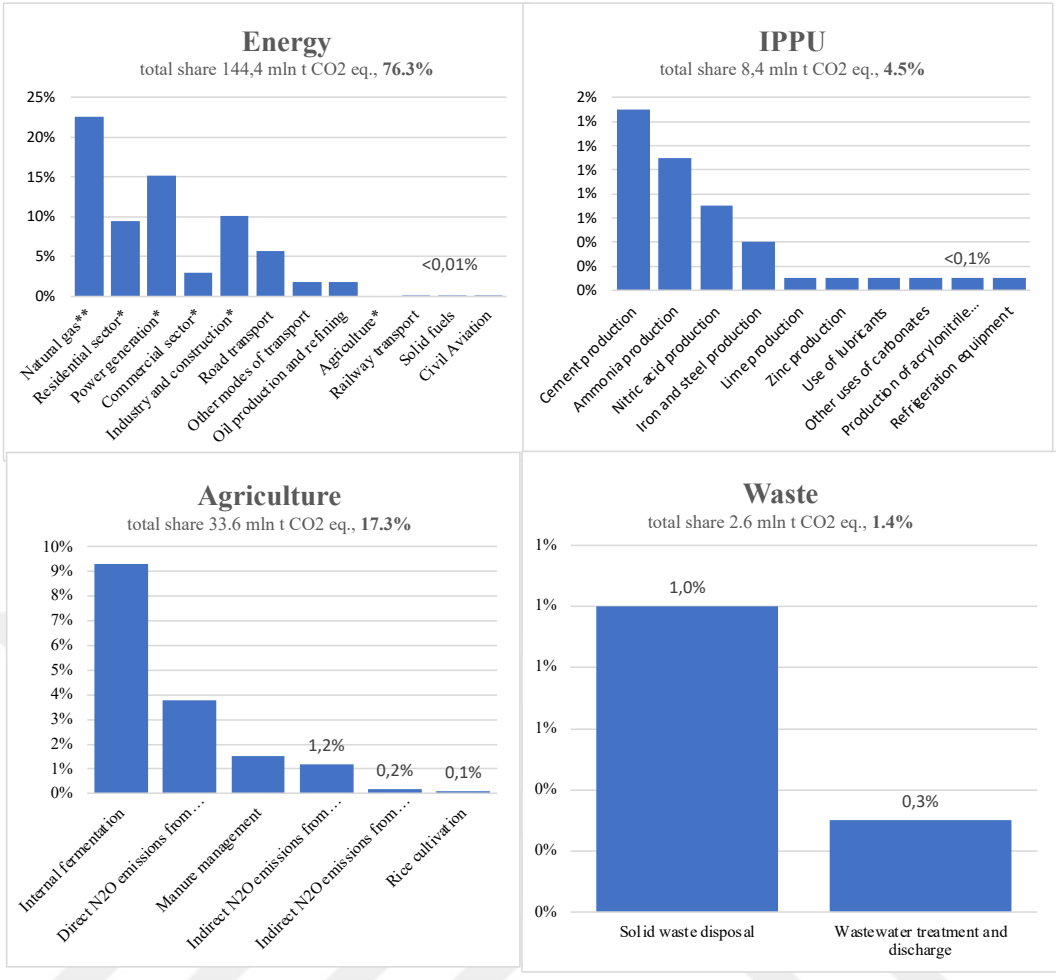



**Figure 1. 10 :** Top 8 countries by energy intensity (total energy consumption per unit of GDP) (Enerdata Yearbook, 2022).

In Uzbekistan, the residential sector constitutes the majority of energy consumption, comprising approximately 50% of the total final energy consumption. Following this, the industry and transport sectors contribute 22% and 20%, respectively. Within the public buildings sector, heating represents a significant portion of energy consumption, accounting for 70% in regional hospitals, 84% in pre-schools, 88% in rural clinics, and 97% in public schools (Shakirkhanova, 2023).

Though updated emissions data (up to 2021) is presented in Chapter 4, the detailed data on GHG emissions for each sector was taken from NDC2. According to this data, the energy sector is the leading contributor to overall GHG emissions, comprising 76.3% (Figure 1.11). The Thus, achieving long term decarbonization targets by 2050 in Uzbekistan (which is currently under development) necessitates a concentrated effort on the energy sector, which accounts for the country's largest GHG emissions (World Bank, 2023).




*Fuel combustion
** Extraction, processing, transportation. (D) – direct. (I) – indirect. IPPU – Industrial Processes and Product Use

**Figure 1. 11 :** GHG in 2017 by sectors. Share of the source in total emissions, % (NDC Uzbekistan, 2021)

## 1.3 Purpose of Thesis

The purpose of this thesis is to provide a comprehensive and systematic analysis of Uzbekistan's transition to a green economy.

To achieve this aim, firstly, thesis identifies enabling conditions for green economy from existing literature, then conducts analysis informed by these conditions.

It studies interconnection between green economic development and international sustainability and climate initiatives such as Paris Agreement and SDGs. It has been identified that while international commitments can be driving force to green economy, the converse is also true; green economy helps achieve targets of these international commitments. Implementation of international commitments in

Uzbekistan is assessed to identify current achievements and challenges, pointing the way forward to improving aspects of the green economy. Moreover, the thesis aims to show the impact of significant initiatives such as European Green Deal and Belt and Road Initiative (BRI) on the green transition of the country.

The selection of these commitments and initiatives, for consideration in the thesis stems from several factors: (1) relevance to the research – chosen commitment documents – Paris Agreemnt and SDGs – directly relate to thesis's focus - green economy (2) global and regional significance - the chosen commitments and initiatives have a substantial impact on shaping global and regional sustainability agendas and influencing policy decisions; (3) bilateral implications – EGD, as a policy framework, is expected to transform the EU into a climate-neutral economy and this tranformation will inevitably affect partner countries, including Uzbekistan; similarly, BRI, massive initiative managed by China – one of Uzbekistan's largest partners - has potential implications for sustainability and green transition. By analyzing these initiatives within this context, the thesis aims to provide insights into their implications and potential impact on green transition in Uzbekistan.

Secondly, the thesis reviews existing country wide development strategies and sectoral policies relevant to green economy. The rationale behind selecting certain sectors lies in their GHG intensity in the economy of the country. This review not only aims to identify policies and intiatives being implemented and ones lacking but also aims to serve as as the groundwork for a comprehensive SWOT analysis.

Finally, the thesis constructs a SWOT analysis based on the country background, identified policy gaps and implementation issues, supplemented by frequently mentioned findings from additional reports obtained through secondary research. The thesis aims to provide thematic recommendations based on initially identified enabling conditions for green economy.

Overall, the purpose of this thesis is to contribute to the literature on green economy transitions by offering insights into Uzbekistan's experiences, challenges, and opportunities. By doing so, it aims to inform decision-making processes and guide actions towards achieving sustainable development goals in Uzbekistan.

## 1.4 Organization of Thesis

This thesis is organized into 5 chapters (Figure 1.12). The introductory chapter of this thesis sets the stage by providing essential background information on Uzbekistan's developmental trajectory, environmental commitments, and economic landscape. This contextual foundation is important for understanding the drivers behind the transition towards a green economy, which is explored in detail in subsequent sections. The literature review chapter delves into the evolution of key concepts such as green economy, sustainable development, enabling conditions for green economy, international commitments that are relevant to green economy. Methodological approaches and rationale for opting particular approach for data analysis and collection are outlined in the methodology chapter. The next chapter will delve into the analysis and results, presenting Uzbekistan's progress and implementation to international commitments, sector-specific policies, and cross-sectoral strategies thoroughly scrutinizing and interpreting these developments. Finally, the conclusion and recommendations chapter presents key findings and offers actionable recommendations for policy-making and improvements.

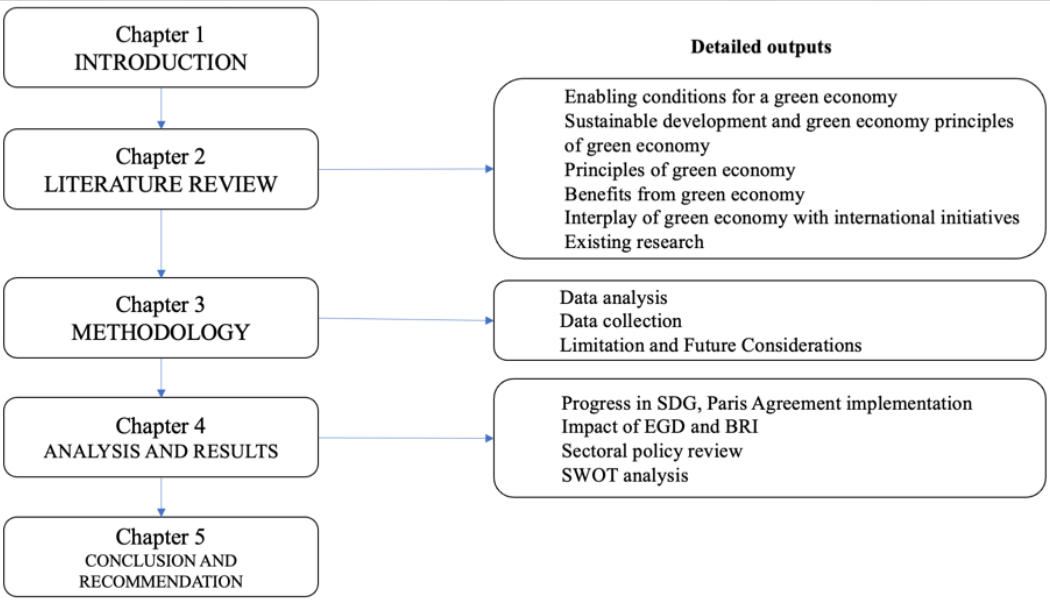



**Figure 1. 12 :** Diagram of organization of the main thesis chapters

# 2. LITERATURE REVIEW

## 2.1 Evolution of Concepts: Green Economy, Green Growth

There are various definitions for both the green economy and green growth. The concept of "green economy" appeared over two decades ago. However, it was first introduced by Pearce et al. (1989) in their *Blueprint for a green economy*, commissioned by the UK's Department for the Environment. For the first time, this work proposed policy measures to integrate environmental considerations into modern economies, paving the way for sustainable development. To enhance the sustainability of economies, advancements in three crucial policy domains were considered imperative: "valuing the environment, accounting for the environment, and creating incentives for environmental improvement". Pearce (1992) challenges the traditional economic assumption that individuals maximize self-interest. In contrast, he advocates for a shift away from purely self-interested decision-making in economic systems. A key aspect of the green economy, as proposed by Pearce, involves restraining human greed and promoting sustainability. Another crucial element is the intentional separation of economic output growth rates from the depletion of environmental resources. In essence, Pearce (1992) identifies three features of green economy: "(1) constraining human greed (2) sustainability (3) decoupling of rates of change in economic output and the environmental assets used up in that process". After three decades, although the concepts and terminology surrounding the green economy have evolved, the core principle persists: achieving economic development with minimized environmental risks.

The 1992 United Nations Conference on Environment and Development, known as the "Earth Summit" in Rio de Janeiro, marked a pivotal moment by concluding that sustainable development is an achievable objective for people worldwide, emphasizing the need to integrate economic, social, and environmental considerations for the preservation of human life on Earth (UN, n.d). A key outcome of the UNCED Conference was Agenda 21, a bold action plan advocating innovative strategies for comprehensive sustainable development in the 21st century. Agenda 21 laid the groundwork for integrating environmental considerations into economic development, contributing to the evolution of the green economy concept. Similar to "Earth

Summit", the EU Sustainable Development Strategy 2001 contributed to the development of the green economy concept by integrating sustainability principles into EU development goals and policies, fostering a holistic approach that addresses environmental, social, and economic aspects.

In October 2008, the United Nations Environment Programme (UNEP) introduced the Green Economy Initiative (UNEP, n.d), aiming to offer analysis and policy guidance for investing in green sectors and greening environmentally unfriendly sectors. As part of this initiative and in response to the financial and economic challenges, UNEP published a "Global Green New Deal" (GGND) in April 2009. The GGND proposed a combination of policy measures to not only revive the global economy and enhance employment but also to expedite efforts against climate change, environmental degradation, and poverty. In preparation for the UN Climate Change Conference in Copenhagen in June 2009, the United Nations issued a joint statement endorsing the concept of a green economy as a means to tackle various crises. The statement expressed optimism that the economic recovery at that time could serve as a pivotal moment for a robust and successful global response to the numerous challenges confronting humanity, centered around the adoption of a worldwide green economy. Subsequently, in 2009, the United Nations General Assembly, through resolution A/64/236, decided to convene a United Nations Conference on Sustainable Development in 2012, with a key focus on: "A green economy in the context of sustainable development and poverty eradication and the institutional framework for sustainable development" (UN, 2011). In 2011, the seventh "Environment for Europe" Ministerial Conference featured extensive discussions on the green economy, encompassing topics such as sustainable water management and integrating environmental considerations into economic development. With over 1400 delegates in attendance, the high-level meeting produced a Ministerial Declaration titled "Save water, grow green!" and initiated the Astana Water Action, outlining outcomes and commitments related to water conservation and sustainable practices. These contributions were instrumental in framing future discussions on the green economy within the context of sustainable development at Rio+20 (ENB, 2011).
The concept of the 'green economy' was coined during the Rio+20 conference (Barbier, 2012), around two decades after the UN conference on environment and development in Rio de Janeiro in 1992 formally adopted the concept of the sustainable development.

The concept has garnered substantial global recognition, leading to a swift growth in literature, encompassing fresh publications on the green economy from international organizations, national governments, experts, non-governmental organizations, and other sources. The consensus reached at Rio+20 among governments was to characterize the green economy as a important instrument for sustainable development, emphasizing its potential to stimulate economic growth, generate employment, and reduce poverty, all while ensuring the environmental well-being (UNDESA, 2012).

Today, there is still no internationally accepted definition of a green economy or green growth; frequently mentioned definitions in various recent publications are as follow:

- **UNEP** defined a green economy as "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is low carbon, resource efficient, and socially inclusive" (UNEP, 2011). This definition has been referenced in several recent reports, including those from UN Environment Management (UNEMG) and the OECD. International institutions like The World Bank (2012) and the United Nations Environment Programme (UNEP, 2011) view this widely accepted concept as a means to achieve sustainability.

- **UNECE** also describes green economy as "a broad-ranging policy agenda and a tool to support the achievement of sustainable development, with an emphasis on aligning economic goals to social and environmental ones. The green economy agenda recognizes the potential of new sustainable technologies and green sectors to become the engine of a new development pathway" (UNECE, 2018).
- **OECD** defines "Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies" (OECD, 2011). Though green economy and green growth have different definitions, they both share some key ideas. Green growth, in essence, aligns with the concept of a green economy, as both emphasize the beneficial intersection of green policies with economic growth and development. Nevertheless, the distinction lies in the green economy's specific emphasis on recognizing finite

environmental limits. The term "growth" in green growth signifies the considerable importance that nations place on the quantitative expansion of their economies, driven by factors such as a growing human population, pursuing development objectives, and poverty reduction (Kanianska, 2017).

- **Green Economy Coalition** states “An economy that provides better quality of life for all within the ecological limits of the planet” (Green Coalition 2024).

## 2.2 Sustainable Development and Green Economy

According to the literature, sustainability is a philosophy, method, or practice that directs the efficient use of resources currently available to ensure that there are enough of them to meet both the demands of the present and those of future generations (Greenland, 1997; Grant, 2010). In order to accomplish specific intended social, economic, and environmental objectives, sustainability is also defined as the capacity to use and allocate resources responsibly to both economic and non-economic activities (Grant, 2010).

In a publication titled World Conservation Strategy: Living Resource Conservation for Sustainable Development (WCS, 1980), the term "sustainable development" was first used. It was published in collaboration with The World Wildlife Fund (WWF), the United Nations Environment Program (UNEP), and the International Union for Conservation of Nature (IUCN). According to that document: “development is the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and improve the quality of human life”. It also states : “For the development to be sustainable, it must take into account social, ecological factors, as well as economic ones; of the living and non-living resource base; and of the long term as well as the short term advantages and disadvantages of alternative actions”. Although the publication of the Brundtland Report in 1987 (WCED, 1987) significantly boosted the concept of sustainable development, its global adoption seems to have taken place only in 2015, specifically through the United Nations' 2030 Agenda.

With fundamental philosophy of green economy practices centered on minimizing negative environmental harm, green economy is recognized as an important instrument

for attaining sustainable development (Khoshnava et al, 2019; Liu et al, 2020; Ali et al, 2021). UNEP (n.d -a) states that the concept of a green economy does not substitute sustainable development; instead, it introduces a new perspective on aspects such as the economy, investments, capital, infrastructure, employment, skills, and the generation of favorable social and environmental benefits. Similarly, OECD (2023) confirms that the core of green growth strategies lies in maximizing the sustainable economic potential of natural assets, which provide vital life support services like clean air, water, and robust biodiversity essential for food production and human health.

The focus of green economy on certain aspects is best explained by financial system that surround sustainable development. According to UNEP (2016), green finance is a component of sustainable finance, or sustainable finance as a progression from green finance. It provides the following descriptions and simplified definition of the terms (Figure 2.1):

- Climate finance - funds for addressing climate change adaptation and mitigation
- Green finance - with broader scope, covers other environmental goals (e.g. biodiversity protection/restoration)
- Sustainable finance - extends its domain to environmental, social and governance factors (ESG).

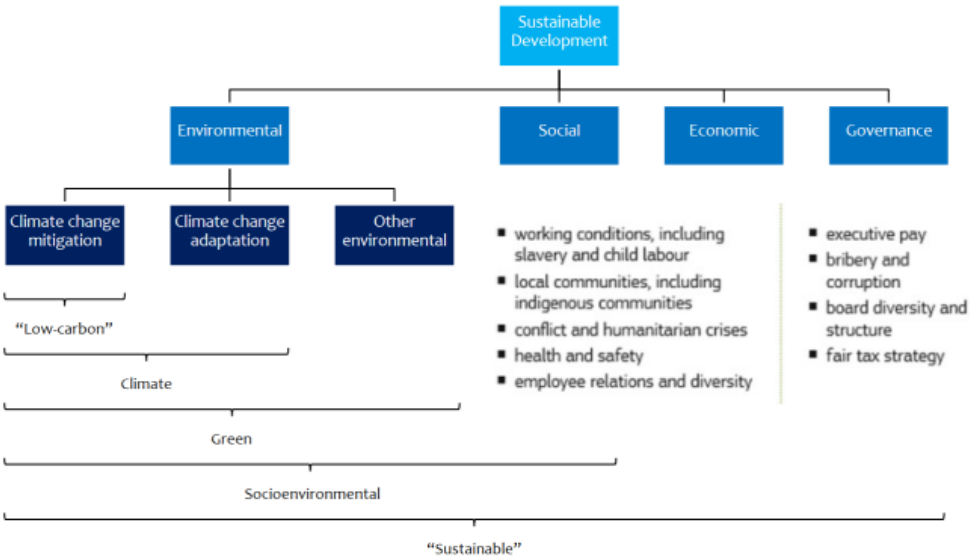



**Figure 2. 1 :** Diagram on Climate, Sustainable, and Green Finance (UNEP, 2016)

## 2.3 Principles of Green Economy

As observed in definitions, the idea of a green economy includes principles rooted in economic, environmental, and social dimensions. Regarding the principles of green economy, various principles have been suggested by academia and international organizations, to better understand and implement the concept, leading to a diverse range of proposals. Despite this diversity, there is significant overlap among different publications, with most of the principles sharing common ground. The United Nations Department of Economic and Social Affairs (UNDESA, 2012) identified eleven commonly recognized green economy principles (Table 2.1).

**Table 2. 1 :** Commonly mentioned principles of green economy (UNDESA, 2012)

| | **Principles identified from review of publications** |
|---|---|
| 1. | The green economy is a means for achieving sustainable development. |
| 2. | The green economy should create decent work and green jobs. |
| 3. | The green economy is resource and energy efficient. |
| 4. | The green economy respects planetary boundaries or ecological limits or scarcity. |
| 5. | The green economy uses integrated decision making. |
| 6. | The green economy measures progress beyond GDP using appropriate indicators/metrics. |
| 7. | The green economy is equitable, fair and just – between and within countries and between generations. |
| 8. | The green economy protects biodiversity and ecosystems. |
| 9. | The green economy delivers poverty reduction, well-being, livelihoods, social protection and access to essential services. |
| 10. | The green economy improves governance and the rule of law. It is inclusive; democratic; participatory; accountable; transparent; and stable. |
| 11. | The green economy internalises externalities |

UNDESA (2012) noted that the common principles in discussions about the green economy predominantly revolve around its social aspects. These principles emphasize the need for the green economy to generate employment opportunities and foster good governance by embracing inclusivity, accountability, and transparency. Additionally, common principles underscore the green economy's objectives to eliminate poverty, improve resource and energy efficiency, increase equity, and assess progress using metrics beyond GDP.

In 2012, the Green Economy Coalition (GEC) supported a broad-based online consultation with hundreds of policy analysts, community activists, academics, and

thinkers on equality, sustainability, and economics. GEC developed 9 Principles of a Green Economy:

1. The Sustainable Principle. A green, fair and inclusive economy is a means to deliver sustainability
2. The Justice Principle. A green, fair and inclusive economy supports equity
3. The Dignity Principle. A green, fair and inclusive economy creates genuine prosperity and wellbeing for all
4. Healthy Planet Principle. A green, fair and inclusive economy restores lost biodiversity, invests in natural systems and rehabilitates those that are degraded
5. The Inclusion Principle. A green, fair and inclusive economy is inclusive and participatory in decision-making
6. The Good Governance and Accountability Principle. A green, fair and inclusive economy is accountable
7. The Resilience Principle. A green, fair and inclusive economy contributes to economic, social and environmental resilience
8. The Efficiency and Sufficiency Principle. A green, fair and inclusive economy delivers sustainable consumption and production
9. The Generations Principle. A green, fair and inclusive economy invests for the present and the future (GEC, n.d)

Later, in 2020, these principles were updated to comprise five principles (Table 2.2):

**Table 2. 2 :** The Five Principles of Green Economy (GEC n.d-a).

| | |
|---|---|
| The Wellbeing Principle | A green economy enables all people to create and enjoy prosperity.<br><br>The green economy is people-centred. Its purpose is to create genuine, shared prosperity. |
| The Justice Principle | The green economy promotes equity within and between generations.<br><br>The green economy is inclusive and non-discriminatory. It shares decision-making, benefits and costs fairly; avoids elite capture; and especially supports women's empowerment. |
| The Planetary Boundaries Principle | The green economy safeguards, restores and invests in nature.<br><br>An inclusive green economy recognizes and nurtures nature's diverse values – functional values of providing goods and services that underpin the economy, nature's cultural values that underpin societies, and nature's ecological values that underpin all of life itself. |
| The Efficiency and Sufficiency Principle | The green economy is geared to support sustainable consumption and production.<br><br>An inclusive green economy is low-carbon, resource-conserving, diverse and circular. It embraces new models of economic development that address the challenge of creating prosperity within planetary boundaries. |
| The Good Governance Principle | The green economy is guided by integrated, accountable and resilient institutions.<br><br>An inclusive green economy is evidence-based – its norms and institutions are interdisciplinary, deploying both sound science and economics along with local knowledge for adaptive strategy. |

Recent publications across various contexts consistently highlight common principles of the green economy, emphasizing its central role as a concept integral to achieving sustainable development (Georgeson et al, 2017; Khalil, 2018; D'amato and Korhonen, 2021; Mikhno et al, 2021; Karuppiah et al., 2022; Chaaben et al, 2022; Zhironkin and Cehlár, 2022; Zvarych et al, 2023).

## 2.4 Enabling Conditions for a Green Economy

Transitioning to a low-carbon economy and embracing a green economy involves decoupling economic growth from environmental harm. Decoupling, in this context, does not entail reducing economic activity but rather achieving more with fewer resources. This involves advocating for sustainable production and consumption practices that safeguard and nurture natural capital while enhancing resource efficiency. A green economy places significant importance on aspects such as the economy, capital, infrastructure, investment, employment, skills, and fostering positive social and environmental results.

To facilitate the shift towards a green economy, specific enabling conditions will be essential, encompassing national regulations, subsidies, policies, and incentives. Additionally, an integral part of these conditions involves the development of international market and legal infrastructure, along with the provision of trade and technical assistance. UN (2011-a) identified examples of such enabling conditions as follow:

- At a national level: fiscal policy changes, reduction of subsidies that contribute to environmental harm, the implementation of novel market-based instruments, directing public investments toward green sectors, greening public procurement, and enhancing both the formulation and enforcement of environmental rules and regulations;
- At international level: to enhance market infrastructure, refine trade and aid flows and foster greater international cooperation.

Numerous studies have investigated the transition to a green economy and conditions necessary for this; this section provides a summary of the enabling conditions identified during literature review, organized under relevant subtopics.

### 2.4.1 Finance and investment

The widely debated transition to a green economy calls for significant investments from both the public and private sectors (Ryszawska, 2016; Cheng et al., 2021; Wang et al, 2022; Chi and Yang, 2023, WTO, 2023). GIZ (2011) defined “green finance” as “a strategic approach to incorporate the financial sector in the transformation process towards low-carbon and resource-efficient economies, and in the context of adaptation to climate change”. In literature, "green finance" covers a wide range of financial products and services such as mortgages, car loans, environmental bonds, certified emissions reduction certificates, carbon credits, eco-savings deposits, capital for alternative energy projects, and green credit cards, among others. For instance, a bank might offer favorable interest rates on car loans to support the financing of vehicles using alternative fuels. This arrangement results in advantages for the consumer through lower financing expenses, benefits for the bank through heightened loan demand, and societal gains from decreased emissions. Establishment of green funds and green banks, as those meeting growing demand for financial instruments are referred as green services (UNEP, 2014; GEP, 2023).

Moreover, stipulated by relevant policies subsidies and incentives represent another demand-side mechanism that can be employed to induce behavioral change and facilitate the transition towards sustainability. UNEP (2011-a) identified five broad fiscal policy options: environmental taxes (e.g., carbon taxes, tax exemptions and others), pollution charges, green subsidies, elimination of environmentally harmful subsidies and public expenditure on infrastructure. GFPN (2023) states that green fiscal policy utilizes fiscal and budgetary instruments "to address environmental challenges such as climate change, pollution, congestion, waste, biodiversity protection, overfishing, and sustainable forestry". Such instruments include: environmental taxes, budgetary reforms, fiscal incentives for green investment. Identifying the predominant types of incentives, subsidies, or taxes is challenging due to variations among countries, both in the nature and effectiveness of these measures.

### 2.4.2 Capital and infrastructure

Governments are progressively acknowledging the pivotal role of infrastructure investment in shaping successful pathways toward a green transition (Khoshnava et al, 2020; Danish et al, 2020). Capital designated for the development of a green economy includes investments in renewable energy infrastructure, transportation, sustainable building initiatives, agriculture, waste management, water infrastructure, research and development, and others. On average, over two-thirds of worldwide greenhouse gas emissions are attributed to infrastructure. Consequently, strategically designed infrastructure initiatives that prioritize climate change and broader sustainability objectives not only have the potential to boost overall output growth and enhance resilience but also contribute to mitigating the carbon footprint associated with economic development (Jobst et al, 2022). According to Ali et al. (2022), about 80 percent of private infrastructure investment in middle- and low-income nations has predominantly focused on non-renewable energy and transportation sectors. These sectors, recognized as significant contributors to global fossil CO2 emissions, have attracted a substantial share of private investment on a global scale.

### 2.4.3 National regulations, policies, standards

Another important factor is the development of strong national policies and regulations, as they play a pivotal role in creating the necessary groundwork for

facilitating the green transition. Policies such as fiscal and non-fiscal incentives, penalties, ecotaxes (Mahmood et al. 2022) encourage users to align investments and economic activities with green economy objectives. Environmental regulations, including restrictions on emissions, pesticides in food, pollution, and water contamination, not only have a primary impact on enhancing the environment but can also serve as catalysts for the green economy. Furthermore, standards such as energy-efficiency codes for buildings and regulations on air, water, and fuel efficiency, can generate a market demand for green technologies, simultaneously enhancing environmental quality and public health (WESS, 2011; Cai et al, 2020; Xu et al, 2023).

### 2.4.4 Government procurement

Governments has the potential to stimulate the production and consumption of greener goods by altering its procurement policies (Siminica et al, 2020; Wang et al, 2021). It is also crucial that green procurement policies consider life cycle concepts. This entails assessing impacts not only during the purchasing stage (including delivery, installation, commissioning, and insurance) but also throughout the use phase (accounting for energy losses, maintenance, repair, and replacement), as well as the end-of-life stage (covering removal, recycling, refurbishment, and disposal). Additionally, considerations should extend to factors like longevity and warranty time frames. Thus, green economy also incorporates certain aspects of a circular economy: reduction of material and energy inputs in the production process, recycling and reuse, environmentally sustainable supply chains, and the promotion of shared ownership (D'amato and Korhonen, 2021).

### 2.4.5 Access to clean technology

While there is no standard definition for clean technology, various organizations and individuals have offered their interpretations. The primary goal of clean technology is to decrease the environmental impact and minimize pollution (Muralikrishna and Manickam, 2017; Muthu, 2020). These goals include improved water quality, better use of resources through recycling, energy-efficiency improvements, waste reduction. The initial drive behind adoption of clean technologies started from the desire to decrease greenhouse gas emissions, mitigate climate change impacts, and reduce dependence on external energy supplies. Similar to many other researchers, Metawa et al. (2022) suggests that worldwide efforts to establish low-carbon economies should

be reinforced by incorporating clean technologies into manufacturing processes and consistently advancing the digitization of financial sectors. Governmental support for the production of clean technologies and growing investor interest for FinTech sectors are expected to stimulate green growth (Liu et al., 2023).

### 2.4.6 Tariffs

Revising import tariffs provides governments with a dual benefit: generating revenue and facilitating the entry of selected goods into the economy, thereby enabling companies to participate in global value chains. Notably, current tariffs are often lower for carbon-intensive industries compared to cleaner industries. According to estimations by Shapiro (2020), estimated global implicit subsidy in trade policy, ranging from $85 to $120 per ton of CO2, surpasses the typical $40 per ton social cost of CO2 emissions. This highlights substantial environmental bias as trade policies inadvertently incentivize the production of carbon-intensive goods with lower tax rates contrary to optimal carbon policy. By reassessing and rebalancing these tariffs, there is a significant opportunity to enhance global income, reduce carbon emissions, and integrate economies into low-carbon value chains. To counteract carbon leakage, where carbon-intensive industries relocate to nations with less stringent environmental regulations, tariffs can be imposed on imported goods according to their carbon footprint. Trade strategies can be formulated to spur innovation in green technologies. By offering preferential treatment or incentives for the import/export of sustainable and energy-efficient technologies, nations can foster the advancement and widespread adoption of state-of-the-art solutions. According to the WTO Environmental Database, at least 30 WTO member countries spanning various regions and economic development stages have implemented tariff reductions with environmental objectives. Trade Policy Reviews of WTO members indicate that these reductions are predominantly focused on renewable technologies, with low-carbon and electric vehicles following closely (WTO, 2021)

### 2.4.7 Education, capacity building, awareness

As green technology and finance continue to advance, the demand for training and education becomes crucial to facilitate a smooth shift towards a green economy. This investment not only eases the transition process but also empowers the population to use the potential benefits that come with it. In general, a diverse range of skilled

technicians, engineers, and tradespeople with knowledge in green practices will be essential to meet the evolving needs of these sectors (UNEP, 2011). According to the ILO (2022), green jobs are decent employment opportunities that actively contribute to preserving, restoring, or enhancing environmental quality (Figure 2.2). These jobs span traditional sectors like industry and agriculture, as well as emerging green sectors such as renewable energies, playing a vital role in promoting sustainable development by addressing issues like energy efficiency, pollution reduction, and climate change adaptation. According to Li et al. (2023-a), education significantly reduces harmful pollutant emissions, with the influencing mechanisms of green innovation and government intervention supporting its positive impact on green transition in China. These findings underscore the importance of implementing supportive policies for green innovation alongside efforts to increase education levels to fully realize the benefits of quality human capital for green transition.

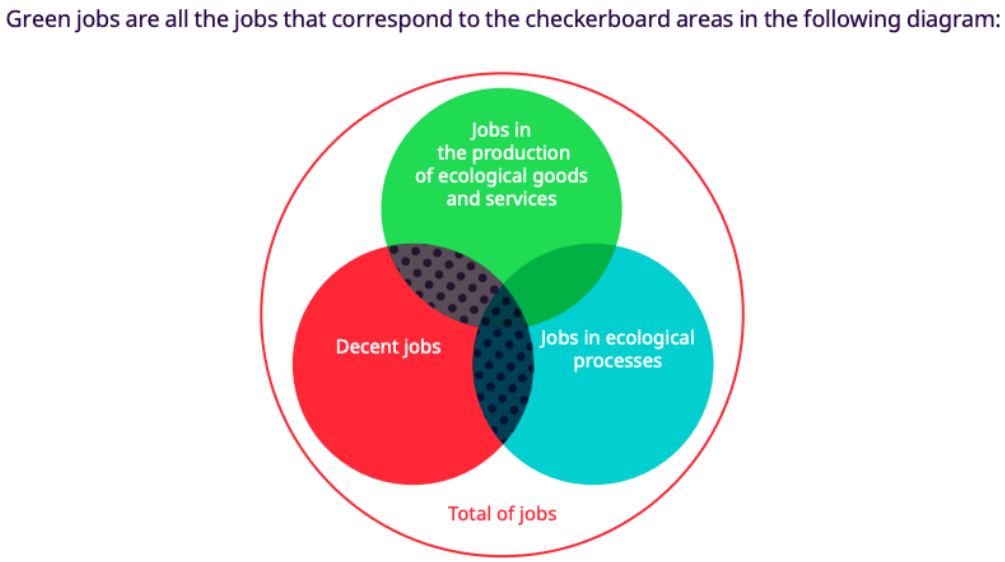
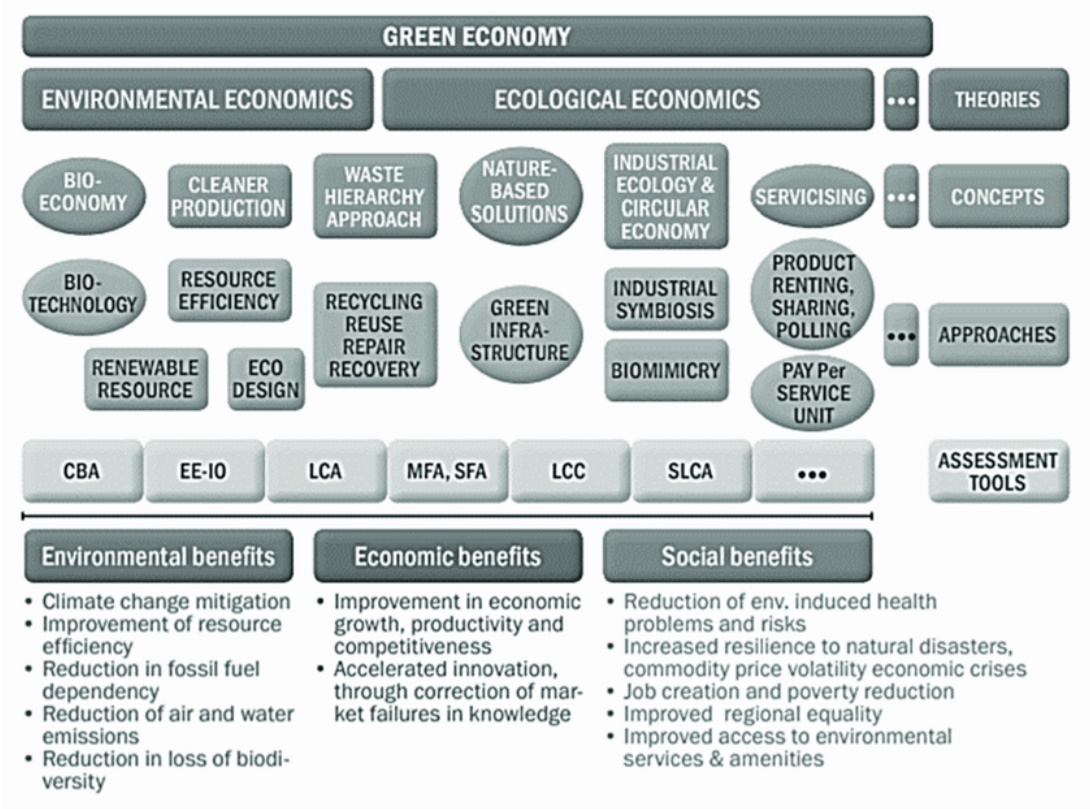



**Figure 2. 2 :** Green jobs (ILO, 2022).

Thus, the shift towards a green economy necessitates a complex set of enabling measures, including supportive institutions and foundational policies. Lastly, it should be noted that the implementation and evaluation of these policies take precedence, highlighting the importance of assessing their effectiveness in real-world scenarios. A well-developed institutional communication is imperative for the successful implementation of policies, ensuring effective dissemination of information and fostering collaboration among stakeholders.

## 2.5 Benefits from green economy

The benefits of a green economy, as reviewed in the literature, include environmental, economic, and social dimensions. Systematizing and understanding the intricate relationships within this framework is important, yet the existing literature underscores the complexity and the need for a more fully developed methodological model. The PEER Report, represented in Figure 2.3, offers a comprehensive illustration of the organization and relationships among theory, concepts, policies, and tools. According to Saikku et al. (2015), authors of the PEER Report, the concept of a green economy can take on various meanings and is interconnected with diverse economic theories, concepts, practical approaches, and assessment tools. Notably, it is associated with both environmental economics and ecological economics, each yielding distinct practical outcomes. Environmental economics aligns closely with cleaner production and resource efficiency, while ecological economics integrates concepts such as circular economy. The implementation of the waste hierarchy can be linked to both theories, contingent on the degree of adoption (downcycling versus upcycling). These concepts are grounded in practical approaches aimed at achieving environmental, economic, and social benefits. Furthermore, the assessment of the effectiveness of these solutions involves the use of various tools, such as lifecycle assessment.




CBA (Cost-Benefit Analysis); LCA (Life-cycle assessment); MFA (Material flow analysis); LCC (Life-cycle costing); SLCA (Social life-cycle assessment).

**Figure 2. 3 :** Conceptual framework for implementing a green economy in practice (current concepts are marked with boxes, while emerging concepts are in circles) (Saikku et al. 2015)).

Research on benefits of green economy conducted by GIZ (2015), similarly, categorized those benefits into three main groups as depicted in Table 2.3.

**Table 2. 3 :** Benefits of Green Economy transformation (GIZ, 2015).

| Economic benefits | Social benefits | Environmental benefits |
|---|---|---|
| Reduced poverty and inequality* | Reduced poverty and reduced social inequality* | Sustainable management of natural assets and resources |
| Increased economic growth and employment* | Increased employment* | Reduced greenhouse gas and other emissions |
| Improved training and skills* | Improved training and skills* | Better adaptation to climate change and resilience to natural disasters |
| Development of new markets and specialization | Better public services | Improved environmental quality |
| Increased productivity, and increased commodity and agricultural yields | Improved health outcomes | |
| Improved energy security | | |
| Improved competitiveness and trade balances | | |

*Economic and social benefits that are marked with an asterisk are duplicated in this table because they can apply equally to both categories.

Thus, the benefits of a green economy are extensive and impactful. Initially, it provides environmental benefits by addressing climate change, preserving ecosystems, and protecting biodiversity. Through a shift away from fossil fuels to renewable energy sources, carbon emissions are cut and ecological harm reduced, ensuring a healthier planet for generations to come. On the economic benefits side, the transition to a green economy stimulates innovation (Choi and Han, 2018) and nurtures sustainable technologies and practices, generating new job opportunities (Ali et al, 2021). Sectors like renewable energy, eco-friendly construction, and waste management contribute to job creation, and economic expansion. Furthermore, embracing a green economy encourages resource efficiency and cost-effectiveness for businesses. Implementation of energy-efficient technologies, adoption of sustainable supply chain practices, and optimization of resource use result in reduced operational costs (Feng et al, 2022). Companies can achieve significant cost savings by minimizing waste, optimizing energy consumption, and embracing circular economy principles, enhancing their competitiveness (Stahel et al, 2013; Kvon, 2019). Although the benefits of a green economy have been demonstrated, ongoing research and long-term studies will continue to reveal and confirm these benefits over time.

## 2.6 Interplay of green economy with international initivatives

Several key international initiatives are anticipated to impact or be affected by Uzbekistan's transition to a green economy. The most critical among these are global commitments such as the Paris Agreement and the SDGs, alongside initiatives such as the European Green Deal and the Belt and Road initiatives. Background information on these initiatives is provided before delving into the analysis of their impact on Uzbekistan, which will be provided in later sections.

The *Paris Agreement,* established during the UN Climate Change Conference (COP21) in December 2015, is a legally binding treaty focused on combatting climate change. Its primary objective is to restrict the global temperature rise to below 2°C compared to pre-industrial levels, with a special emphasis on striving to keep it below 1.5°C. It operates on a five-year cycle where countries submit their national climate action plans, called Nationally Determined Contributions (NDCs), with each iteration expected to be more ambitious than the last. This necessitates significant economic and social transformations guided by scientific evidence (UNFCCC, n.d.-a).

The *2030 Agenda for Sustainable Development*, adopted by every United Nations Member State in 2015, serves as a collective framework for fostering peace, prosperity, and sustainability worldwide. Central to this agenda are the 17 Sustainable Development Goals (SDGs), which represent an urgent call to action for all countries, regardless of their level of development, to participate in collaborative global efforts. These goals highlight the intersection of ending poverty and combating other forms of deprivation, along with initiatives that improve health and education, reduce inequality, promote economic progress, and combat climate change while protecting our oceans and forests.

Many organizations and researchers mentioned that green transition, and its aspects individually, is important to achieving the targets of Paris Agreement (Liu et al, 2023, UNEP, n.d-a) and SDGs (Voumik et al, 2014; Khoshnava et al, 2019; Houssam et al, 2023, UNEP, n.d-b). According to GGGI (2019), there is an urgent need for a more rapid shift towards a green and circular economy to ensure sustainable growth and achieve target of the Paris Agreement. Additionally, it states that the implementation

of economy-wide green economy strategies serves as a robust foundation for adopting more ambitious NDCs.

Similarly, UNDP (2022), *How Just Transition Can Help Deliver the Paris Agreement* report states that a green transition is key to achieving targets set by the Paris Agreement and SDGs. "Just transition" is a relevant concept to green economy about "greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind".

There are five ways just transition is believed to help achieve the Paris Agreement:

- Brings the public along - investing in green business and jobs;
- Supports a green jobs revolution - jobs are decent – with guaranteed living wages, proper workplace safety protections, and health benefits – and that they contribute to poverty eradication and social inclusion;
- Lays the groundwork for a resilient net-zero economy - transparent planning processes with the active participation of a broad range of stakeholders can help minimize fear opposition, and inter-community and generational conflict;
- Drives contextualized local solutions - develop a local vision for just transition;
- Reinforces the urgency for concerted efforts - leaders need to stay focused on whole-of-economy NDCs and Long Term Strategies (LTS) that incorporate whole-of-society approaches (UNDP, 2022).

The global climate goals set out in the Paris Agreement depend on a green transition to a net-zero emissions future. However, unless effectively addressed, the necessary socio-economic transformations could lead to greater social inequality, exclusion, civil unrest and hampering the competitiveness of businesses, sectors and markets. Recognizing these risks, many countries are actively addressing them by incorporating a fair and equitable transition into their short- and long-term climate plans, processes and practices. The transition to a green and circular economy is important and requires a significant reorientation of public policy, public finance and private investment in both developed and developing countries (GEC, 2016).

Many of SDGs are directly linked to principles of green economy, among which there are affordable and clean energy (SDG 7) and responsible consumption and production (SDG 12). The green economy actively contributes to eradicating poverty, fighting inequality, and addressing climate change, which align with SDGs. By directing investments into sectors like renewable energy and sustainable agriculture, green economy acts as a catalyst for economic growth, job creation, and the holistic achievement of SDGs. In this symbiotic relationship, the green economy and SDGs mutually reinforce each other, paving the way for a sustainable and inclusive global future (SDG, n.p; Khoshnava, 2019).

In response to the heightened priority placed on climate policy since its inception in December 2019, the European Commission, under the leadership of Ursula von der Leyen, introduced the *European Green Deal* (EGD) in December of the same year. Growing concern about climate change in Europe has led to support for green parties and movements such as Fridays for Future or Youth Strike for Climate (Deisenrieder et al., 2020; Boulianne et al, 2020), as well as influence on elections. At the core of the EGD is the objective of achieving a minimum 55% reduction in emissions by 2030, serving as a stepping stone toward attaining climate neutrality by 2050 compared to 1990 levels (European Union, n.d; European Union, n.d-a).

EGD was established in alignment with the Paris Agreement and the SDGs framework (Koundouri et al, 2021). It outlines the areas and sectors where the goal of achieving climate neutrality by 2050 should be pursued. The EGD provides the blueprint for actions to be undertaken by governments and carried out by businesses, individuals, and organizations within EU. It includes a roadmap for various actions related to climate, energy, circular economy, transport, biodiversity, sustainable finance, agriculture, and the integration of sustainability across all EU policies. Some specific initiatives within this deal are the European Climate Law, the introduction of a carbon border tax, the buildings Renovation Wave, the 'Farm to Fork' strategy, the biodiversity strategy, the forest strategy, the Just Transition Mechanism, and the European Climate Pact. The EU Climate Law, adopted on June 24, 2021, legally binds EU member states to a target of a 55% emissions reduction by 2030 and climate neutrality by 2050. However, the main ambitions of the EGD should not be seen solely through an ecological lens, despite the high visibility of the EU's climate neutrality target. It is perceived as both a new approach to growth and an economic model under the

framework of green growth (Ataseven, 2023). EGD also addresses economic, employment, healthcare, food, innovation, and social justice aspects (Aşıcı, 2021).

EGD, while primarily targeting the European Union (EU), has implications that extend beyond EU borders, impacting non-EU countries. This influence is attributed, in part, to the incorporation of circular economy and decarbonization principles within the framework of the green economy. These principles encompass minimizing material and energy inputs during production, promoting recycling and reuse practices, establishing environmentally sustainable supply chains, and advocating for shared ownership (D'amato & Korhonen, 2021). Finally, by adopting carbon pricing and carbon taxes as part of green economy initiatives, a country can align itself with the EU's environmental standards. This alignment is crucial to avoid potential trade risks associated with the EU's implementation of cross-border carbon adjustments under the EGD (Almeida et al., 2023).

Another important inititive that impact green transition of partner countries, including Uzbekistan is the *Belt and Road (BRI) initiative*. The BRI initiative is based on the concept of the Great Silk Road - a historical symbol that was “the road along which in antiquity and the Middle Ages there was trade between China, the Eurasian steppes, Central Asia, India, the Near East and Europe: Byzantium, Venice, etc" (Kuzmina, 2010). BRI is a strategic initiative launched by China, aiming to establish land and maritime networks connecting Asia, Africa, and Europe. This initiative stands out as one of the most extensive infrastructure projects ever undertaken by a single nation.

In 2023, it marked a decade since Chinese President Xi Jinping introduced the Belt and Road Initiative in Astana, Kazakhstan's capital, in September 2013. The BRI comprises two main components: the Silk Road Economic Belt and the 21st Century Maritime Silk Road (Figure 2.4). The Economic Belt focuses on developing and extending land routes to facilitate the movement of people and goods across Europe, the Middle East, Central Asia, and Asia. Conversely, the Maritime Road involves the expansion of sea routes across East Asia, South Asia, the Middle East, and Africa.

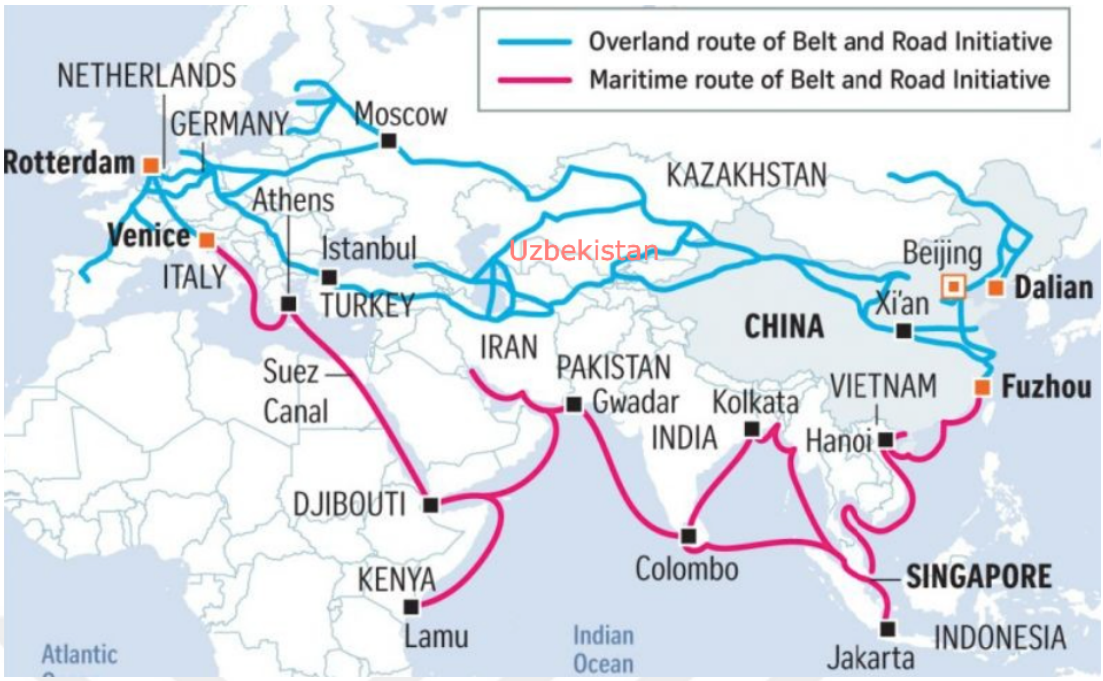



**Figure 2. 4 :** BRI's demonstrative map (Asian Green, 2023)

The initiative outlines five key priorities:

- policy coordination;
- infrastructure connectivity;
- unimpeded trade;
- financial integration;
- and connecting people (EBRD, n.d).

BRI projects and investments have been executed in numerous countries spanning Asia, Africa, Europe, and even South America. By 2023, there have been over 200 cooperation agreements signed under the BRI, involving more than 150 countries and 30 international organizations (XINHUANET, 2023). The projects encompass the construction or enhancement of roads, ports, railways, pipelines, and other infrastructure vital for trade. Additionally, initiative aimed at improving internet connectivity and advancing digital technologies have been pursued.

In response to criticism over BRI's environmental concerns, efforts have been made to promote sustainability. The Green Investment Principles (GIP), introduced in 2018 with input from international organizations, aim to ensure BRI projects prioritize sustainability by requiring assessments and disclosure of climate risks, setting green investment targets, and committing to reducing carbon-intensive investments.

Moreover, the World Economic Forum's 2022 report emphasizes the importance of creating a more sustainable BRI by leveraging finance and technology (WEF, 2023). It highlights the need for financial institutions to decrease investments in carbon-intensive sectors and increase the utilization of sustainable finance mechanisms, while also acknowledging China's potential to provide low-carbon technologies to emerging and developing economies through the BRI.

The impact of the BRI on the transition of participating countries to a green economy depends on various factors, including the specifics of projects and implementation practices. BRI can support the green transition of member countries by promoting investment in renewable energy, technology transfer and sustainable infrastructure, thereby promoting economic growth and employment. However, some BRI projects may worsen environmental degradation, increase carbon emissions and contribute to debt dependency, potentially hampering efforts to achieve sustainability and inclusive development. This thesis reviews the BRI's impact on Uzbekistan's green economic development within its analysis and results chapters.

### 2.7 Existing Research

Raxmanova (2022) agrees that Uzbekistan's vast potential for solar and wind energy, along with the use of biomass, supports its transition to a green economy. The author agrees that this shift is crucial due to depleting natural resources, with initiatives like solar power plants and electric vehicle production fostering sustainable growth and job creation. Pulatovich and Sabitxanova (2022) agree that current green growth driven by digitization and decarbonization will transform key sectors like energy and transport, ensuring over 50% renewable energy use and widespread carbon-neutral technologies to combat climate change and foster sustainable living. Butaboev and Akhunova (2023) highlight that Uzbekistan's energy sector requires significant upgrades to meet the increasing demand, with substantial losses in the current system. They assert that investments in renewable energy, enhanced energy efficiency, and green economic reforms are crucial for sustainable development, emphasizing the need for a favorable investment climate and strategic support from the state. Khamdamov et al. (2024) argue that Uzbekistan can achieve sustainable development by adopting a green

economy model, which would enhance resource efficiency, reduce fossil fuel dependency, and improve environmental quality. Additionally, authors agree that promoting public awareness and developing green infrastructure and jobs in environmental sectors can further boost the economy while preserving natural resources. Khusainov (2024) emphasizes that successful implementation of green practices in Uzbekistan requires coordinated efforts from the government, businesses, and society, involving strategies like developing coordinated plans, fostering innovation, and raising public awareness. He believes that supporting socially and environmentally responsible business initiatives, ensuring public participation in decision-making, and enhancing international cooperation are crucial steps towards achieving sustainable development and environmental safety. Davlatova (2024) identifies that Uzbekistan's transition to a green economy involves addressing significant challenges like resource efficiency, environmental protection, and ensuring a healthy lifestyle, which require coordinated efforts from the state, businesses, and society. The author suggests solutions such as developing alternative energy sources, modernizing technologies, establishing ecological advisory centers, and fostering public support and awareness to achieve sustainable development and environmental preservation. Sharapova (2024) emphasizes the significance of foreign experiences in guiding Uzbekistan's transition to a green economy. Drawing from examples like Bhutan's Gross National Happiness strategy and Germany's renewable energy policies, Uzbekistan can strategically improve Green Economy Strategy and promote sustainable practices in energy, transport, and circular economy initiatives to foster sustainable and low-carbon economic growth. Akhunova (2024) emphasizes the importance of modernizing production technologies and enhancing legal frameworks to support renewable energy adoption for sustainable economic growth in Uzbekistan. Yavmutov et al. (2024) highlights Uzbekistan's establishment of a robust legal framework, encompassing national and international laws and policies, alongside various sustainable development projects.

To conclude this section, the Green Strategy of Uzbekistan, adopted in 2019, is still in its nascent stages, and research on this topic is emerging with limited depth and breadth. The authors highlighted here are among the most relevant voices addressing various aspects of Uzbekistan's green economy transition. However, the overall quality of research in this area remains developing, often focusing on specific sectors without

comprehensive sectoral policy reviews or comparisons with international sustainability goals like the SDGs or commitments under the Paris Agreement. Furthermore, there is a notable absence of analyses linking Uzbekistan's initiatives to broader international frameworks such as the European Green Deal (EGD) or the Belt and Road Initiative (BRI) partnerships.

The current thesis work aims to fill this gap by offering a thorough analysis of Uzbekistan's green economy transition. It will provide comprehensive sectoral policy reviews and evaluate the country's progress within the context of international sustainability goals, such as the SDGs and the Paris Agreement commitments. Additionally, this research will explore the connections between Uzbekistan's green economy strategy and policies and broader international frameworks, such as the EGD and the BRI. By doing so, it aims to provide more holistic understanding of Uzbekistan's efforts towards green economy and their alignment with global sustainability objectives.

# 3. METHODOLOGY

## 3.1 Data Analysis

This work uses SWOT situational analysis to assess the strengths, weaknesses, opportunities and threats of Uzbekistan's development towards green economy. SWOT analysis can be broadly divided into two components: internal factors, encompassing strengths and weaknesses influenced by the internal environment, and external factors, which include opportunities and threats shaped by the external environment.

SWOT analysis was developed in the 1960s as part of the System of Plans framework by Stewart et al (1965) (Puyt, 2020; Puyt 2023). The approach aimed to facilitate strategic planning in identifying and addressing concrete issues within an organization, fostering a participatory, co-creative strategy-making process. SWOT analysis continues to be widely used in both public and private organizations across various sectors for strategic management. Its enduring relevance and popularity suggest it will likely maintain its position as a primary source of information for strategic planning in the future (Benzaghta et al, 2021). Numerous examples demonstrate the application of SWOT analysis in the field of environmental and sustainable development (Nikolaou et al, 2010; Bull et al, 2016; Jatmiko et al, 2021; Bonfante et al, 2021), circular economy (Poes et al, 2019; Stylianou et al, 2024), decarbonization (Gu et al, 2023) and green economy (Ali et al, 2021; Yang ett al, 2022; Chan, 2024).

SWOT analysis is employed for this study due to its compactness and its ability to comprehensively capture both internal and external factors with the use of wide range of qualitative data. This method enables a holistic understanding of the present situation and assists in formulating recommendations. Due to the scarcity of scholarly articles, the systematic approach to identifying specific components of the SWOT analysis primarily involved a review of high-quality publications from international organizations and government reports. Factors were selected based on their frequent

mention in these reviewed documents from the period 2019-2024, considering Green Strategy adaptation happened in 2019. Publications by organizations such as the World Bank, UN, OECD, and similar entities were considered high-quality, as most of them were developed with the participation or validation of key public institutions in Uzbekistan responsible for the green economy development. Additionally, this approach included validation through reputable news articles available on the web. If a factor was frequently cited and endorsed by these reliable sources, it was included in the analysis. The SWOT analysis also included factors identified as a result of analysis of international commitments, initiatives, country-wide strategies/documents, and sectoral policy analysis. The analysis involved a thorough review of policies, articles, high-quality publications, and other relevant documents. This comprehensive approach ensured that the SWOT analysis was well-rounded and reflective of reliable sources.

To analyze quantitative data, the author chose descriptive analysis to summarize and describe the main features of the datasets. This was accomplished using software programs such as MS Excel, Google Sheets, and other visualization tools.

### 3.2 Data Collection

This study uses both qualitative and quantitative data. Data has been collected through comprehensive desk review of the relevant literature which included:

- scientific articles and conference proceedings;
- reports by state and international organizations (World Bank, UN, OECD etc) on Uzbekistan's green economy, decarbonization, climate change related topics;
- country-wide and sectoral strategic documents/policies;
- news articles from web pages, and official websites of state/international organizations.

Qualitative data was obtained through keyword searches to ensure relevance with the research topic, preference was given to sources published within the last decade. Following a thorough review of selected articles, irrelevant ones were excluded from consideration. Quantitative data collection followed a similar approach, prioritizing the use of the most recent data and considering the credibility of the data source. Most

of the quantitative data was sourced from publicly available databases of UzStat and Eurostat organizations. GHG inventory data for the country was extracted from the most recent NDC and draft of National Inventory reports published by GoU. Finally, quantitative data was aquired from SDG Index website for further compilation and analysis.

### 3.3 Limitation and Future Considerations

The primary limitations of this research are associated with the reliance on secondary qualitative data sources. Firstly, the scarcity of scholarly articles on the topic within Uzbekistan context constrained the breadth of the literature review, potentially biasing the analysis towards a limited set of perspectives from international organizations and government reports. The reliance on these sources, while providing authoritative insights, may have overlooked alternative viewpoints for a holistic understanding. Moreover, while efforts were made to prioritize recent data from 2019 to 2024, it is important to note that a five-year timeframe may not capture all relevant developments, especially considering Uzbekistan's Green Strategy extends until 2030, with many of its objectives and deadlines yet to be fully realized. This could potentially limit the depth of analysis for certain components of the SWOT assessment, as early conclusions may not fully reflect the trajectory or impact of ongoing initiatives within the strategy's longer-term framework.

Another critical consideration is the scarcity of quantitative data, particularly concerning CO2 emissions, green investments volumes, waste generation across different industries within Uzbekistan. Detailed quantitative metrics for these environmental factors are essential for accurately assessing the vulnerability of various industries to sustainable initiatives (CEAP and CBAM, specifically under this research). Moreover, the absence of consistent data on green investments constrains the ability to evaluate the impact of green policies in depth. This lack of data makes it difficult to accurately measure how specific green policies influence, for example, GDP growth, employment rates, and GHG reductions.

These limitations highlight the need for future research to incorporate more diverse data sources and consider validation through stakeholder meetings or semi-structured interviews. Such approaches could provide deeper insights into stakeholder

perspectives and practical challenges, thereby enhancing the reliability and applicability of future studies in this field.

# 4. ANALYSIS AND RESULTS

## 4.1 International Commmitments

In 2015, Uzbekistan became a signatory of the United Nations General Assembly resolution on Sustainable Development Goals and has since then made efforts to align its national policies with the Global Agenda 2030. Later, the GoU signed the Paris Agreement (UNFCC, n.d) in 2017 and ratified in 2018. In 2017, the country submitted its NDC1 (NDC1, 2017), aiming for a 10% reduction in GHGs per unit of GDP by 2030 from 2010 levels. By updating NDC in 2021, Uzbekistan significantly increased its ambition, targeting a 35% reduction in GHGs per unit of GDP by 2030 from 2010 levels (NDC2, 2021). With rapid GDP growth projected, Uzbekistan has the scope to further increase the ambition of its commitment. A Long Term Decarbonization Strategy (LTS) currently under preparation is expected to provide the basis for updating the NDCs and potentially lead to more ambitious targets. In 2022, Uzbekistan also became a member of the Global Methane Pledge and committed to reducing methane emissions by 30% by 2030 (Usov, 2022). The Table 4.1 below provides a summary of the analysis in this section.

**Table 4. 1 :** Summary of global environmental initiatives significant for Uzbekistan

| Document | Implementation | Current achievments |
|---|---|---|
| SDGs | 2015: Uzbekistan became a signatory of SDGs<br>2017: approved National Action Strategy 2017-2021 covered SDG areas<br>2018: presented National SDGs until 2030<br>2019: Voluntary National Review was introduced<br>2022: approved New Uzbekistan Strategy 2022-2026 covers SDG areas<br>2022: presented Revised National SDGs until 2030<br>2022: GoU established coordination council to oversee National SDGs<br>2023: approved Uzbekistan-2030 Strategy covers SDG areas | Ranking by SDG Index Score (2023): 69 out of 166 countries<br>Alignment between national strategic plans and the global SDGs : 79%<br>Alignment between domestic development documents and the global SDGs : 48.8% |
| Paris Agreement | 2017: GoU signed PA<br>2017: submitteed INDC (NDC1)<br>2018: PA was ratified by Law No.491 dated 2.10.2018<br>2021: submitted NDC2 | Climate change: Off track, slight drop of GHG emissions per unit of GDP between 2010 (3.58 kt $CO_2e$) and 2020 (3.07 kt $CO_2e$) (OECD, 2023-a) |
| EGD | Not implemented in non-EU countries, but has identified impacts | Circular economy : At nascent stages<br>Carbon pricing : not implemented |
| Belt and Road initiative | Uzbekistan is a participating country of BRI | Substantial investments in renewable energy supply chain |

### 4.1.1 Implementation of SDGs

GoU has strategically demonstrated its commitment to SDGs through a series of significant actions. In 2018, the Cabinet of Ministers passed resolution no. 841 "On measures to implement National goals and tasks for sustainable development until 2030" dated 23.10.2018, establishing National SDGs and adopting a comprehensive "whole-of-government" approach for systematic achievement. Subsequently, from 2019 to 2020, various government ministries and agencies initiated Voluntary National Reviews (VNR) to assess progress, with oversight from the Ministry of Economy and Finance (former Ministry of Economic Development and Poverty Reduction). In 2022, a revised set of National SDGs (excluding Goal 14 – Life Below Water) was adopted through Cabinet of Ministers resolution No. 83 “On additional measures to accelerate the implementation of National Goals and Objectives in the field of sustainable development for the period up to 2030” dated 21.02.2022, introducing a monitoring system encompassing 190 indicators, 128 of which are published on the UzStat agency portal. This resolution also led to the creation of a dedicated coordination council, including the Parliamentary Commission, to oversee the systematic realization of

national Goals and objectives in sustainable development until 2030. Furthermore, at the session of the UN General Assembly on December 14, 2022, the resolution "On strengthening the role of parliaments in accelerating the achievement of sustainable development goals" developed based on the president's initiative. On December 29 of the same year, the joint decision of the councils of the chambers of the Oliy Majlis on the implementation of this resolution was adopted.

Uzbekistan has introduced a series of documents since 2015, holding strategic significance for the country's mid-to-long-term development planning. These encompass national comprehensive development programs, sector-specific development strategies, concept notes, and National SDGs. Dominating framework development agendas such as the National Action Strategy for 2017-2021, New Uzbekistan 2022-2026 strategy, Uzbekistan-2030 strategy have become significant for implementation of SDGs.

The positive trajectory in SDG achievements over the past few years sets a promising foundation for Uzbekistan's sustainable development efforts. However, it is important to note that there are still gaps in the alignment of national documents with the SDGs. According to UNDP's review (2022-a), the alignment between Uzbekistan's national strategic development plans and the global SDGs stood at 79%. However, when examining the alignment of the national SDGs and associated objectives with other regional (sub-national, specific to one region) development documents, the report concludes that the level of coherence drops significantly to 48.8%. In essence, only 62 out of the total 127 goals are mirrored in various national strategic documents, indicating that a substantial portion of SDGs and their objectives are exclusively reflected in the national SDG program and not integrated into other key national strategic documents. By observing regional development strategies, it becomes clear that most of them are poorly connected to national level document, mostly they are short-term and focus on economic and social development (job creation, urbanization, improving exports etc.) or sectoral development (improvement of tourism of a particular region). Key areas of focus within the SDG agenda are often neglected, leading to an imbalanced emphasis on specific sectors.
Some of the examples of such documents (usually in the form of Decisions of the Cabinet of Ministers) are:

- "On measures for rapid development of tourism of Samarkand city and Samarkand region in 2017-2019";
  "Regarding additional measures for the complex socio-economic development and further improvement of the living standard of the population in 2022 — 2026 in Khorezm region".

The review also suggests that Goals 1 (Poverty), Goal 2 (Hunger), Goal 3 (Health), and Goal 5 (Gender) demonstrate complete adherence, encompassing all global targets within the country's assessed policy planning (Figure 4.1). Conversely, Goal 10 (Inequalities between and within countries) exhibits the least integration at 50%, followed by Goal 13 (Climate change) at 60% and Goal 17 (Partnerships) at 68%. The limited coverage of SDG 10 is attributed to certain targets within this goal being overseen and regulated by the international community, such targets include: 10.5 (Monitoring global financial markets), 10.6 (Developing countries representation and voice), 10.a (Special and differential treatment for developing countries), and 10.c (Remittances transaction cost). Goal 17 (Partnerships) faces challenges in aligning with critical targets like 17.7 (Diffusion of environmentally sound technologies) and 17.9 (Capacity building for Sustainable Development). Goal 14 (Oceans) shows no alignment in reviewed documents, mainly due to Uzbekistan's status as a double-land-locked country, denying access to the world seas.

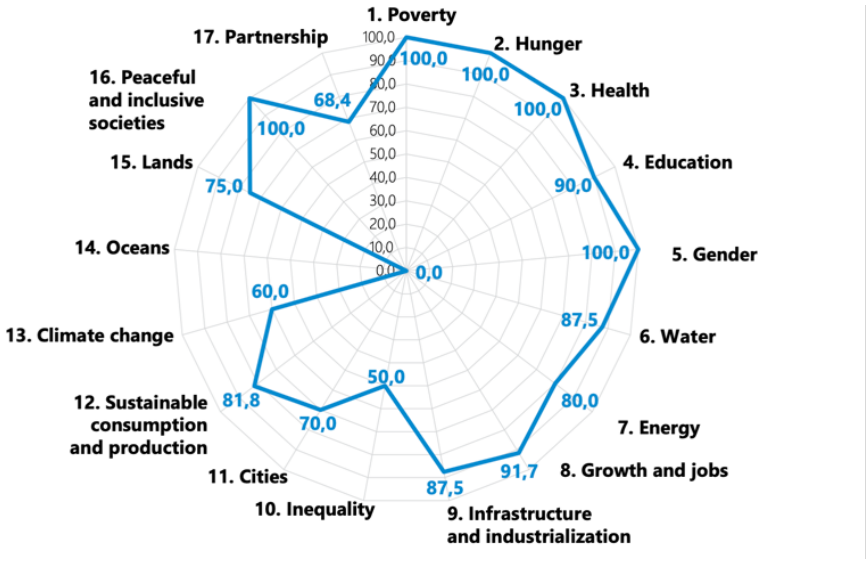



**Figure 4. 1 :** Alignment of Uzbekistan's development plans with global SDGs and Agenda 2030 (UNDP, 2022-a)

In Sustainable Development Report[2] for 2023, Uzbekistan ranked 69 place among 166 countries (SDG Index, 2024). Compared to 2022, while the SDG Index Score remained relatively stable, the rating experienced an 8-point increase, surpassing countries such as Morocco, Türkiye, Malaysia, Mexico, and several others. In Central Asia, Uzbekistan ranks 3rd, after Kyrgyz Republic ( with rating 45) and Kazakhstan (with rating 66).

In late 2022, Uzbekistan showed improvements in sustainable development across 10 out of 16 goals: poverty reduction, good health and well-being, quality education, gender equality, clean water and sanitation, industry, innovation and infrastructure, sustainable cities and communities, climate action, peace, justice, and strong institutions, and partnerships for the goals. Regarding dynamics in scores, the report indicates "major challenges remain" in goals 3, 6, 7, 15 and 16 and "stagnating or increasing at less that 50% of required rate" is observed in goals 2, 7, 8, 12, and 15. Figure 4.2 compiles scores by goals for the years 2020, 2021, and 2022, while Figure 4.3 provides, for upper middle-income countries (UMIC) for the same period, for comparison. For the purpose of the analysis, we can categorize goals with scores lower than Uzbekistan's overall score of 69 as challenges. These include goals 1, 2, 6, 7, 9, 15, 16, and 17. Among these, goals 6 (Clean water and sanitation), 7 (Affordable and clean energy), 9 (Industry, innovation, and infrastructure) and 15 (Life on land) emerge as particularly important for green economy development, as they directly impact on environment.

[2] The Sustainable Development Report (formerly the SDG Index & Dashboards) is a global assessment of countries' progress towards achieving the Sustainable Development Goals. It is a complement to the official SDG indicators and the voluntary national reviews.

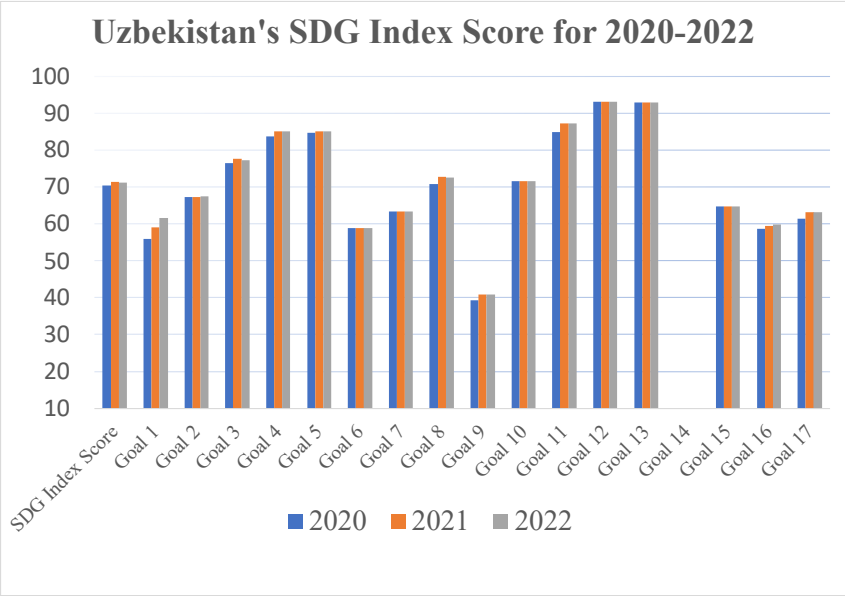



**Figure 4. 2 :** Uzbekistan's SDG index score for 2020-2022

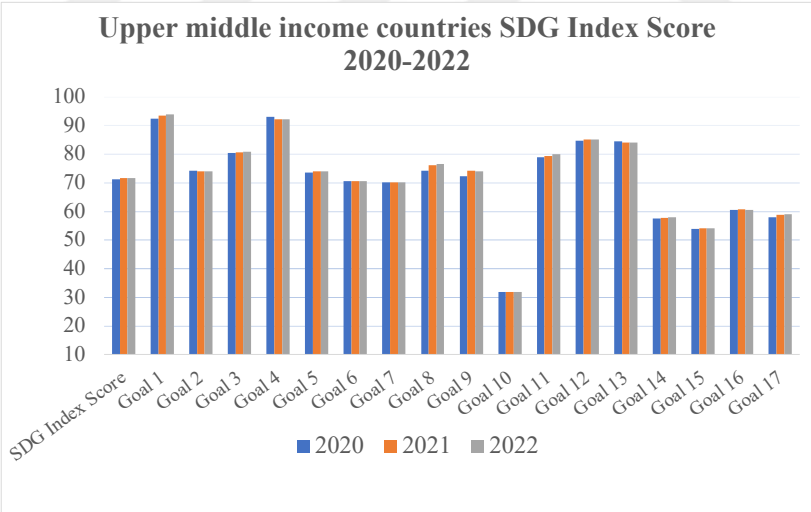



**Figure 4. 3 :** Upper middle income countries SDG Index Score 2020-2022

In conclusion, the assessment of SDG performance following Uzbekistan's adoption of the Green Strategy reveals both progress and areas needing improvement.

Over the period from 2019 to 2024, Uzbekistan's SDG index score has shown a modest increase, rising from 69 to 71.2, rising from 77th rank to 69th among other countries.

This could potentially demonstrate the initial impact of the Green Strategy on national sustainability efforts. While improvements have been noted across all 10 SDGs assessed, it is clear that sectors such as industry, innovation, and infrastructure (Goal 9) still require further enhancement. Similarly, efforts towards establishing strong institutions (Goal 16) also need additional focus to achieve significant progress. Despite these challenges, Uzbekistan's commitment to the Green Economy and sustainable development is evident. The positive strides made across various SDGs underscore the country's determination to align its national development agenda with global sustainability objectives. Moving forward, sustained efforts in prioritized areas, alongside continued monitoring and adaptation of strategies, will be crucial for realizing lasting improvements and ensuring Uzbekistan's continued advancement towards a sustainable future

While Uzbekistan managed to achieve an overall score close to that of UMIC, highlighting the country's remarkable achievements in various aspects; when comparing individual goals to those of UMIC's, it can be seen that the country has room for improvements in goals 1, 6, 7, 9 and it is assumed achievable for Uzbekistan.

### 4.1.2 Implementation of Paris Agreement

Uzbekistan's NDC2 goal has been significantly intensified compared to the earlier NDC1 objective, exceeding it by more than threefold. This new goal has been set based on the most recent greenhouse gas inventory data and is designed not to hinder the country's socio-economic progress.

According to draft report by Uzhydromet[3], as of 2021, Uzbekistan emitted 201 million tonnes of CO2 eq. (including FOLU). According to estimations, it represents 0.39% of global emissions (Climate Watch, 2024). Report indicates that between 1990 and 2021, GHG emissions experienced significant changes across various sectors (Figure 4.4 and Table 4.2). There was an increase in emissions in the following sectors:

- Energy by 7.4%
- IPPU (Industrial processes and use of products) by 121.0%
- Agriculture by 172.7%

[3] Hydrometeorological Service of Uzbekistan under Ministry of Ecology, Environmental Protection and Climate Change

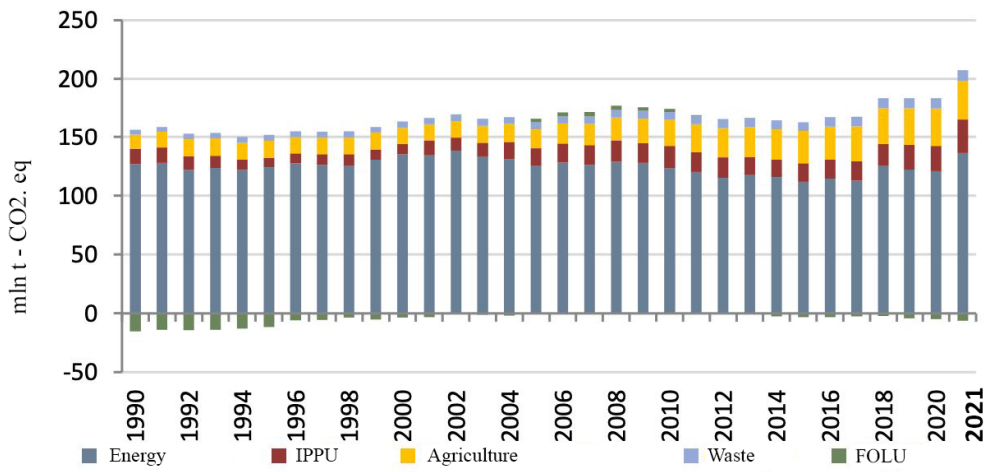
- Waste +107.1%

Additionally, the CO2 absorption capacity in the FOLU sector significantly declined. This decrease, amounting to 58.7%, was primarily due to increased emissions from the "Pastureland" category. Additionally, this decline in CO2 absorption highlights the compounding effect of changes in land use and management on overall GHG emissions.

For the period 2010-2021 (relative to the base year according to Paris Agreement), GHG emissions by inventory sector changed as follows:

- Energy - increased by 10.5%
- IPPU - increased by 54.1%
- Agriculture - increased by 43.3%
- Waste - increased by 34.2%

It is important to note that the data shows a significant increase in emissions across all sectors following 2019, the year when Uzbekistan initially adopted its Green Strategy. This trend suggests that despite the introduction of the Green Strategy aimed at reducing environmental impact and promoting sustainability, emissions have continued to increase.




IPPU – The Industrial Processes and Product Use
FOLU - Food and Land Use

**Figure 4. 4 :** Dynamics of greenhouse gas emissions for 1990-2021 by sectors (Uzhydromet, 2023).

**Table 4. 2 :** Greenhouse gas emissions by sector, million tons of CO2-eq. (Uzhydromet, 2023).

| Year | Energy | IPPU | Agriculture | Waste | Total | FOLU | Total (-FOLU) |
|---|---|---|---|---|---|---|---|
| **1990** | 126,97 | 13,22 | 12,09 | 4,42 | **156,7** | -15,38 | **141,32** |
| **1991** | 127,97 | 12,96 | 13,59 | 4,54 | **159,05** | -13,95 | **145,1** |
| **1992** | 121,81 | 11,92 | 14,43 | 4,66 | **152,82** | -14,3 | **138,53** |
| **1993** | 123,48 | 10,59 | 14,64 | 4,79 | **153,5** | -13,97 | **139,53** |
| **1994** | 121,84 | 8,68 | 14,73 | 4,89 | **150,14** | -13,07 | **137,07** |
| **1995** | 124,32 | 7,94 | 14,41 | 5 | **151,67** | -11,69 | **139,98** |
| **1996** | 127,68 | 8,31 | 13,74 | 5,11 | **154,84** | -5,96 | **148,88** |
| **1997** | 126,25 | 8,98 | 14,25 | 5,19 | **154,67** | -5,64 | **149,02** |
| **1998** | 125,28 | 10,05 | 14,28 | 5,29 | **154,89** | -3,42 | **15147** |
| **1999** | 130,59 | 8,87 | 14,42 | 5,39 | **159,27** | -5,22 | **154,05** |
| **2000** | 135,27 | 8,87 | 14,48 | 5,43 | **164,05** | -3,66 | **160,39** |
| **2001** | 134,32 | 12,83 | 14,37 | 5,54 | **167,06** | -3,11 | **163,95** |
| **2002** | 138,52 | 10,95 | 14,6 | 5,7 | **169,77** | 0,08 | **169,85** |
| **2003** | 132,91 | 12,1 | 15,33 | 5,81 | **166,15** | -1,38 | **164,77** |
| **2004** | 131,11 | 14,62 | 16,05 | 5,91 | **167,69** | -1,83 | **165,86** |
| **2005** | 125,36 | 15 | 16,91 | 6,01 | **163,28** | 2,95 | **166,23** |
| **2006** | 128,47 | 15,98 | 17,74 | 6,13 | **168,32** | 3,26 | **171,58** |
| **2007** | 126,19 | 17,02 | 18,78 | 6,26 | **168,25** | 3,56 | **171,81** |
| **2008** | 128,87 | 18,09 | 20,19 | 6,41 | **173,57** | 3,76 | **177,33** |
| **2009** | 128,05 | 16,76 | 21,57 | 6,59 | **172,97** | 3,18 | **176,16** |
| **2010** | 123,32 | 18,95 | 23,01 | 6,82 | **172,11** | 2,44 | **174,55** |
| **2011** | 120,29 | 16,85 | 24,3 | 7,06 | **168,5** | 0,74 | **169,24** |
| **2012** | 115,26 | 17,43 | 25,63 | 7,25 | **165,56** | 0,08 | **165,64** |
| **2013** | 117,51 | 15,51 | 26,21 | 7,42 | **166,65** | 0,43 | **167,08** |
| **2014** | 115,89 | 14,66 | 26,77 | 7,62 | **164,95** | -2,73 | **162,22** |
| **2015** | 111,96 | 15,73 | 27,8 | 7,83 | **163,32** | -3,28 | **160,05** |
| **2016** | 114,69 | 16,03 | 28,98 | 8,04 | **167,73** | -3,16 | **164,58** |
| **2017** | 113,04 | 16,46 | 30,25 | 8,24 | **168** | -2,68 | **165,32** |
| **2008** | 128,87 | 18,09 | 20,19 | 6,41 | **173,57** | 3,76 | **177,33** |
| **2009** | 128,05 | 16,76 | 21,57 | 6,59 | **172,97** | 3,18 | **176,16** |
| **2010** | 123,32 | 18,95 | 23,01 | 6,82 | **172,11** | 2,44 | **174,55** |
| **2011** | 120,29 | 16,85 | 24,3 | 7,06 | **168,5** | 0,74 | **169,24** |
| **2012** | 115,26 | 17,43 | 25,63 | 7,25 | **165,56** | 0,08 | **165,64** |
| **2013** | 117,51 | 15,51 | 26,21 | 7,42 | **166,65** | 0,43 | **167,08** |
| **2014** | 115,89 | 14,66 | 26,77 | 7,62 | **164,95** | -2,73 | **162,22** |
| **2015** | 111,96 | 15,73 | 27,8 | 7,83 | **163,32** | -3,28 | **160,05** |
| **2016** | 114,69 | 16,03 | 28,98 | 8,04 | **167,73** | -3,16 | **164,58** |
| **2017** | 113,04 | 16,46 | 30,25 | 8,24 | **168** | -2,68 | **165,32** |
| **2018** | 125,33 | 18,86 | 31,18 | 8,39 | **183,76** | -2,37 | **181,39** |
| **2019** | 122,27 | 21,06 | 31,94 | 8,62 | **183,88** | -4,12 | **179,76** |
| **2020** | 120,84 | 21,56 | 32,53 | 8,86 | **183,8** | -4,89 | **178,91** |
| **2021** | 136,32 | 29,21 | 32,97 | 9,15 | **207,65** | -6,35 | **201,3** |
| **(1990-2021)** | 7,40% | 121,00% | 172,70% | 107,10% | **32,50%** | -58,70% | **42,40%** |
| **% 2021** | 65,60% | 14,10% | 15,90% | 4,40% | **100,00%** | | |
| **(2010-2021)** | 10,50% | 54,10% | 43,30% | 34,20% | **20,60%** | | **15,30%** |

However, the 2023 OECD assessment indicates that Uzbekistan is off track in achieving GHG reductions under the Paris Agreement. There was a slight decrease in

GHG emissions per unit of GDP from 3.58 kt CO2e in 2010 to 3.07 kt CO2e in 2020 (OECD, 2023-a).

Rapid population growth and the expansion of various industries, such as construction, textiles, automotive manufacturing, and agriculture, necessitate the advancement of the energy sector in Uzbekistan. Additionally, the ongoing aridification of the climate demands increased energy usage for cooling purposes. As a result, projections indicate that despite the accelerated development of renewable energy sources, GHG emissions are anticipated to experience a marginal increase up to 2030 (NDC2, 2021), with forecasts suggesting an annual growth of 2.0 in 2023, 1.6 in 2024, 1.9 in 2025 and 2.0 tones of CO2 eq. in 2026 (World Bank, 2024).

Independent organizations such as the Climate Action Tracker do not currently evaluate the fulfillment of NDC commitments of Uzbekistan. According to NDC2, monitoring will be carried out in line with developing documents, including the National Adaptation Plan and the Climate Change Strategy of the Republic of Uzbekistan, and the Biennial Transparency Report submitted to the UNFCCC.

With increased targets on NDC commitments, GoU released *A carbon-neutrality roadmap for Uzbekistan's electricity sector*, aiming for carbon neutrality by 2050 (CNES, 2021). The document outlines measures such as enhancing the efficiency of the transmission grid, establishing regulations for renewable energy, promoting carbon pricing, conducting public awareness campaigns, and strengthening environmental safeguards.

The government aims to address the issue in the energy sector, where substantial subsidies (Figure 4.5) lead to artificially low electricity and natural gas prices. This, in turn, hinders revenue generation, making it challenging to cover production and delivery costs. The current low prices discourage both households and businesses from prioritizing energy efficiency and conservation measures, impeding the sector's ability to enhance service delivery.

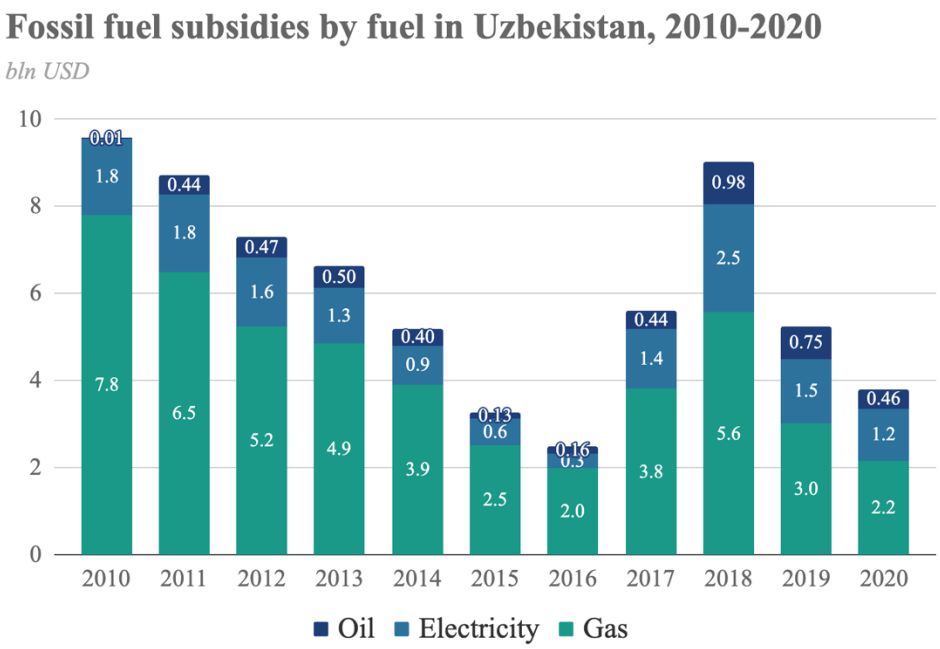



**Figure 4. 5 :** Fossil fues subsidies by fuel in Uzbekistan, 2010-2020

To change this situation, the government has initiated energy subsidy reforms, gradually aligning tariffs with actual costs.

Electricity and gas tariffs in Uzbekistan remained unchanged since August 2019, with multiple postponements of planned increases. However, from October 1, 2023, prices for these utilities rose for large enterprises, budget organizations, and other legal entities. This followed the adoption of a CoM decision "On additional measures to introduce market mechanisms in the fuel and energy sector" from **16.04.2024** aimed at introducing market mechanisms into the fuel and energy sector. The decision included approving new prices for energy resources, which will gradually change from 2024 to 2025, along with establishing basic consumption norms for electricity and natural gas for the population starting **May 1, 2024**. Economists criticized the previous price policy for widening the wealth gap, with subsidies benefiting the wealthy and causing significant losses for energy companies due to low tariffs (Gazeta.uz, 2024).

As of May 1, the social norm[4] for the consumption of energy resources is as follows:

- for electricity - up to 200 kW/h per month;
- gas (from March to October) - up to 100 cubic meters;

[4] The social norm of energy consumption is defined as energy that is purchased by the population at a preferential rate. That is, energy is sold at a relatively low (preferential) price up to a certain standard, and is sold at market prices for consumption above this standard.

- gas (from November to February, that is, during the heating season) - up to 500 cubic meters.

Moreover, in late 2023, the GoU has signed $46.25 million agreement for the iCRAFT Project, aimed at supporting the country's clean energy transition, energy efficiency, and subsidy reforms. The iCRAFT Project is a pioneering climate and carbon finance transaction in Central Asia under the Paris Agreement, aligning with international efforts to limit global temperature increases by purchasing emission reductions and promoting access to international carbon markets for Uzbekistan. According to experts, there is anticipated reduction of around 60 million metric tons of CO2 over the project's lifetime. Under the project, approximately 2-2.5 million tons of CO2 are expected to be purchased with the country selling remaining emissions reductions on international carbon markets (World Bank, 2023-a).

While these important initiatives underscore the country's strong commitment to the goals set out in the Paris Agreement, it requires time for such projects to be successfully implemented to realize the initially intended benefits. Despite ongoing efforts to attract global investment in such projects, there has been little to no progress in the implementation of carbon pricing. Although not mentioned in the Paris Agreement, it remains a critical policy instrument increasingly adopted by many countries and subnational entities to curb emissions and meet international climate commitments (Carbon Market Watch, 2017).

In conclusion, the assessment of Paris Agreement implementation and progress in Uzbekistan since the adoption of the Green Strategy highlights several key findings. Since 2019 there has been a notable increase in GHG emissions, primarily attributed to industrial processes and agriculture. Looking ahead, GHG forecasts indicate a projected annual growth ranging between 1.6 to 2 tonnes of CO2 from 2030 to 2026, underscoring the urgency of targeted interventions to curb emissions (World Bank, 2024).

To effectively align with the goals of the Paris Agreement, Uzbekistan should prioritize specific areas within its Green Economy strategy. Key focus areas include enhancing green practices in industrial processes and agriculture; improving energy efficiency within the industrial sector, with a particular emphasis on addressing emissions from cement and ammonia production, which account for 37% and 28% of

CO2 emissions in the IPPU sector, respectively (FBUR, 2021). These industries represent significant sources of GHG and require targeted efforts to adopt cleaner technologies and practices.

### 4.2 European Green Deal

EGD represents the European Union's commitment to achieve the objectives outlined in the Paris Agreement, primarily through the goal of achieving carbon neutrality for the 27-nation bloc by 2050. While the EGD primarily outlines policies for EU countries, its influence extends significantly to trade partners from non-EU countries, including Uzbekistan. The implementation of the EGD ~~will~~ pushes such nations to adapt their policies and navigate economic implications to sustain the current levels of trade. This section delves into the potential impact of EGD on Uzbekistan's green economy policies and initiatives, recognizing the EU's significant position as one of the country's key international partners.

#### 4.2.1 EGD's importance for non-EU countries

Commission President Ursula von der Leyen emphasized, "This is an important sign to Europe and to our global partners that the green transition is possible, that Europe is delivering on its promises," highlighting the significance of EGD. Hence, in light of the EU's extensive global economic influence, the policies outlined in the EGD may present both challenges and opportunities for nations worldwide with diverse partnerships and connections to the EU. The EGD presents an opportunity for other nations to join in the global effort to combat climate change and transition toward sustainability with a relatively smooth socioeconomic transition (Sandri et al, 2023; Rybski, 2022). As well as this, collaboration with third countries on a cross-border carbon adjustment mechanism, technology sharing, and the promotion of green industries will influence both the implementation of the EGD within the EU and the involvement of major polluters in the global climate agenda (Siddi, 2021). Thus, the success of countries in aligning with the demands of this deal will determine their future trade, financial outcomes, the strength and quality of their political connections with the EU (Aşıcı, 2021).

There are two main tools consisting of laws and initiatives used by EGD that would affect the trade channels of the EU: Circular Economy Action Plan (CEAP) and Carbon Border Adjustment Mechanism (CBAM) . CEAP geared toward transforming the entire lifecycle of products to minimize waste production and reduce the demand for natural resources. The CEAP aims to make sustainable products commonplace, empower consumers and public buyers, and target resource-intensive sectors, including packaging, technology, vehicles, and textiles, with the goal of making sustainability the standard in the EU. By emphasizing waste reduction, regional benefits, and global leadership, it seeks to foster sustainable growth, achieve climate neutrality by 2050, and combat biodiversity loss. The European Commission has affirmed "circularity goals are unlikely to be met without ensuring that suppliers in developing countries also adopt circular business practices" (European Comission, 2020), which emphasizes the interconnectedness of global supply chains to need to promote sustainable practices beyond national borders. Not only will the EGD necessitate elevated sustainability standards in primary production and industrial processes, but small and medium-sized enterprises (SMEs) from non-EU countries will be required to provide more information about the products they export to Europe. While in the short term, this could lead to potential increases in production and export costs, in the long-run, it will enhance competitiveness in a sustainable global marketplace.

On the other hand, carbon leakage has been a concern since the establishment of the EU ETS in 2005. To address this issue, the EU adopted a free allowance policy, which will gradually be phased out from 2026 to 2034 (ICAP, 2023), with the CBAM implementation.

This risk of carbon leakage can materialize in two ways: either EU companies move their production to countries with less ambitious emission reduction goals, or EU products get substituted with imports that have higher carbon footprints. To combat this, CBAM will impose financial obligations on certain imports from outside the EU. EU importers can offset this price by purchasing carbon certificates[5] which reflect the

[5] The Carbon Border Adjustment Mechanism (CBAM) entails – similarly to the system of allowances under the EU ETS – the surrendering of certificates (CBAM certificates) by importers, based on the embedded emission intensity of the products they import in the EU and purchased at a price corresponding to that of the EU ETS allowances at any given point in time. These certificates will not be linked to the EU ETS system of allowances but will mirror the price of these allowances to ensure a coherent approach to the pricing under the EU ETS. Available at: https://emissions-euets.com/cbam-certificates

cost of compliance with EU carbon pricing rules. If non-EU producers can prove they have already paid for carbon emissions in their country, the EU importer is exempt from additional costs. The CBAM is planned to be gradually implemented and initially apply to high-risk carbon leakage goods, providing businesses and non-EU countries with legal clarity and stability (The European Green Deal, 2019). Thus, the EGD impacts imports by promoting sustainability and addressing carbon leakage risks, thereby influencing trade channels and encouraging more environmentally responsible practices, which in turn may require adjustments and responses from third countries.

### 4.2.2 Uzbekistan-EU partnership and EGD

Diplomatic ties between Uzbekistan and the УГ were formalized on November 16, 1994. The Partnership and Cooperation Agreement (PCA) between the EU and Uzbekistan was signed in Florence in June 1996. In the past few years, the relationship between Uzbekistan and the EU has significantly advanced, reaching a new level of depth and comprehensiveness. In July 2022, the three-year negotiations concluded, leading to the signing of the new Enhanced Partnership and Cooperation Agreement (EPCA) in Brussels. This agreement replaces the longstanding PCA, which had been in effect for over two decades.

EPCA now encompasses additional domains, such as foreign policy, security, conflict prevention, crisis management, protection of personal data, asylum and border management, combatting illegal immigration, organized crime, corruption, and terrorism. The key provisions of the EPCA align closely with the priorities outlined in the main development strategy of the country - New Uzbekistan Development Strategy 2022-2026. Compared to the PCA, the new EPCA Agreement addresses a broader spectrum of subjects. Unlike the previous framework agreement, it now serves as a a full-fledged mechanism for comprehensive facilitating interaction between Uzbekistan and the EU, extending to trade and economic cooperation.

Uzbekistan and the EU are actively engaging in the EU-Central Asia Economic Forum to establish specific measures aimed at enhancing trade and economic connections between Uzbekistan and the EU. In March 2022, a conference took place in Tashkent tolaunch the European Union Multiannual Indicative Programme for Uzbekistan spanning 2021-2027. The program's initial funding amounts to €76 million for the period 2021-2024. Specifically, 40% of the funds are allocated for "inclusive digital

and green growth," while 36% is designated for the "development of a smart and eco-friendly agri-food sector", which signifies a commitment to both fostering sustainable development and economic cooperation (Multi-annual Indicative Programmed 2021-2027).

Additionally, there is an ongoing implementation of a €5.2 million (as of 2022) project titled 'EU Contribution to the Multi-partner Trust Fund on Human Security for the Aral Sea Region,' as part of the EU's financial and technical assistance framework (UN, 2024). The EU-Central Asia International Conference on Connectivity: The Global Gateway, held in Samarkand on November 18, 2022, and initiated by Uzbekistan, played a pivotal role in enhancing inter-regional cooperation. President Shavkat Mirziyoyev highlighted the importance of focusing on digital transformation, transport connectivity, and green growth projects to strengthen relations; the conference led to specific agreements for practical cooperation in these key areas.

The export data from Uzbekistan to the EU27 reveals a consistent upward trend in the total export values over the five-year period. Starting at 168 million euros in 2018, the figure has reached 846 million euros in 2022 (Table 4.3).

**Table 4. 3 :** Export data from Uzbekistan to the EU27, value in Euros (Eurostat)

| PRODUCT/PERIOD | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| 20 Chemicals and chemical products | 45,257,152 | 30,505,349 | 40,741,192 | 104,534,952 | 301,982,912 |
| 24 Basic metals | 26,272,942 | 38,528,025 | 32,560,057 | 142,162,363 | 270,222,480 |
| 13 Textiles | 39,420,374 | 39,996,914 | 59,015,325 | 109,249,838 | 135,074,837 |
| 10 Food products | 18,649,534 | 25,765,388 | 22,379,299 | 30,360,175 | 35,702,253 |
| 14 Wearing apparel | 6,081,289 | 13,755,650 | 7,363,361 | 5,816,615 | 23,994,806 |
| 01 Products of agriculture, hunting and related services | 9,209,866 | 13,227,027 | 10,252,673 | 17,370,022 | 16,013,749 |
| 08 Other mining and quarrying products | 24,606 | 24,475 | 3,557 | 29,380,384 | 11,137,500 |
| 15 Leather and related products | 4,247,540 | 6,433,841 | 4,981,978 | 6,975,950 | 9,443,937 |
| 17 Paper and paper products | 1,384,914 | 4,026,945 | 6,688,036 | 5,400,113 | 6,257,641 |
| 19 Coke and refined petroleum products | 8,965,913 | 4,868,229 | 3,028,655 | 6,768,388 | 5,505,214 |
| 27 Electrical equipment | 309,623 | 261,588 | 1,160,216 | 375,787 | 5,424,058 |
| 38 Waste collection, treatment and disposal services; materials recovery services | 1,451,350 | 1,684,363 | 2,212,868 | 4,810,788 | 4,071,763 |
| 26 Computer, electronic and optical products | 778,656 | 3,671,447 | 896,543 | 1,078,382 | 3,867,149 |
| 23 Other non-metallic mineral products | 60,058 | 108,093 | 74,503 | 278,840 | 3,603,655 |
| 25 Fabricated metal products, except machinery and equipment | 313,561 | 257,057 | 2,368,129 | 4,843,135 | 3,268,593 |
| 07 Metal ores | 3,501 | 3,260 | 2,686 | 5,576 | 2,030,958 |
| 28 Machinery and equipment n.e.c. | 347,903 | 1,574,913 | 1,006,728 | 2,423,433 | 1,428,444 |
| 30 Other transport equipment | 1,092,480 | 961,098 | 268,128 | 972,815 | 1,294,508 |
| 16 Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials | 9,162 | 6,939 | 24,402 | 19,671 | 927,628 |
| 32 Other manufactured goods | 853,848 | 1,020,953 | 564,207 | 674,855 | 895,311 |
| 05 Coal and lignite | | | 40 | 111 | 799,651 |
| 29 Motor vehicles, trailers and semi-trailers | 348,474 | 135,314 | 629,127 | 176,444 | 687,055 |
| 11 Beverages | 56,930 | 109,680 | 292,114 | 342,781 | 304,510 |
| 21 Basic pharmaceutical products and pharmaceutical preparations | 7,309 | 2,951 | 86,506 | 784,313 | 226,672 |
| 58 Publishing services | 502,485 | 938,269 | 1,628,516 | 14,547 | 213,229 |
| 31 Furniture | 5,241 | 18,506 | 75,336 | 4,407 | 152,195 |
| 22 Rubber and plastic products | 50,299 | 53,427 | 52,600 | 501,720 | 126,145 |
| 12 Tobacco products | 105,648 | 22,842 | 8,645 | 76,518 | 40,609 |
| 59 Motion picture, video and television programme production services, sound recording and music publishing | 834 | 4,176 | 151 | 21,899 | 13,547 |
| 90 Creative, arts and entertainment services | 922 | 20,998 | 2,432 | 2,202 | 12,617 |
| 18 Printing and recording services | 1,955 | | 1,409 | | 2,110 |
| 96 Other personal services | 35,662 | 16,115 | 21,830 | 11,367 | 902 |
| 91 Library, archive, museum and other cultural services | | 80,578 | | 99 | 569 |
| 02 Products of forestry, logging and related services | | 6 | 67,944 | 26,143 | 23 |
| 03 Fish and other fishing products; aquaculture products; support services to fishing | | | | | 22 |
| 71 Architectural and engineering services; technical testing and analysis services | | 49 | | | 18 |
| **TOTAL** | 168,116,739 | 189,771,138 | 199,693,991 | 476,908,203 | 846,083,565 |

When analyzing top 10 exported product categories by NACE classification (Figure 4.6), it can be noticed that the category of chemicals products (mostly fertilizers and inorganic chemicals) emerges as the dominant commodities in Uzbekistan's exports to the EU27 throughout the years, constituting more than one third of all exports in 2022 (16% in 2018). Similarly, "Basic Metals" (mostly gold, iron, steel) consistently holds a prominent position, with its share within all export volume rising from 15% in 2018 to 31% in 2022, emphasizes the significant role these sectors play in driving and sustaining Uzbekistan's exports to EU27. The next category is textiles which exhibit positive growth over the years, with volumes nearly tripling from 2018 to 2022 and share within export share constituting 15% from the whole exports in 2022. Almost all categories experienced growth in export volumes, with the “Metal ores” category exhibiting the most remarkable increase of 580 times in 2022 compared to 2018 (refer to Annex for detailed data). According to the recent information, trade volume between Uzbekistan and EU nations witnessed about 36% increase in 2023 (Kun.uz, 2023). Concurrently, in 2023, exports from Uzbekistan to EU saw a substantial 86% surge.

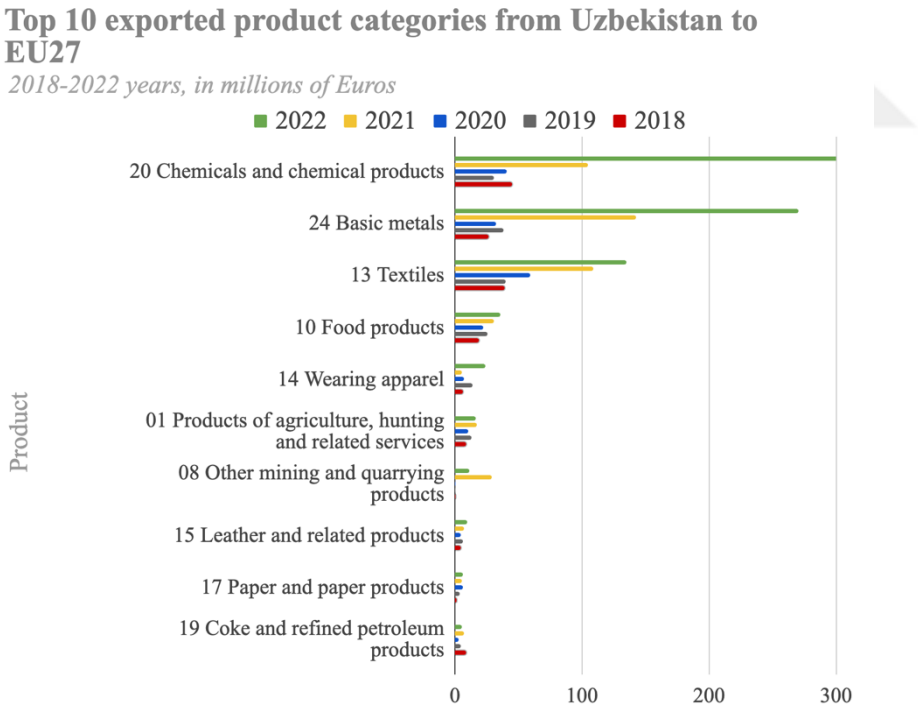



**Figure 4. 6 :** Top 10 exported product categories from Uzbekistan to EU 27 (Eurostat, 2023).

Notably, significant growth was observed in product categories related to the metals, chemical industry, textiles, and foodstuffs.

These positive trade outcomes are attributed largely to Uzbekistan attaining the "GSP+"[6] beneficiary status under the European Union's Generalized System of Preferences (GSP) in 2021 (Gazeta.uz, 2022). The GSP+ status enables Uzbek exporters to deliver over 6,000 types of goods to the European market without incurring customs duties. Specifically, in 2022, Uzbekistan experienced nearly a doubling of exports in high-value-added goods. Moreover, the count of enterprises with European capital in Uzbekistan has more than doubled during this period (Brusselstimes.com, 2022). So far, only eight countries[7] in the world have access to such preferential conditions; Uzbekistan was the last to receive it. Thanks to the abolition of import duties, exporters in Uzbekistan saved more than 28 million euros in 2022, and compared to 2019, this contribution has increased more than tenfold (from 2.5 million euros) (EEAS, 2024).

Thus, Uzbekistan and the EU27 aim to sustain the favorable trajectory of trade growth; ongoing developments underscore their commitment to fortify an open and constructive dialogue, fostering a strong partnership between the two parties. These conditions also make Uzbekistan less dependent on other trading partners, increasing trade incentives with European countries. Even if the export share of EU27 within the all exports of Uzbekistan constitute around 5% (in 2022), EU27 is still in in top partners of Uzbekistan by exports (Section 1.1.3). Moreover, given the Average Annual Growth Rate (AAGR) at 59% and a positive growth trend, one can project that export volumes will reach 8.5 billion by 2027 (2022 as base year) (refer to the Annex).

The vulnerability of Uzbekistan's industries to the CBAM and CEAP was assessed based on the CO2 emissions of their relevant sectors (Table 4.4). Industry selection was guided by 2022 export volumes, specifically targeting the top 10 product categories with the highest exports (Table 4.3). As specific CO2 emission data for each industry were unavailable, the total CO2 emissions of relevant sectors were used

[6] a special incentive arrangement for sustainable development and good governance. GSP+ slashes these same tariffs to 0% for vulnerable low- and lower-middle income countries that implement 27 international conventions related to labour and human rights, environmental and climate protection, and good governance.

[7] Bolivia, Cape Verde, Kyrgyzstan, Mongolia, Pakistan, Philippines, Sri Lanka, Uzbekistan.

as a proxy. For industries such as textiles, apparel, and food products, which are not subject to CBAM but are impacted by CEAP, the relevant sector was identified as waste. This choice reflects the emphasis on waste reduction and resource efficiency crucial for achieving circularity, rather than the entire carbon footprint (which would have been under IPPU sector). Sectors with high CO2 emissions, like Energy and Agriculture, were categorized as high vulnerability due to their significant environmental impact. Industries under IPPU were considered moderately vulnerable, acknowledging their CO2 emissions from industrial processes. This methodology ensures a nuanced understanding of each industry's environmental impact and vulnerability to regulatory measures aimed at enhancing sustainability and reducing carbon emissions.

While this evaluation provides a tentative qualitative understanding, it serves as an initial assessment within this topic. Considering that these 10 categories constitute over 90% of total exports to EU27 in 2022, it is imperative for GoU to implement measures to address potential threats associated with CEAP and CBAM in its trade practices.

**Table 4. 4 :** CEAP and CBAM vulnerability assessment

| Product category (NACE code) | Relevant sector and its total CO2 eq. emissions 2021 | Recent export volumes (2022) | CEAP and CBAM vulnerability | Reasoning |
|---|---|---|---|---|
| Chemicals and Chemical Products (20) | IPPU 29.21 mln t CO2 eq. | 302 mln EUR | Moderate | CEAP: Chemicals often involve complex production processes and may generate hazardous waste.<br>CBAM: Depending on the energy intensity of the chemical production processes, this sector face carbon-related challenges. |
| Basic Metals (24) | IPPU 29.21 mln t CO2 eq. | 270 mln EUR | Moderate | CEAP: Basic metals production typically involves significant energy consumption and resource depletion.<br>CBAM: Metal production is energy-intensive. |
| **Textiles (13)** | Waste 9.15 mln t CO2 eq. | 135 mln EUR | Low | CEAP: The textile industry is known for high water usage, chemical use, and waste generation. |
| **Food Products (10)** | Waste 9.15 mln t CO2 eq. | 35.7 mln EUR | Low | CEAP: Agriculture and food production have implications for land use, water consumption, and waste generation. |
| **Wearing Apparel (14)** | Waste 9.15 mln t CO2 eq. | 23.9 mln EUR | Low | CEAP: The fashion industry is often associated with fast fashion and high levels of textile waste. |
| Products of Agriculture, Hunting, and Related Services (01) | Agriculture 32.9 mln t CO2 eq. | 16 mln EUR | High | CEAP: Sustainable agricultural practices and reducing waste are critical for circularity in this sector.<br>CBAM: Agricultural practices and transportation-related emissions could be targeted. |
| Other Mining and Quarrying Products (08) | IPPU 29.21 mln t CO2 eq. | 11 mln EUR | Moderate | CEAP: This sector may need to focus on circular practices in resource extraction and waste reduction.<br>CBAM: The energy intensity of mining activities could be a concern. |
| Leather and Related Products (15) | IPPU 29.21 mln t CO2 eq. | 9.4 mln EUR | Moderate | CEAP: Leather production involves resource-intensive processes.<br>CBAM: Carbon-intensive production methods need attention. |
| Paper and Paper Products (17) | IPPU 29.21 mln t CO2 eq. | 6.2 mln EUR | Moderate | CEAP: Sustainable forestry practices, recycling, and reducing paper waste are essential for circularity in this sector.<br>CBAM: Energy efficiency in paper production and sustainable sourcing of raw materials will be crucial for compliance with CBAM. |
| Coke and Refined Petroleum Products (19) | Energy 136 mln t CO2 eq. | 5.5 mln EUR | High | CEAP: Circular practices may involve reducing dependency on fossil fuels, promoting cleaner alternatives, and enhancing recycling or reuse of petroleum products.<br>CBAM: Given the carbon-intensive nature of the petroleum industry, transitioning to cleaner energy sources and reducing emissions are vital for CBAM compliance. |

Thus, as Uzbekistan seeks to maintain its trade relations with the EU and other environmentally-conscious partners, it must be prepared to align its policies and practices with the goals outlined in the EGD. This alignment is significant not only for ensuring continued access to European markets but also for fostering the green

transition of Uzbekistan's economy. Failing to align with these environmental standards, however, could potentially jeopardize export revenues and pose risks to the overall economic well-being and employment situation in Uzbekistan.

### 4.2.3 Belt and road initiative

Another important international initiative that is anticipated to have impact on green transition of Uzbekistan is BRI. The potential impact of BRI on Uzbekistan's green economy transition will be assessed based on existing research conducted on other partner countries, as well as through analyzing investment patterns and their effects on the country.

According to 2023 data, China has emerged as Uzbekistan's primary trade and investment ally, outpacing Russia in significant indicators. Trade with China expanded significantly, growing by 1.5 times from $9.06 billion to $13.7 billion. While Uzbek exports to China decreased by 6.4% to $2.46 billion, imports from China increased substantially, rising by 1.7 times to $11.26 billion (Uzstat, 2024).
Research by Center for Economic Research and Reforms of Uzbekistan (CER) cited in Asia Today (2024) indicates that investment cooperation with China spans numerous sectors, such as energy (including renewables), oil and gas, chemicals, light manufacturing, automotive, electrical industries, building materials production, telecommunications, healthcare, pharmaceuticals, agriculture, and more.

In 2024, just before his official visit to China, president Mirziyoyev penned an article for the People's Daily newspaper titled "Uzbekistan and China: Millennia-long friendship and cooperation" (People's Daily Online, 2024). In the article, he stated:

> *"For us, the BRI is not just an infrastructure project. Through the joint implementation of the initiative, the region is becoming an important link in global connectivity, overcoming transport remoteness. Today, we can firmly state that the earlier voiced predictions of skeptics about the predestined fate of the region's countries to become only a transit corridor for China's trade with Europe, South Asia and the Middle East failed to come true. Today, investments are increasing in Central Asia, with the number of joint high-technology industries growing, enhancing the economic potential of our countries."*

President Mirziyoyev believes that the BRI is fostering increased investment in Central Asia and a rise in collaborative high-tech industries. This, in turn, is seen as boosting the economic capacity of the region's countries. The BRI has the largest impact on total energy consumption, followed by energy intensity and per capita energy consumption, suggesting that the BRI has directly reduced overall energy consumption.

Wu et al., (2021) found that BRI significantly improves energy efficiency in medium and high-energy efficiency quantiles, particularly benefiting resource-rich and low-income participating countries. Che et al. (2023) identify that BRI and high national income significantly alleviate energy poverty across BRI countries. They emphasize the positive impact of technology cooperation and humanitarian aid in mitigating energy poverty. Ultimately, the study underscores BRI's contribution to addressing global challenges and advancing the United Nations 2030 Sustainable Development Goals. Liu and Ma's (2023) research suggests that the BRI has facilitated green economic growth, ultimately leading to the attainment of emission reduction objectives within partner nations. Ji et al. (2023) suggests that in BRI countries, factors like technology, renewable energy, human capital, and urbanization reduce CO2 emissions, while economic growth raises them. Authors propose BRI nations enhance collaboration, invest in renewables, utilize technology spillovers, and tackle environmental policy issues linked to the resource curse.

The BRI initiative is of significant interest to Uzbekistan, especially in the context of the creation of a trans-Eurasian high-speed highway, including roads and railways in the direction of Kyrgyzstan and China. Experts believe that this will be a key factor in developing the economy and improving the well-being of the people of Uzbekistan (Kim, 2023). Uzbekistan has supported and joined this initiative as one of its early adopters. Due to its geographical location and the presence of developed transport infrastructure, Uzbekistan plays a key role in the creation of transport corridors between West and East, China and Europe. Uzbekistan’s development policy actively coincides with the priority areas of the BRI initiative, including the development of tourism, agriculture, transport, investment climate and green economy.

Xinhua News Agency (2023) described key projects in Uzbekistan implemented within the framework of BRI initiative over the past 10 years. This includes the construction of the Angren-Pap electrified railway line through the Kamchik mountain

pass, which reduced travel time from Tashkent to Andijan to 7-8 hours and created new jobs for about 1500 people. Also significant is the launch of the Tashkent-Andijan-Osh-Irkeshtam-Kashgar transport corridor, which has reduced the delivery time of goods from Uzbekistan to China to two days and reduced delivery costs.

Cooperation with China has also led to the implementation of gas and hydropower projects, including the modernization and construction of hydroelectric power plants. In recent years, Uzbekistan has seen the commissioning of 11 new hydroelectric power stations, while another 9 have undergone modernization, largely with support from China. For instance, in 2018, a decision was made to upgrade the Aktepinskaya hydroelectric power station, originally built in 1943 in the Tashkent region, with funding from the Chinese Exim Bank. More recently, in 2023, the Tupalang hydroelectric power station in the Surkhandarya region in southern Uzbekistan underwent modernization with assistance from Chinese experts. Upon successful testing, its capacity will reach 175 MW, supplying consumers with 467 million kWh of electricity annually and resulting in significant natural gas savings amounting to 126.2 million cubic meters. Presently, Uzbekistan and China are actively engaged in 14 collaborative investment initiatives focused on hydropower. These efforts align with an ambitious goal to boost Uzbekistan's hydropower capacity by 1.7 times by 2030, aiming for over 3.4 thousand MW.

A significant portion of the Belt and Road Initiative's investments in Uzbekistan has been directed towards renewable energy sources (RES). In 2022, the BRI's energy engagement in Uzbekistan was just above $500 million, with approximately 20% allocated to gas projects and 80% to solar and wind initiatives combined. By 2023, the investment remained consistent at around $510 million (Figure 4.7), exclusively for solar and wind projects (Nedopil, 2023; Nedopil, 2023-a).

Amidst a rising demand for renewable energy in Uzbekistan, China has been actively embracing green energy initiatives since 2018. China's increased engagement presents considerable opportunities for expediting Uzbekistan's green transition, consequently reducing environmental pollution.

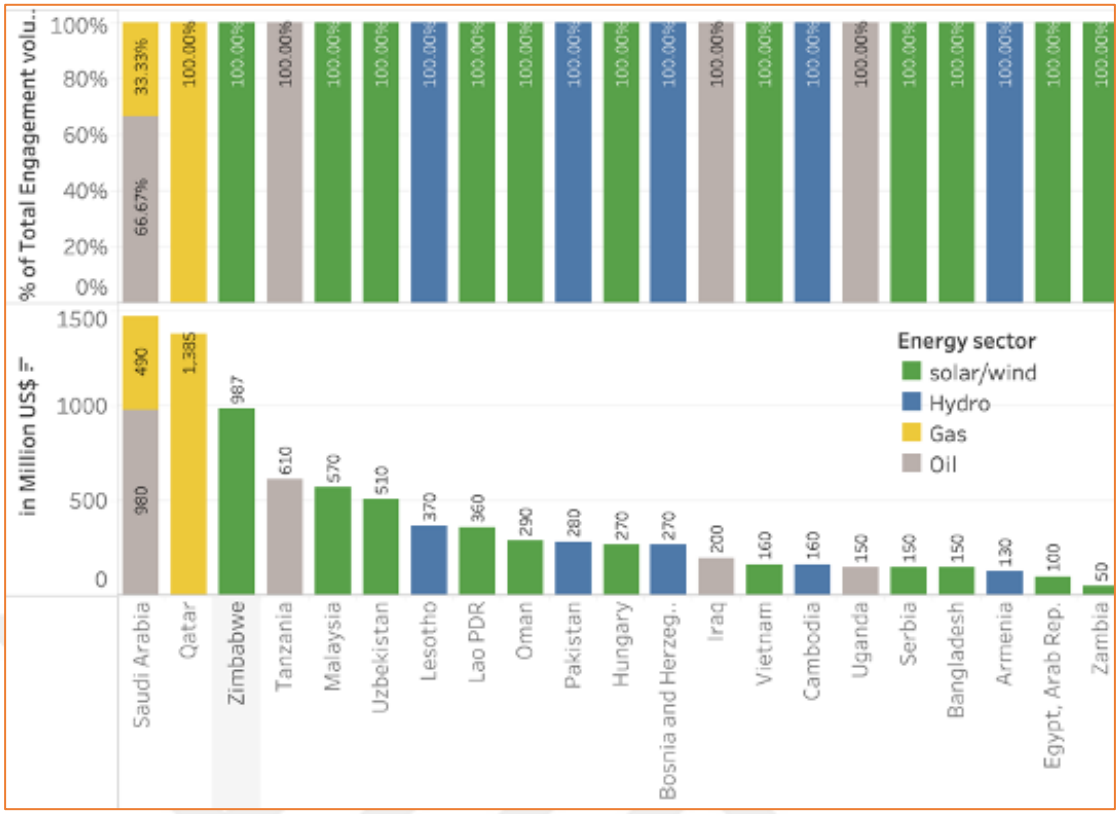



**Figure 4. 7 :** Chinese energy engagement in BRI, 2023 (Nedopil, 2023-a).

The EBRD's (2020) research examines the BRI effects on Uzbekistan. It highlights improved cross-border transport as vital for economic growth and poverty reduction. It states that BRI infrastructure projects, supported by conducive policies, can boost Uzbekistan's exports, FDI, and GDP and that Uzbekistan's ongoing market-oriented reforms align well with the BRI, optimizing benefits and minimizing risks.

Thus, BRI is significantly contributing to Uzbekistan's green transition by directing a substantial portion of its investments towards infrastructure development, technology transfer, and renewable energy sources. Moreover, BRI's transport upgrades are expected to positively influence trade, FDI, and GDP which will reduce poverty and improve the quality of life.

While investments in renewable energy infrastructure offer potential for transitioning to cleaner energy sources, the fossil fuel-based projects under BRI, could hinder the country to move away from carbon-intensive energy pathways. Moreover, as reviewed literature suggest, projects under BRI with insufficient or poor-quality environmental assessments, could trigger ecosystem degradation, especially in sensitive areas such as biodiversity hotspots. Additionally, the influx of Chinese firms and technology may foster overreliance, potentially entrenching a country's

dependency on Chinese resources. This could also hinder the development of a domestic green industry supply chains, limiting the country's capacity for economic growth and self-sufficiency in the long term. The review of sources suggests that there is a probability of similar outcomes occurring in Uzbekistan, although there is limited research and no concrete evidence to confirm this yet.

### 4.3 Cross-sectoral Policy and Development Strategies

In addition to formally commiting to international agreements, GoU has adopted a number of key documents at national level that govern climate change and green growth. They include both president decrees and resolutions, and government resolutions that have mid and long-term visions. The most important documents in greening the economic transformation became adopting PP-4477 "On approving the Green Economy Transition Strategy for 2019-2030", dated 04.10.2019 (hereinafter Green Strategy 2019-2030) and PP-436 "On measures to improve the effectiveness of reforms aimed at the transition of Uzbekistan to a "green" economy by 2030" dated 02.12.2022 (hereinafter Green Strategy Action Plan 2030). Furthermore, high-level strategic documents such as New Uzbekistan Development Strategy for 2022-2026 and Uzbekistan – 2030 Strategy ensure the alignment of national development goals with climate change objectives.

This section provides an overview of the above mentioned and other policies and initiatives that directly or indirectly contribute to the green growth across key areas.

Green Strategy 2019-2030 is the first document that outlined long-term vision for Uzbekistan's green economy incorporating climate agenda. The primary objective of the strategy is to achieve a 35% reduction in GHG emissions per unit of GDP by 2030, relative to the 2010 baseline. It defines priorities across various sectors, including renewable energy sources, water management, agriculture, forestry, solid waste management, green technology adoption, education, science, electricity, thermal power, oil and gas, chemical industry, construction and building materials, transportation, and promoting green investments. The document sets ambitious targets, including a twofold enhancement in energy efficiency, a reduction in the carbon intensity of the country's GDP, and an increase in the share of renewable energy to constitute 25% of the total electricity generation. This document aims to foster

sustainable economic development by incorporating green economy principles into ongoing structural reforms. Specifically, the key focus areas of the strategy include: (i) enhancing the energy efficiency of major economic sectors, (ii) diversifying energy consumption and promoting the utilization of renewable energy sources, (iii) addressing climate change through adaptation and mitigation measures, optimizing natural resource utilization, and preserving natural ecosystems, and (iv) establishing financial and non-financial mechanisms to support the green economy.

While the Green Strategy 2019-2030 marked a significant policy breakthrough by aligning climate change objectives with national economic plans, some listed goals and initiatives are failing to meet specified deadlines. To name some, as of January 2024, there is an absence of comprehensive national-scale renovation programs for buildings, the government has not approved the energy certification system, green loans and green jobs are not yet introduced.

Green Strategy Action Plan 2030, followed the above-mentioned document and complemented it by establishing wider set of sectoral targets, policies and institutional setup. This resolution endorsed a program outlining the transition to a "green" economy until 2030, repeating objectives of Green Strategy 2019-2030: a 35% reduction in specific GHG emissions per unit of GDP from 2010 levels, by 2030. It also outlines target for the expansion of renewable energy sources capacity to 15 GW, aiming for a 30% share in overall generation. It encompasses a concept for transitioning to a "green" economy, emphasizing energy conservation in industries, an Action Plan for "green" growth, and benchmarks for fuel and energy savings in economic sectors, targeting a 20% reduction in energy intensity by 2026 compared to 2022. Furthermore, it includes measures to enhance water use efficiency across all economic sectors, incorporating water-saving irrigation technologies over an expanse of up to 1 million hectares. The initiative involves augmenting green spaces in urban areas to 30% or beyond through the annual planting of 200 million seedlings, aiming to reach a total of 1 billion. Additionally, it targets an increase in household waste recycling to 65%, among other provisions.

While both documents specify measurable targets and measures for energy sector, which is the dominant sector by the GHG emissions, it lacks specific targets for sectors

characterized by high emissions, such as transportation, buildings and construction, and manufacturing. Similar to Green Strategy 2019-2030, there is evidence of some goals not meeting specified deadline which could indicate challenge in this area. For example, the resolution mandated the implementation of a modern monitoring, reporting, and verification (MRV) system according to standards of UNCCC by January 1, 2024; as of May 2024, this has not been introduced yet. However, both documents are currently in the implementation phase, with their completion set for 2030. As the deadline has not been reached, it is premature to evaluate their effectiveness. It is important to highlight that there is no publicly accessible monitoring of progress for these documents; typically, internal monitoring is conducted by the responsible entities.

Another significant achievement in green policies in Uzbekistan is the Resolution of the Cabinet of Ministers (CoM) No. 561 "On the approval of the National "Green" Taxonomy" dated 26.10.2023. It has marked a significant milestone for the green economy in Uzbekistan, having been established for the first time. Its establishment was outlined as a subgoal in the PP-271 "On Measures for the implementation of the "Innovative Carbon Resources Use for Energy Reforms" by project with the Participation of the World Bank" dated 08.08.2023 and the Green Strategy Action Plan 2030. The resolution, overseen by the Ministry of Economy and Finance (MEF), plays an important role in contributing to the climate and environmental goals outlined in these key documents. MEF has been assigned as the key authority tasked with the creation and execution of Uzbekistan's green economy classification system.
The document defines specific sectors and sets criteria for evaluating compliance within the "green" domain, which include 25 sub-sectors and 56 activities, within the following sectors:

1. Efficiency of use of water and raw materials
2. Improvement of air and soil quality
3. Sustainable agriculture and forestry, ecotourism
4. Green transport
5. Energy efficiency improvement
6. Renewable energy
7. Green buildings

As per the document, all businesses, whether private or state-owned, receiving financial support from the government (such as subsidies, grants, credit lines, guarantees, etc.) are obligated to report their investment costs using the defined classification until October 1, 2024, during an experimental phase. This also applies to projects funded through "green" bonds, loans, and other funding sources, which will follow this classification. The purpose of this trial period is to identify potential enhancements to eligibility criteria and evaluate the policy's effectiveness. Currently, the taxonomy does not impose obligations on organizations, and there are no associated incentives. The updated taxonomy is expected to include more sectors, detailed criteria and thresholds, obligations and user incentives by the end of 2024.

Currently, two relevant multi-sectoral development strategies include national objectives in accordance with environmental goals: the New Development Strategy of Uzbekistan for 2022-2026 and the Uzbekistan-2030 Strategy. These strategies reflect the emissions reduction target set out in the original NDC.

The New Uzbekistan Development Strategy for 2022-2026 was adopted in January 2022 to continue reform already started in 2017. It outlines a thorough agenda that includes 100 distinct goals and 398 actionable measures. The country has set ambitious targets to implement green economy technologies and improve the energy efficiency of the economy by 20 percent. This encompasses reducing the emission of harmful gases per unit of GDP across various economic sectors by 10 percent. Goal 24 and Goal 80 of the strategy are specifically linked to climate change mitigation and adaptation concerns (Table 4.5).

Another key objective is to halve poverty by the end of 2026 and increase the country's GDP per capita by 1.6 times, reaching 4000 USD - creating preconditions for entry into the category of upper-middle-income country status[8] by 2030. The document also lays out an ambitious goal (Goal 22) for substantial growth in industrial production - 1.4 times. Specifically, there are targets to increase automobile manufacturing by 1.4 times and double total exports, as well as to double production in the electrical industry and triple total exports. Goal 28 aims to enhance the country's export capacity, aiming to reach export volumes of $30 billion by 2026 ($16.6 billion in 2021). This involves

[8] The World Bank categorizes upper-middle-income countries as economies with Gross National Income (GNI) per capita ranging between $4,466 and $13,845.

increasing the private sector's contribution to exports to 60 percent. Additionally, there are plans to boost the proportion of finished and semi-finished products in the export composition by 3.3 times, with a particular focus on expanding the export of finished products to EU under the GSP+ system. The goal also includes raising the number of exporting businesses from 6,500 to 15,000 and broadening the export market to encompass 150 countries (from current 115 in 2023), by enhancing the promotion system for domestic product exports to foreign markets.

To achieve its goals, the government is implementing various reforms, such as economic liberalization, which includes reforms in the agricultural sector, elimination of monopolies, improved competition, privatization, price stabilization, decentralization, and land ownership. Furthermore, investments in human capital aim to provide productive employment opportunities to the country's mainly young population.

The following key strategic document is the Uzbekistan – 2030 Strategy, outlining five primary directions and 100 goals for the period until 2030. This strategy aims to foster sustainable economic development, emphasizing the transition to a green economy (Goal 51), mitigation and adoptation to climate change (Goals 66-71).

**Table 4. 5 :** The main strategic goals and the priority directions of the intervention in terms of climate change mitigation and adaptation defined by the New Uzbekistan Development Strategy for 2022-2026 and "Uzbekistan – 2030" Strategy.

| **NEW UZBEKISTAN DEVELOPMENT STRATEGY FOR 2022-2026** | **"UZBEKISTAN – 2030" STRATEGY** |
|---|---|
| GOAL 24: Uninterrupted supply of electricity to the economy, active implementation of green economy technologies in all areas, increase in the energy efficiency of the economy by 20 percent | GOAL 51: Transition to a green economy, dramatically increasing the use of renewable energy as its basis |
| Increasing electricity generation by an additional 30 billion kWh by 2026, bringing the total generating capacity to 100 billion kWh. | Bringing renewable energy sources to 25 thousand megawatts and the share in total consumption to 40 percent. |
| Saving up to 3 billion cubic meters of natural gas by increasing the share of renewable energy sources to 25 percent by 2026. | Reducing natural gas consumption by modernizing 3 thermal power plants with a capacity of 3 GW. |
| Ensuring the stable operation of the energy system of Uzbekistan and ensuring its reliability when interacting with the energy systems of neighboring states. | Creating a monitoring system covering all greenhouse gases in the field of climate change (MRV). |
| Widespread introduction of renewable energy sources and improvement of energy efficiency in housing and communal services, at social facilities and in other areas. | Introducing a system for assessing energy efficiency (energy audit) of apartments in multi-stored buildings. |
| Reducing losses in industries and improving the efficiency of resource use. | Developing the market for "green certificates" in industry and the introduction of "ecological labeling" practices. |
| Reducing the volume of GHG emissions into the atmosphere per unit of GDP by sectors of the economy by 10 percent compared to 2010 levels. | Reducing greenhouse gases per unit of GDP by 30 percent compared to their level in 2010. |
| Acting on the production and use of electric vehicles. | Transfer of urban public transport completely to environmentally friendly fuel. |
| GOAL 80: Protection of the ecology and the environment, improvement of the ecological state of cities and regions, implementation of the nationwide project "Green Land" | GOALS 66-71: Environmental protection, preventing the negative impacts of climate change |
| Planting at least 200 million tree seedlings annually as part of the nationwide Green Land project. | Planting 200 million tree seedlings annually and bringing the level of greening in the republic to 30 percent, creating a care and irrigation system for each planted tree. |
| Establishment of a system of aerobiological monitoring in 10 regions of the republic in accordance with the initiatives of the national project "Green Land". | Installing and modernizing existing highly efficient dust and gas treatment equipment and local water treatment facilities, introducing an environmentally friendly territory regime in 14 regions. |
| Bringing the level of collection of household waste to 100 percent, and for recycling rates to increase from the current 21 percent to 50 percent in 2026. | Increasing the level of coverage of solid waste collection and removal services by 100 percent, and the level of waste recycling by 65 percent. |
| Completion of work on the definition of sanitary protection zones and coastal areas of 51 terrestrial natural water bodies (rivers, small rivers, and natural lakes) in the republic. | Increasing water use efficiency by 25 percent, bringing the total area of land covered by water-saving technologies for irrigating crops to 2 million hectares, including drip irrigation technology to 600 thousand hectares. |
| Transformation of the city of Tashkent into a comfortable for the population, ecologically clean area with all conditions for living, bringing the level of its landscaping to 30 percent. | Increasing the area of green space in the city of Tashkent by 5 times, bringing it to 5 thousand hectares. |

| | |
|---|---|
| Creation of an additional 500,000 hectares of green space on the dry bottom of the Aral Sea, bringing the total area to 2.5 million hectares, or 78 percent of the territory, by the end of 2026. | Creating an additional 600 thousand hectares of green space at the bottom of the dried-up Aral Sea, bringing their total volume to 2.6 million hectares or up to 80 percent of the territory. |
| Implementation of projects in the Aral Sea region based on the programs of the International Green Climate Fund and the Global Environment Facility aimed at protecting biodiversity, and preventing climate change and soil erosion, worth 300 million US dollars. | Expanding protected areas to 12 percent, annual bio botanical testing of plants in natural pastures and hayfields on 2 million hectares. |
| Organization in cities and regional centers of "public parks" for every 50 - 100 thousand people. | Ensuring the creation of green areas on at least 30 percent of their territory in drawing up master plans for cities and ensuring in constructing residential buildings that “green areas” are proportional to the population size. |

Similar to the New Development Strategy for 2022-2026, the document lacks specific details regarding targets and objectives. For instance, Goal 51 mentions the introduction of energy audits for multi-storey buildings, but it lacks clear deadlines and methodology. Given its recent establishment in late 2023, it is believed that accompanying documents are still being developed.

Funding for initiatives related to the "green transition" and greenhouse gas emission reduction is allocated following approval by the President and the higher government bodies. However, budget planning procedures and documents such as the Medium-Term Budget Strategy and Budget Address do not designate climate change or greenhouse gas emission reduction policies as distinct areas of government expenditure (UNDP, 2023). Without clear directives or guidelines, there is a risk that long-term budget allocations for certain expenditures could consistently receive insufficient funding compared to more immediate spending priorities. Developing appropriate methods for financial management and data collection is important for conducting more sophisticated analyses of economic efficiency and policy (Gilmore and Clair, 2018).

### 4.4 Sectoral Policies Related to Green Economy Development

This section offers an overview of policies and initiatives aimed at promoting green practices within selected sectors, while also identifying the sectoral challenges hindering the adoption of sustainable practices. The rationale behind selecting these sectors lies in their substantial contributions to GHG emissions and energy intensity. While Uzbekistan currently lacks specific emissions reduction targets within sectors, objectives within sectors have been aligned to some extent with the goals of decarbonization and promoting sustainable practices.

### 4.4.1 Energy efficiency and renewables

According to Norkulov et al. (2022), Uzbekistan's emissions intensity exceeds that of its Central Asian counterparts by more than twice, and it surpasses the global average by more than six times, and eighteen times the average in the ECA region. The energy sector is the primary contributor to emissions in the country, accounting for the highest share - 76%. Thus, the nation prioritizes modernizing and diversifying its fuel and energy industry for sustainable development.

The analysis of the national energy balance indicates that natural gas represented 91% of primary energy production, while others include oil and gas (5%), coal (2%), electricity (1%) and petroleum products (<1%). In 2019, Uzbekistan's Total Final Consumption (TFC) reached 30.9 million tons of oil equivalent (Mtoe). Natural gas dominated final consumption, accounting for approximately 60% of the TFC (Figure 4.8). Meanwhile, electricity and heat contributed about 15% and 10% respectively to the TFC. Petroleum-related products, such as gasoline and diesel, constituted around 12.6% of the total final consumption. Analyzing consumption by sector reveals that households were the largest consumers, accounting for 34.8% of the TFC, followed by industry at 23% and transport at 19.7%.

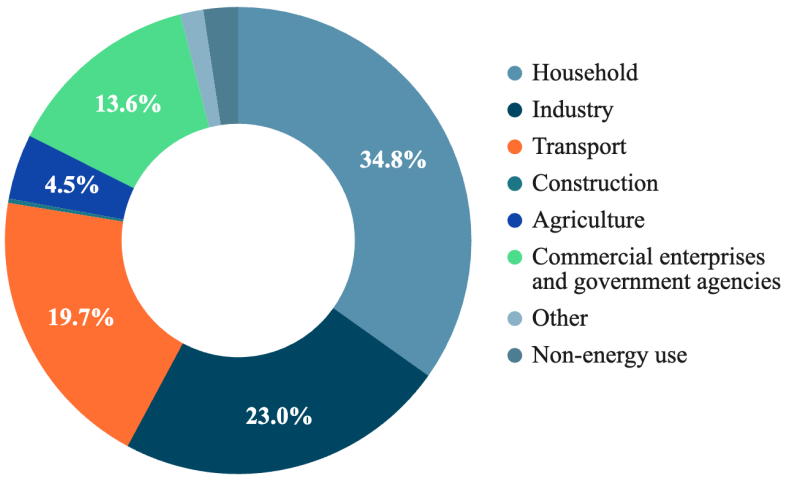



**Figure 4. 8 :** Total final consumption per fuel and by sector in 2018, % (Energy Charter, 2022).

Regarding natural gas consumption in the country, both the power sector and the population emerged as primary consumers, comprising 41% and 31% of total consumption, respectively, throughout the analyzed period. Gas has consistently served as the predominant fuel for power generation, constituting an average of 76%

over the past decade, whereas coal and hydro each averaged 12% of total generation (IEA, 2022-a). As a response, the government is shifting its focus towards enhancing energy efficiency and advancing renewable energy sources.
As mentioned in strategic documents, the government aims to increase the share of renewable energy sources to 25% by 2026 and 30% by 2030 of total power generation, double energy efficiency by 2030 relative to 2018 levels, and halve the energy intensity of GDP.

One of the main sectoral development documents is the Concept of providing the Republic of Uzbekistan with electrical energy for 2020-2030. It provisions the following by 2030:

- increase capacity from 12.9 GW to 29.3 GW, and electricity production from 63.6 billion kWh to 120.8 kWh;
- raising the proportion of renewable energy sources (including hydroelectric, wind, and solar power) to 40% of the total installed capacity of power plants and up to 26% of the composition of electricity generation by 2030. According to the concept, by 2030 the share of wind farms and solar power plants in the electricity generation structure should reach 15%.
- diversification of the energy sector of Uzbekistan - the share of thermal generation should be reduced from 89 to 58%. The share of thermal power plants is planned to be reduced through the development of nuclear energy.

As a result of achieving the set goals by 2030, natural gas consumption will decrease from 16.5 billion cubic meters to 12.1 billion cubic meters, while the annual volume of coal combustion will increase from 4.1 million tons to 8.5 million tons Also, after modernization, reduce losses during electricity transmission to 2.35% and losses during distribution to 6.5% (1.85 times less than the 2019 level) will be achieved.

To promote the adoption of renewable energy, Uzbekistan offers tax incentives outlined in the Law "On the Use of Renewable Energy Sources" and the Tax Code. Presidential Decree No UP-220, dated September 9, 2022, introduces compensation schemes ranging from $190 to $1,400 for individuals and the private sector installing renewable energy sources with capacities of 0.5 to 5 kW. However, the pace of electricity distribution system development lags behind the expansion of renewable energy capacities, potentially leading to increased energy losses. To address this,

measures such as digitalizing distribution, modernizing infrastructure, and involving the private sector are crucial (ITA, 2023; Suyarov et. Al., 2023; Umarov, 2024).

### 4.4.2 Green infrastructure

Transportation

The transport sector, dominated by road transport, has been emitting increasing amounts of greenhouse gases in recent years amid growth in freight and passenger transport. GHG emissions by the sector surged to 12.3 million tCO2-eq in 2017 from 9 million tCO2-eq in 2012, mainly driven by expanding economic activities. Freight, 90% of which is transported by roads, increased by 70% in physical terms compared to five years earlier, contributing significantly to this rise (NDC2).

Transport is the third largest energy consumer in Uzbekistan after the residential and industrial sectors. The average share of the transport sector in the total final energy consumption has been 19.65% over the last decade.

Natural gas and oil products are the primary fuel used in the transport sector, with least being electricity (54%, 43%, 3% in 2019, respectively) (Energy Charter, 2022). Electricity is consumed in public transport, represented by Tashkent's metro, trams, and intercity electric trains. Also, electricity is used by compressor stations in pipeline transport for oil and gas transportation. However, a very small portion of coal is still used in railway transport. Public transport in Uzbekistan includes buses, mini-buses and electrified transportation - metro. Despite the variety of public transport means, there is still a lack of interconnectivity between the different routes and areas of low coverage in some cities. As a result, public transport is not attractive, and people prefer to use individual cars (ITF, 2019; Energy Charter, 2022, Podrobno.uz, 2023).

Some policies in greening transportation include:

- DP-5863 "On Approval of the Concept of Environmental Protection of the Republic of Uzbekistan until 2030, dated 30.10.2019 prohibits the import of motor fuel with ecological standards lower than "Euro-3" from January 1, 2022, and motor fuel below "Euro-4" from January 1, 2023.
- to transfer urban public transport fully to environmentally friendly fuels;
- increase the share of electrified railways to 65%;

- 40% reduction of freight transportation times by railway in the northern direction (Uzbekistan – 2030 Strategy, Goal 51);
- development of the market and infrastructure of transport and logistics services, raising the level of electrification of the railway infrastructure to 60% and rapid development of the road network. (New Uzbekistan Development Strategy for 2022-2026, Goal 36);
- advancing "green" transportation aligned with long-term urban development strategies and environmental safety measures;
- initiating the replacement of outdated vehicles with newer, more eco-friendly models through incentivized disposal programs;
- promoting the growth of electric transportation and enhancing public transit systems (Green Strategy 2019-2030).

The electrification of the transportation sector, particularly railways and motor traffic, holds substantial energy efficiency potential according to researches (Energy Charter, 2022).

Buildings

The residential sector emerges as the predominant consumer of energy in Uzbekistan, representing a substantial 34.8% of the TCF. When combined with the tertiary sector (commerce and public services), the collective energy usage of all buildings amounts to 48.4% of TFC (IEA, 2022-a). Notably, during the period spanning 2010 to 2019, the housing sector witnessed an annual increment of over 12 million square meters in new residential constructions, with the capital city of Tashkent alone contributing an average of more than 1.6 million square meters annually. Additionally, this expansion has notably exacerbated the decline in urban air quality.

At present, there is a lack of sectoral documentation or roadmap that delineates a strategic approach toward greening buildings in Uzbekistan. While some targets for improvement of buildings have been stipulated in multi-sectoral development strategies, the methodology and technical details are often not specified in such documents. Moreover, building codes currently lack minimum energy efficiency standards aligned with climate change-related objectives (IEA, 2022-a). This underscores a need for the formulation and implementation of robust policy

frameworks aimed at fostering energy-efficient and environmentally sustainable building practices.

While there are existing government incentives for buildings with environmental components (especially installed solar panels), the execution of targeted measures to promote green building development is not evident. According to CPEIR (2023), it is necessary to establish standards and requirements for both green and energy-efficient buildings. Additionally, introducing energy-efficient standards for household equipment is important, along with mandating their implementation for new buildings under construction.

Some of the targets and policies in this sector are include the following:

- To increase energy efficiency in buildings and structures by 30% (New Uzbekistan Development Strategy for 2022-2026, goal 96);
- Wide implementation of renewable energy sources in the housing and communal economy, social sector facilities and other areas, promotion and improvement of energy efficiency. (New Uzbekistan Development Strategy for 2022-2026, paragraph 7);
- By 2026, take measures to cover at least 25% of the electricity used for buildings and structures of offices, organizations and enterprises from renewable energy sources; (Green Strategy Action Plan 2030, chapter 3);
- mandatory solar panel installations on 50% of new multi-storey buildings (PP-57 dated 16.02.2023).

According to PP-5577 dated 14.11.2018, all new public or commercial buildings must undergo an energy audit passport process before they can be commissioned, except for those that receive green building certification (BREEAM and LEED). The efficiency of this rule remains uncertain as there has been an insignificant increase in the number of green certified buildings, and data on the energy efficiency of buildings in the country remains limited.

### 4.4.3 Industry

IPPU sector ranks third in terms of GHG emissions, following the energy and agriculture sectors. The primary sources of emissions within the IPPU sector include

cement manufacturing, ammonia and nitric acid, steel and glass production, accounting for more than 92.5% of the sector's total emissions (FBUR, 2021).

Green Strategy Action Plan 2030 outlines the following targets for industry sector:

- increasing energy efficiency in industry by at least 20 percent;
- accelerating the implementation of environmental, social and corporate governance (ESG) principles in industrial enterprises;
- ensuring "green" and low-carbon development of the national economy, in particular industry;
- introduction of wastewater treatment and circular water supply at industrial enterprises;
- installation of local treatment facilities, reconstruction and modernization of existing ones, taking measures to increase the scale of reuse of purified water for technological or domestic purposes.

Achieving the stated objectives in the industrial sector poses a significant challenge due to its diverse nature and specialized knowledge requirements. It is of high importance for relevant stakeholders to incorporate the latest knowledge and expertise when addressing these goals, as many practices such as circular water supply, energy audits in industrial facilities, and other initiatives may involve methodologies that are new to the country. To effectively tackle evolving challenges and shifting circumstances, it is essential to constantly innovate new methods to drive advancement. This involves employing cohesive, integrated strategies that incentivize businesses and encourage proactive industrial initiatives and solutions. It also entails increasing awareness of opportunities and advantages, facilitating access to expertise, knowledge, and technologies, and fostering stable regulatory conditions conducive to progress.

### 4.4.4 Agriculture

In 2017, the agriculture sector in Uzbekistan was the second-largest contributor to GHG, comprising 17.8% of the country's total emissions. Agriculture plays a crucial role in transitioning the country towards a green economy, offering both decarbonization potential and substantial contributions to the national GDP (21% in 2022) (Uzstat, 2024-b). Additionally, it serves as a major source of employment,

accounting for 26% of total employment in 2022 (World Bank, 2024-b). However, the sector faces enormous challenges from climate change and environmental degradation, threatening both production levels and income growth.

The sustainability of agricultural production is threatened by dwindling water resources and diminishing soil fertility, exacerbated by deficiencies in the energy sector, hindering the efficient operation of essential irrigation systems. According to research, if there is a decrease in water availability ranging from 10% to 30%, it could lead to a reduction in agricultural output by anywhere from 6% to 28%. Correspondingly, employment in the sector could decrease by 55,000 to 250,000 jobs (UNDP, 2021).

Some of the targets and policies in this sector include the following:

- To double the incomes of farmers and rural households, and to achieve an annual growth rate of at least 5% in agricultural production through the intensive advancement of agriculture practices (New Uzbekistan Development Strategy for 2022-2026, goal 30);
- Increasing water use efficiency by 25 percent, bringing the total area of land covered by water-saving technologies for irrigating, including drip irrigation technologies (Uzbekistan – 2030 Strategy, goal 62);
- Ensuring rational water use in the agricultural sector, by modernizing irrigation systems and increasing in the share of water channels (Uzbekistan – 2030 Strategy, goal 63);
- PP-5853 “Agricultural Development Strategy of the Republic of Uzbekistan for 2020-2030”, dated 23.10.2019, covers nine strategic priorities, the first being food security of the population. Within its framework, the following key targets are expected to be achieved by 2030:
    - increase in the rate of processed products up to 30%;
    - gradual increase of state budget expenditures for agricultural research to achieve 1% (as a share of the gross agricultural product);
    - growth of average labor productivity in agriculture by 1.7 times (up to 6.5 thousand US dollars per employee per year);

- advancing scientific research, enhancing educational programs, improving information and consultation services in agriculture and rural development, and establishing a transparent system for sector-specific statistics.

- Green Strategy Action Plan 2030 outlines key focus areas:
  - promoting climate-smart sustainable practices for diversified agricultural production, fostering a sustainable agro-ecosystem;
  - encouraging both diversification and specialization of crop production on farms to enhance resilience against climate-related risks;
  - developing and adopting methods for sustainable pasture and pastureland management to preserve ecological health and minimize land and forest degradation;
  - planting trees with climate-resistant qualities to mitigate erosion, sand and dust storms, and enhance overall ecosystem and infrastructure resilience.

### 4.4.5 Waste reduction and recycling

Uzbekistan has witnessed significant growth in waste generation, attributed to population growth, development, and lifestyle changes. This surge has led to an increase in municipal solid waste (MSW) from 6.933 million tonnes in 2016 to 7.425 million tonnes in 2020 (Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan, 2023).

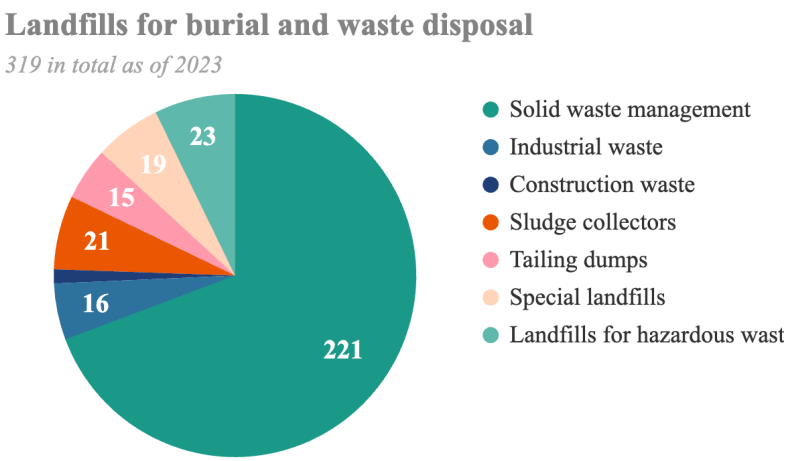



**Figure 4. 9 :** Landfills for burial and waste disposal : Landfills for burial and waste disposal (MEEPCC, 2023).

In 2017, GHG from the waste sector constituted 1.4% of overall GHG. Methane emissions dominated the waste sector emissions, comprising 94.8%, while nitrous oxide emissions contributed 5.2% (NDC2, 2021). In Uzbekistan, there are 319 landfills for burial and waste disposal in total (Figure 4.9).

Several initiatives and strategies have been outlined to address waste management challenges in Uzbekistan:

- PP-4291 "On Approval of the Strategy for Municipal Solid Waste Management in the Republic of Uzbekistan for the period 2019-2028" dated 17.04.2019, outlines main reforms for waste management important for green economy, and provisions the following:
    - improving pricing and optimizing tariffs in the field of sanitary cleaning;
    - use of solid household waste objects as sources of alternative energy;
    - ensuring the recycling of at least 60 percent of generated solid waste; However, this target was updated to 65% by 2030 with Green Strategy Action Plan 2030. Current rate of recycling of waste is 32% (Ministry of Ecology, Environmental Protection and Climate Change, 2023).
    - increasing the volume of processing of specific solid household waste (mercury-containing waste, tires, batteries, used oils, packaging waste, etc.) up to 25 percent;
    - reducing the volume of solid household waste sent for disposal to landfills by up to 60 percent;
    - bringing the condition of all landfills into compliance with established requirements, complete reclamation of the lands of liquidated landfills;
    - use of alternative energy sources at solid waste management facilities up to 35 percent;
    - ensuring monitoring of the condition of landfills (monitoring the condition of underground (ground) water and atmospheric air) up to 100 percent.

This strategy seeks to establish a comprehensive waste management system due to the absence of a robust institutional and legal framework. By emphasizing organized waste management, full-service provision, and promoting recycling, reuse, and energy

recovery, the strategy aims to reduce landfill dependency and enhance environmental sustainability.

Despite these initiatives, several challenges persist. The insufficient provision of waste management services in rural areas, inadequate infrastructure, and the inadequacy of existing landfills are significant hurdles. Challenges also extend to managing industrial waste, medical waste, e-waste, and batteries due to limited recycling and disposal technologies (Ministry of Ecology, Environmental Protection and Climate Change, 2023).

The prevalence of illegal dumps, coupled with the absence of regular monitoring, further complicates waste management efforts. Research conducted by Radkevich et al (2022) in the Tashkent region reveals that illegal dumps in rural areas vary in size, composition, and structure, ranging from 1.0 to 18,895 m2, with approximately 50% falling between 100m2 - 5000m2. Given the extensive and uneven distribution of these dumps, comprehensive ground monitoring is practically unfeasible, requiring significant resources in labor, time, and finances. Morever, in 2023, Uzbekistan recorded over 17,000 instances of infractions concerning the disposal of waste in unspecified locations and the dumping of industrial waste (Kun.uz, 2024). This phenomenon is attributed to low environmental awareness, inadequate waste management infrastructure, and a lack of regular landfill monitoring systems.

With waste generation projected to increase in Uzbekistan due to population growth, estimated to reach 16-16.7 million tons by 2028, effective waste management becomes increasingly critical (Kun.uz, 2024-a). The waste sector holds significant importance in greening the economy by presenting opportunities for reuse and recycling of manufacturing product (Nandy et al., 2022).

#### 4.4.6 Water

Access to clean water and proper sanitation is crucial for sustainable development, particularly in developing countries where investments in water infrastructure are needed to achieve the benefits of a green economy (Laitinen et al, 2020). Green infrastructures are increasingly seen as vital components of water management

strategies, aiding in both immediate and long-term sustainability efforts (Liu and Jensen, 2018).

Uzbekistan ranks among the 25 countries most vulnerable to water stress, a situation worsened by climate change. Inefficient water use, outdated infrastructure, and poor agricultural practices contribute to land degradation and toxic dust storms in the Aral Sea basin (CPEIR, 2023).

The latest reforms outlined in the mentioned documents below entail a series of actions being implemented across all surface water bodies in the country. These measures aim to identify and address violations in water management, eliminate factors leading to irrational water use, and ensure adherence to regulations governing water usage and consumption:

- PP-3823 “On measures to improve the efficiency of water resources use" dated 02.07.2018
- DP-6024 "On approval the water sector development concept of Uzbekistan for 2020-2030" dated 10.07.2020
- DP-101 "On measures for the effective organization of public administration in the field of water management in the framework of administrative reform" dated 20.06.2023

New Uzbekistan Strategy for 2022-2026 (Goal 31) outlines plan for a distinct state program to radically reform the water resources management system, emphasizing water conservation. The goal is to save a minimum of 7 billion cubic meters of water, reduce electricity consumption in water facilities, and adopt public-private partnership principles for managing water facilities. Goal 34 of this strategy aims to raise the population's access to drinking water to 87%, involving the modernization of wastewater systems in 32 major cities and 155 district centers. The "Uzbekistan-2030", with its third section outlining organizational and practical steps towards water resource conservation and environmental preservation. This includes a target of enhancing water use efficiency in the country by 25% and expanding the application of water-saving technologies for irrigating agricultural crops to cover 2 million hectares of land.

PP-107 "On urgent measures to increase the efficiency of water resources use" focuses on measures to enhance water resource efficiency. The document outlines key directions for 2023, including the precise allocation of existing water resources, increased state support for water-saving technologies, and the incorporation of modern information and communication technologies in water management. Effective January 1, 2025, a nationwide "Water Accounting" information system is expected to be implemented, enabling the electronic generation and approval of monthly reports between water supply organizations and consumers through digital signatures.

### 4.4.7 Forestry

Uzbekistan possesses a small amount of forest, covering about 3.68 million hectares of land, which is only around 8.6% of the country's total land area (Agostini and Setlur, 2022). Country's forests act as carbon sinks; absorbing approximately -8632.2 Gg of CO2, equivalent to about 4.5% of the nation's total GHG (in 2017), forestry emerges as a significant aspect of environmental management for a green economy (NDC2, 2022).

Moreover, forests in Uzbekistan primarily serve protective purposes, playing a vital role in combating desertification, erosion, and various natural disasters. They also safeguard irrigated farmlands and pastures from degradation, exerting a substantial influence on other sectors of the national economy, including agriculture, livestock, and water preservation (Zakhadullaev, 2018).

Some of the sectoral targets in forest management are summarized below:

- To expand forest land to approximately 14 million hectares or 32% of Uzbekistan's territory by 2030 (Concept for forest management development (PQ-4850));
- To bring forest plantations in the Aral Sea region to 2.3 million hectares (Strategy of Uzbekistan 2030);

Over the last 30 years, Uzbekistan's forests have suffered degradation from unregulated animal husbandry, increased demand for wood in energy-scarce rural areas, and the encroachment of irrigated agriculture. Additional pressures stem from shifting climate conditions, including wildfires, droughts, and outbreaks of pests and diseases, potentially worsened by climate change (World Bank, 2022-b). Thus, the challenge facing Uzbekistan's forest sector is to advance elements aligning with the green economy, such as promoting green jobs, fostering sustainable consumption

habits, enforcing land use planning to prevent agricultural expansion into forests, enhancing recycling and recovery initiatives, expanding the provision of renewable energy, and optimizing ecosystem services.

### 4.4.8 Other areas of green initiatives

In this section, cicular economy practices contributing to green economy are considered. The concept of green economy encompasses elements from circular economy, emphasizing resource efficiency and acknowledging the importance of ecological processes (D'Amato et al., 2017).

In Uzbekistan at the present time, circular economy practices remain relatively unfamiliar in both public and private sectors. Several studies have recommended that the country should adopt a circular economy action plan, complemented by the establishment of a legal framework and regulatory environment to facilitate progress in this area (World Bank, 2022-c, Teo et al., 2023). Despite limited evidence of circular economy principles being implemented, initial efforts are underway to adopt them.

Green Strategy Action Plan 2030 provisions the following:

- Enhancing industrial wastewater treatment efficiency and promoting circular water supply involve installing local treatment facilities, upgrading old structures, and expanding the reuse of purified water for various purposes.
- Executing circular economy practices in specific value chains and sectors involves formulating and presenting to the Cabinet of Ministers a five-year action plan for applying circular economy principles in agriculture and textiles. Additionally, recommendations for establishing Eco-Industrial Parks (EIP) to expedite the adoption of decarbonization and circular economy practices will be put forward.

Moreover, in March 2020, the World Bank initiated a Technical Assistance (TA) project, supported by the Korea Green Growth Trust Fund (KGGTF), to advance circular economy initiatives in Uzbekistan. This comprehensive effort encompasses analytical studies, capacity development, and knowledge sharing, emphasizing the

circular economy as a means to achieve a green economy. The TA specifically targets the agriculture-food value chain, conducting an in-depth evaluation to enhance natural resource efficiency and mitigate issues such as agriculture and food waste, pollution, and greenhouse gas emissions. Project is expected to end in late 2024, underscoring the commitment to fostering circular economy in Uzbekistan (KGGTF, 2024).

Considering the preliminary nature of these efforts and their anticipated timelines for implementation, it is premature to evaluate their effectiveness at this stage.

#### 4.4.9 Education and capacity building

Green skills are the competencies necessary to thrive in a sustainable society, encompassing knowledge, abilities, values, and attitudes (Arthur, 2022). As the world transitions to greener economies, these skills are essential for achieving sustainable goals, including upgrading infrastructure, enhancing resource-use efficiency, adopting clean technologies etc., thereby facilitating the growth of the green economy.

Although development documents emphasize the importance of training personnel for green economy development, they often lack specific measurable targets. However, prompted by a separate resolution from the President, the establishment of the "Central Asian Green University" in Uzbekistan has been initiated, introducing innovative programs in ecology, environmental policy, eco-journalism, and related fields, marking a significant step in promoting environmental and green education. Furthermore, internal quotas for government universities have begun prioritizing programs related to environmental sustainability, although they are not explicitly labeled 'green'. Research conducted by Vahabova (2023) revealed that in the 2022/2023 academic year, over 30% of personnel undergoing training are dedicated to disciplines related to the green economy, representing a substantial increase from the 5% recorded in the 2019/2020 academic year. However, in 2023, IFMR conducted a pioneering study in Uzbekistan focusing on the capacity shortage in "green" sectors. The research highlighted key areas of the "green" economy, with 18.4% of respondents identifying waste processing, 16.9% emphasizing "green" construction, and 12% selecting RES as significant sectors. Concerning the deficit of specialists in various domains, the most substantial demand was observed for experts in renewable energy

sources (RES) at 17.3%, waste processing at 15.4%, and urban area planning, including architects specializing in energy-efficient houses, at 10.7% (IMRS, 2023).

Universities, including their regional branches, have initiated training programs to prepare professionals for the transition to a green economy:

- Specialized fields include biotechnology, renewable energy engineering (with a focus on solar and wind energy), and efficient use of water and land resources;
- Training extends to bioeconomics, climate risk assessment, as well as design, operation, and production of energy-efficient technologies, including artificial intelligence.

Efforts towards sustainable and green development are underway, yet there remains a noticeable gap in the provision of organized personnel training at the governmental level, particularly for individuals already engaged in these fields. Currently, there is a lack of mandatory or voluntary short programs aimed at raising awareness and building capacity in green skills. Interestingly, there is no evidence that either the Ministry of Employment and Poverty Reduction, nor the Ministry of Ecology, Environmental Protection, and Climate Change of the Republic of Uzbekistan, or even the Ecological Party, have taken initiative in this regard. A central decision from higher authorities appears significant to address this issue and recognize the significance of structured training programs for the development of green skills.

### 4.4.10 Green technology

Uzbekistan has shown progress in the development of green technology, aligning with initiatives and targets outlined in the country's development documents. Some of these are summarized below:

- For the first time, in 2022-2023, large production plants for solar panels were launched in the country (Spot.uz, 2022; Erzikov, 2023);
- In 2020-2023, there has been introduction of more than 14 new types of innovative and sustainable construction materials, including plasterboard, foam block, polystyrene block, porcelain tiles, sandwich panels, soft roofing materials, and heat-insulating materials (Rustamova, 2021);

- Investment Agreement was signed on “Organization of production of electric and hybrid vehicles and their components in Uzbekistan” between the Uzbekistan and the Chinese conglomerate BYD. The planned production volume at the first and second stages of the investment project will be 50 thousand units, and with the completion of the third stage the figure will reach 300 thousand cars (Daryo.uz, 2023);
- The state systematically stimulates the import of electric vehicles: since 2019 (PP-3818 dated 29.06.2018), customs duties and excise taxes on the import of electric vehicles have been abolished. From 2021, the 3% fee for registering an electric vehicle with the traffic police has been abolished. In 2023, VAT was reduced and benefits were announced for the production of electric vehicles and business at electric filling stations (PP-443 dated December 19, 2022).
- Green Economy Transition Strategy for 2019-2030 provisions:
  - studying the adoption of "green" technologies, including resource-saving and waste-free production methods, safe chemicals, and the practical utilization of renewable energy;
  - implementing innovative developments and supporting start-up projects, facilitating their commercialization, and facilitating technology transfer;
  - the development and submission to the Cabinet of Ministers of proposals for the development of “green” technologies, improving the integration of science and production.

However, despite these efforts, there is still more to be done to fully explore and capitalize on the potential of green technology in Uzbekistan. For example, to incentivize the adoption of green technologies, it is imperative to develop a robust legal and regulatory framework, regularly establish fiscal and non-fiscal incentives. This entails defining and approving green labeling and standards across various sectors, establishing minimum energy efficiency requirements, and implementing mechanisms to encourage investment in environmentally sustainable practices. By solidifying these foundations, Uzbekistan can create a conducive environment for the widespread adoption of green technologies, driving sustainable growth and mitigating environmental impact in the long term.

## 4.5 SWOT Analysis

**Table 4. 6 :** Summary of SWOT analysis for green economy development

| **Internal factors** | |
|---|---|
| ***Strengths*** | ***Weaknesses*** |
| - Sustained economic growth<br>- Potential for substantial green energy mix<br>- Rich natural resources to support green investment<br>- Strong commitment towards green transition | - Highly centralized governance system<br>- Private sector challenges<br>- Prevalence of shadow economy<br>- Limited number of domestic investors<br>- Inefficient urban growth policies<br>- Infrastructure challenges<br>- Poor capacity building for green economy<br>- Data gaps and fragmentation |
| **External factors** | |
| ***Opportunities*** | ***Threats*** |
| - Enhanced international support<br>- A young and fast-growing population<br>- Potential green bond financing<br>- Expanding green markets<br>- Potential to improve and benefits from circular economy | - Risks associated with the labor market<br>- Moving from fossil fuels to renewable energy is a complex process<br>- Weak policy enforcement and implementation<br>- Growing risks from IPPU sector |

**<u>Strengths</u>**

**Sustained economic growth**

According to the World Bank (2024) forecasts, Uzbekistan's economy is projected to sustain growth rates of approximately 5.3-6% until 2026. Despite recent external challenges such as the COVID-19 pandemic and Russia's invasion of Ukraine, the economy has demonstrated resilience, owing in part to its modest levels of government and external debt (remaining below 40% over the past five years, within the allowed 60% of GDP debt limit) (Kun.uz, 2023-a; Ministry of Economy and Finance, 2022), a decreasing budget deficit (approximately 4.8% in 2022), substantial international reserves (estimated at USD 33.5 billion for 2023-2024) (OECD, 2023-a). Uzbekistan's sound debt management strategy played an important role in achieving a BB- sovereign credit rating in 2023 as assessed by Standard and Poor's and Fitch Ratings, While a BB- rating categorizes Uzbekistan's creditworthiness as speculative and non-investment grade, it positions the country alongside nations such as Brazil, Georgia, and Greece in the same rating category (Agency for Attracting Foreign Investments, 2023). The economic stability and creditworthiness demonstrated by Uzbekistan create a favorable environment for the development of a green economy. Leveraging

these strengths can support investments in renewable energy, energy efficiency, sustainable infrastructure and other green projects, helping to achieve long-term sustainability goals.

**Potential for substantial green energy mix**

The current proportion of RES in electricity supply in Uzbekistan stands at 10.2% (IEA, 2019), and there are targets to increase to more than 30% until 2030. Due to its significant size, geographical features and climatic conditions, Uzbekistan has great potential in the field of solar and wind energy. The country's abundance of sunshine (about 300 sunny days a year) and vast areas well suited for solar power plants further contribute to this potential (UNDP, 2022-b). As per World Bank projections in 2023, renewable energy sources have the potential to contribute to 70 percent of the domestic energy supply by 2060 (World Bank, 2023). Uzbekistan possesses significant renewable energy resources, with a substantial portion attributed to solar energy. The overall gross potential for solar energy is calculated at 2,134 x 10^3 PJ, and the technical potential is estimated to be 7,411 PJ. This figure is nearly four times the nation's present primary energy consumption (World Bank, 2013). To achieve these goals, a comprehensive strategic vision must be developed. Coordinated action, infrastructure access, and attracting large investments are essential components of the strategy.

**Rich natural resources to support green investment**

As identified in literature, enabling conditions for green economy includes significant capital and instrastructure investments. Analysis of available export and manufacturing data presented in Section 1.1, Uzbekistan's rich natural resources, including agricultureal products, minerals, and metals, could potentially provide a solid foundation for developing a green economy. Provided sustainable practices are integrated, along with initiatives focused on waste reduction and carbon footprint reduction, these resources and associated revenue from them can strategically be utilized for capital expenditures to support green activities. Natural resources significantly contribute to the government's income, with an estimated 15% (World Bank, 2022-a) of the state budget derived from revenues generated by oil, gas, and minerals. Moreover, natural resources play a crucial role in providing income for

households in rural areas, especially through the agriculture sector, which constitutes 23% (2022) of employment (UzStat.uz, 2022).

**Strong coommitment towards green transition**

The analysis of existing policies and plans reveal that the GoU has demonstrated a strong commitment to promoting environmental sustainability and transitioning to a green economy. The introduction of the Green Economy Transition Strategy, later Green Taxonomy and other supporting policies underscores its dedication to fostering environmentally friendly practices. Notable among these documents are the drafts of Climate Change Strategy for 2030, the Environmental Code, long-term decarbonization strategy, the legislation pertaining to renewables, climate, and environmental monitoring - MRV, these documents collectively provide a strategic, legal, and operational foundation for Uzbekistan's transition to a green economy. Furthermore, Law "On Public-Private Partnership" was enforced in 2019 that has become an important tool for stimulating investment and the development of environmentally sustainable projects, contributing to the country's transition to a green economy. For example, in 2022-2026, PPP projects worth $14 billion will be implemented, which will cover half of the investment needs for sustainable development (Spot.uz, 2023).

**<u>Weaknesses</u>**

**Highly centralized governance system**

Despite recent reforms, local governments lack authority in planning for revenue generation, managing finances independently, and making significant capital investments (World Bank, 2023). To improve territorial responsiveness to green initiatives there is a need to clearly define the roles, responsibilities, and accountabilities of subnational administrations. This alignment should be coupled with the necessary fiscal and administrative capabilities. Municipalities, particularly in urban areas, are increasingly important in promoting local climate actions through urban planning, regulation, and incentives within their local area. The implication is that granting more autonomy and enhancing the capacity of local governments could lead to more effective and responsive climate action, especially in urban settings.

**Private sector challenges**

Uzbekistan's economy is predominantly influenced by the state, which heavily favors SOEs (World Bank, 2022-d). Approximately 2,800 SOEs are directly controlled by the central government in Uzbekistan, collectively employing 18% of the workforce, contributing to 20% of exports, and representing about half of the GDP. The significant presence of SOEs across various sectors such as energy, finance, transport, and agriculture.

The overrepresentation of SOEs in the country is believed to impede competition, innovation, and impose financial strains on the state budget, contributing to a potential slowdown of the economic growth. This is often attributed to inefficient use of capital and labor by SOEs (OECD, 2023-a). The government has demonstrated commitment to improving corporate governance as part of its agenda to privatize many SOEs in the upcoming years. Notably, measures have been taken to introduce supervisory boards with independent members. However, the central government maintains authority over CEO appointments in SOEs, and there is overrepresentation of civil servants on supervisory boards (Izvorski et al., 2021). According to OECD (2021), international best practices in SOEs management refer to appointment of management and supervisory board members should be depoliticized and professional. Studies also indicate that reforms on SOEs are possible without privatization, but by focusing on improving performance of SOEs (Phi et al, 2019). Thus, to mitigate SOE risks, the GoU should limit their presence to critical sectors such as energy, telecommunications, transportation etc., while ensuring independent monitoring and facilitating the adoption of performance improvement measures based on best practices.

On the other hand, the government must ensure private sector receives necessary infrastructure, technology and other resources which would incentivize it to increase investment in green initiatives (Ebeke and Jaumotte, 2023).

**Prevalence of shadow economy**

In Uzbekistan, the prevalence of the shadow economy[9] is notably higher compared to many other developing nations. While the shadow economy constitutes a considerable

[9] IMF's definition "Also called the underground, informal, or parallel economy, the shadow economy includes not only illegal activities but also unreported income from the production of legal goods and services, either from monetary or barter transactions. Hence, the shadow economy comprises all economic activities that would generally be taxable were they reported to the tax authorities"

portion of GDP globally, typically around 7.5% even in the most developed countries, in Uzbekistan, it is estimated to be much larger, particularly prominent in sectors like services and agriculture, where it comprised 40-50% of GDP in 2019 (Hamidov and Davletov, 2020). Addressing this issue is important for improving regulatory oversight and financing sustainable development initiatives.

**Limited number of domestic investors**

According to the World Bank (2022-a) review, private investment in green initiatives in Uzbekistan is currently minimal due to several factors. These include the absence of a robust regulatory framework for green finance instruments and the lack of sufficient incentives in GHG regulation. Additionally, the scarcity of green private sector projects is linked to modest carbon reduction goals. Furthermore, there is a lack of active engagement from financial institutions and investors in discussions pertaining to the risks and potential returns associated with green finance. Currently, in Uzbekistan, funding for the green transition and reliable energy directly depends on attracting foreign investment, loans and grants from international financial institutions, foreign public financial institutions and other foreign donors. It remains challenging to discern the extent of government-directed investment compared to authentic commercial investment (World Bank, 2022). A nascent banking and financial sector, combined with constrained and illiquid capital markets featuring high interest rates, constrains the ability of small and SMEs to secure credit. Moreover, Uzbekistan's banks possess the ability to make domestic investments, with some banks like SanoatQurilishBank (SQB) initiating investments in green projects. Nevertheless, the banking industry is known for its excessive bureaucracy and cautious approach to risk, prompting entrepreneurs and small businesses to seek alternative sources of private financing in informal lending markets (UNDP, 2021).

**Inefficient urban growth policies**

Barriers to more efficient development include outdated building codes, stagnant city master plans, and outdated infrastructure with inefficient utility rates. A highly centralized urban planning and management system hampers proper densification efforts, resulting in ineffective sprawl. This also means that cities are expanding at the expense of agricultural land, which poses a threat to food security. Outdated master plans were designed for extended periods, failing to align with the swiftly evolving

needs of cities. Consequently, these plans became irrelevant, and the creation of new ones was avoided due to the associated high costs. In addition, utilities face financial problems due to the government setting tariffs below cost, resulting in insufficient revenue to invest in infrastructure. The lack of official subsidies further limits modernization efforts, perpetuating a cycle of dilapidated infrastructure, waste and environmental problems. Dependency on national programs, coupled with outdated urban plans and migration restrictions, further hampers proper regional development (Sivaev et al., 2022).

**Infrastructure challenges**

Uzbekistan's green transition faces infrastructure challenges, including aging assets, unreliable service delivery, and high transport costs. In 2017 and 2018, manufacturing companies experienced between 24 to 29 days of power outages annually. This led to substantial output losses, estimated at 24 percent for large firms and 38 percent for small firms, due to service disruptions, including electricity, gas, and water (World Bank, 2022-d). Investing in replacing aging infrastructure presents economic benefits and an opportunity for transitioning to lower-carbon options. The transport sector, primarily reliant on road transport and natural gas-fueled vehicles, requires modernization alongside energy sector transformation. The International Transport Forum proposes significant expansions in road capacity (486% by 2030, 1365% by 2050) and rail capacity (459% by 2050). Among Central Asian nations such as Kazakhstan, Kyrgyzstan, and Tajikistan, the need for increased road capacity enhancements in Uzbekistan is notably higher to accommodate rising demands (ITF, 2019).

**Data gaps and fragmentation**

In Uzbekistan, data related to both the environment and the economy are collected from various organizations, such as the Agency for Statistics under the President of the Republic of Uzbekistan, the Ministry of Ecology, Environmental Protection and Climate Change, and the Academy of Sciences. These data are used to calculate various environmental and economic indicators. However, the lack of a coherent framework for these indicators, which was last abandoned in 2011, results in measurement gaps, inconsistency with international standards and results in fragmented data that is not consolidated into a single accessible database for all

relevant institutions (World Bank, 2023). The absence of a coherent framework for environmental and economic indicators impedes the monitoring of progress, efficient resource allocation, and policy formulation, thereby challenging the development of a green economy.

**Skills and capacity gaps for green economy**

With the emergence of the green economy and the increasing proliferation of green policies and initiatives, the GoU is facing a pressing shortage in skills and capacity. This skills gap is further exacerbated by the minimal progress identified in Goal 16 of the SDGs in Uzbekistan, suggesting potential weaknesses in institutions supporting sustainable development. Recognizing that capacity building is a time-consuming process, it is imperative to strategically address this shortage promptly. While universities, including their regional branches, have initiated training programs for professions crucial to the shift to a green economy, there is still a low proportion of students pursuing fields related to green initiatives, estimated at around 30%, only for master's level students.

**Opportunities**

**Enhanced international support**

The prospect of international collaboration presents an important opportunity for Uzbekistan's transition to a green economy. Collaborating with international organizations and partnering with other countries can generate various benefits, particularly in terms of financial and technical support for green initiatives. By forming strategic alliances, Uzbekistan can access financing, expertise and technological know-how that are crucial for the successful implementation of sustainable and environmentally friendly projects. In the last few years, international organizations such as World Bank, ADB, UNDP, EBRD have been actively supported Uzbekistan in greening the economy. Moreover, this study highlights that Uzbekistan has gained additional prospects for economic, environmental and social development through its participation in both the BRI and the European Union's GSP+. These partnerships provide opportunities for Uzbekistan to achieve its development goals in many dimensions, including improved infrastructure, trade facilitation, environmental sustainability and social welfare.

**A young and fast-growing population**

In contemporary Uzbekistan, where children and young people below 30 years constitute 53% (UzStat.uz, 2023) of the population, there is a unique demographic window that holds great potential for the country's future. In the next 15-20 years, this youthful demographic will evolve into the largest labor force Uzbekistan has ever experienced, presenting an exceptional opportunity for significant socioeconomic development. Youth groups play a pivotal role in instigating transformative changes within their localities, contributing to the collaborative development of broader adaptation and mitigation projects that address the specific needs of their communities. The emergence of low (or zero) carbon enterprises initiated by young people globally is a source of hope, underscoring the localized nature of a green transition (IIED, 2022). Investing in youth education and skills development in areas related to green economy can contribute to building a skilled workforce that supports the green transition. As well as this, by actively involving the youth in shaping the vision and policies for sustainable development, Uzbekistan can leverage the potential of its labor force to drive meaningful progress in green skills, technology, investment and transition as whole.

**Potential green bond financing**

In Uzbekistan, the utilization of green bonds presents a promising avenue for financing the country's transition towards sustainability, particularly in bolstering renewable energy projects and other impactful sectors. With a growing global emphasis on sustainable finance and increasing demand for green financial instruments, Uzbekistan stands to diversify its investor base by issuing green bonds aligned with its national transition objectives. Leveraging the success of previous sovereign and corporate green bond issuances, Uzbekistan could further develop its domestic capital market and facilitate corporate issuances while addressing legislative barriers for subnational governments. Additionally, tapping into the burgeoning market for green mortgages offers another avenue for green bond issuance. Especially considering the potential demand for Islamic financial products among a sizable portion of Uzbek citizens, identifying themselves as Muslims and approximately 27% of citizens do not have bank accounts citing reasons related to their faith. However, to fully realize the potential of Islamic finance, Uzbekistan must address regulatory gaps and enhance awareness of Islamic financial instruments, such as sukuks, which offer Shariah-

compliant alternatives to traditional bonds, thus attracting both domestic and foreign investors while stimulating the domestic capital market's growth (OECD, 2023-a).

**Expanding green markets**

Ongoing economic reforms present the opportunity for Uzbekistan to explore emerging green markets, and sustained, inclusive economic growth can provide the financial capacity to enhance resilience to climate change. Analysis reveals that Uzbekistan has the potential to tap into more than $2 billion in annual exports by participating in existing green value chains, not including potential future expansions. Expediting trade integration would foster heightened competition, efficiency, and productivity, allowing Uzbekistani businesses to access external markets as part of the transition to a green economy (World Bank, 2023). In terms of export destinations, Uzbekistan possesses the most significant potential for exporting green goods to the Europe and Central Asia region. However, North America and East Asia Pacific also exhibit substantial export potential. Regarding product categories, the highest potential for green exports is found in machinery and electrical appliances designed for environmentally friendly purposes. With rapidly increasing incomes, the public sector, businesses, and individuals can better absorb the associated costs of fortifying resilience against climate change impacts and shifting towards a low-carbon economy. For accelerated economic growth, Uzbekistan can unlock the potential of green markets by aligning its policy frameworks to actively and competitively engage in this transition (World Bank, 2023, Norkulov et al., 2022).

**Potential to improve and benefit from circular economy**

The adoption of a circular economy strategy promotes green growth and industrialization by eliminating waste through the design of regenerative and circular systems. As per UNECE (2023), shifting to a circular economy has the potential to generate approximately 4.5 trillion USD in global economic growth by 2030, simultaneously aiding in the restoration of natural systems. Designed for regeneration, a circular economy conserves and improves natural capital, maximizes resource yields, and reduces systemic risks through effective management of stocks and renewable flows. In collaboration with global entities like the World Bank, the United Nations Industrial Development Organization, the European Union, and the United Nations Development Programme, the government is intensifying its initiatives to implement

innovative and sustainable technologies. These efforts aim to enhance waste treatment and disposal, reinforce pollution control, reduce water and energy consumption, and improve production processes, particularly in sectors like textiles and garments. Despite these endeavors, there is room for further actions to sustain the established momentum and bolster support for endeavors aimed at achieving circularity (UNECE, 2022).

**Threats**

**Risks associated with the labor market**

Economic transformation will bring about changes in labor market demands, leading to the phasing out of certain jobs while creating demand for new skills in emerging industries. This shift can create challenges for individuals and families whose livelihoods may be affected by job changes or skills mismatches. During this transition, the changing nature of the labor market may create economic uncertainty and individuals may face difficulties adapting to changing work environments. Concurrently, the possible escalation of energy, water, and food costs may pose affordability challenges, leading to an increase in poverty. In the context of Central Asia and Uzbekistan, where women play a key role in agriculture, rising temperatures and extreme weather events could disproportionately affect them, placing a heightened impact on households led by women. Without intervention, climate change has the potential to significantly impact the economy, employment rates, and working conditions (World Bank, 2022-c).

**Moving from fossil fuels to renewable energy is a complex process**

Although fossil fuel subsidies have generally decreased in recent years, Uzbekistan stands out as the country with the highest level of such subsidies, accounting for approximately 6% of its GDP in 2020. In the structure of energy subsidies in Uzbekistan during 2010-2020 the share of natural gas decreased from 81.5% to 57%, while the share of electricity increased from 18.4% to 31.2%. The scale of support for the oil sector has also increased. Reducing these subsidies remains a complex process. Economic concerns, such as the potential impact on energy prices and inflation, as well as social considerations regarding access to affordable energy for households and industry, must be balanced with the need to promote more sustainable and cleaner energy sources.

On the other hand, renewable energy, in combination with flexible power generation, can help to reduce the fossil fuel dependence of the electricity sector of Uzbekistan. However, there are some obstacles associated with this transition. The upfront expenses associated with adopting renewable energy technologies are frequently viewed as impediments, posing financial challenges for individuals, businesses, and governments and restricting their capacity to invest in such technologies. Additionally, the implementation of large-scale energy storage systems can incur substantial costs, with the associated expenses of energy storage technologies, including batteries, pumped hydro, and thermal storage, serving as barriers to their widespread adoption (IEA, 2022-a). In Uzbekistan, the return-on-investment period for solar panels is approximately 8-9 years, primarily influenced by comparatively lower electricity tariffs. In contrast, in developed nations, this timeframe does not surpass 3 years for comparison (CABAR, 2022). Regarding social impacts, the presence of regulated utilities in the country suggests that end users may experience some protection, with the potential for the entire cost of green investments not being transferred entirely to customers through increased tariffs. A successful transition from fossil fuels to renewable energy sources in Uzbekistan requires comprehensive strategic and policy planning and timely implementation.

**Weak policy enforcement and implementation**

Green growth entails comprehensive changes across the entire economy, necessitating robust policy coordination and the establishment of an institutional and regulatory framework that spans various sectors. Strong political commitment is essential to effectively navigate tradeoffs between sectors and to ensure the continuity of actions across successive governments (Norkulov et al., 2022). According news sources, there has been frequent criticism from the President on poor implementation of policies and chasing after “targets” not quality of work (Kun.uz, 2023-b). If policy implementation and enforcement is inadequate, the intended impact of green initiatives will be undermined, possessing threat to economic development as whole.

**Growing risks from IPPU sector**

Both the SDG and Paris Agreement implementation analyses within this work, highlight that the sector poses significant challenges for Uzbekistan's green economy development. The sector not only shows minimal progress in achieving SDG goals

related to industrial sustainability but also has substantially increasing GHG emissions compared to other sectors, as evidenced by findings since 2019. The increase in emissions, particularly from industries like cement and ammonia production, underscores the urgent need for targeted interventions. As identified in Section 4.2.2, vulnerabilities in the CBAM and CEAP affecting the top 10 categories exported from Uzbekistan to the EU, with five of them from the IPPU sector, further underscore the sector's pivotal role in the green economy. Without effective measures to improve energy efficiency and adopt cleaner technologies in these industries, Uzbekistan risks falling short of its commitments under the Paris Agreement and hindering overall progress towards green economy.

## 5. CONCLUSION AND RECOMMENDATIONS

In conclusion, as Uzbekistan experiences population growth alongside rapid urbanization and widening disparities between rural and urban areas, there arises a pressing need to prioritize the sustainable utilization of natural resources and mitigate climate change effects. It becomes imperative to disentangle economic growth from carbon emissions and unsustainable consumption and production practices. Notably, with the burgeoning manufacturing sector and the ongoing urbanization trend, it becomes crucial to channel investments towards industries that are both clean and efficient, while ensuring inclusivity and resilience.

In addition, another relevance of the green economy to Uzbekistan is that this model helps the country achieve international sustainability commitments such as the SDGs and the Paris Agreement, as evidenced by literature review. Moreover, transitioning towards a green and sustainable economy can enhance Uzbekistan's international competitiveness by aligning its industries with the stringent environmental standards set by the European Green Deal, thereby facilitating smoother trade relations with not only the EU, but with other key partners of EU. While BRI investments can support renewable energy infrastructure, fossil fuel projects and insufficient environmental assessments risk hindering the country's transition away from carbon-intensive sources, and Chinese involvement could encourage over-dependence, limiting the development of domestic green industries and economic self-sufficiency.

As for the current situation in the country, the trajectory of green development has gained unprecedented momentum through the adoption of strategic documents and the establishment of ambitious targets, demonstrating a robust commitment to sustainable growth. Initiatives like the Green Strategy 2019-2030 and the Green Strategy Action Plan 2030 have laid out comprehensive frameworks for transitioning towards a green economy, spanning sectors from energy to agriculture and transportation. Moreover, the integration of climate change objectives into high-level strategic documents such

as the New Uzbekistan Development Strategy for 2022-2026 and the Uzbekistan - 2030 Strategy reflects a holistic approach to aligning national development goals with environmental priorities. Nevertheless, there remains room for improvement in policy development, with ongoing challenges such as delays in meeting specified deadlines and the need for more detailed and inclusive sector policies, particularly in areas characterized by high emissions. Furthermore, there are challenges stemming from targets that may require further elaboration, occasionally lacking clarity in measurability or a clearly outlined methodology for achieving the specified objectives. To maintain momentum, it is crucial to address these multifaceted challenges comprehensively and bolster monitoring mechanisms to ensure the effective implementation of green development initiatives.

Sectoral policy review showed that Uzbekistan is endeavoring to incorporate green development principles to some extent across various sectors of the economy.

- In the energy sector, the country is focusing on increasing the share of renewable energy sources, offering tax incentives, and modernizing infrastructure to enhance energy efficiency.

- Similarly, in the transportation sector, efforts are being made to transition urban public transport to environmentally friendly fuels, increase the share of electrified railways, and promote eco-friendly vehicle replacement programs.

- In the building sector, the country has set targets to improve energy efficiency, promote renewable energy sources, and mandate solar panel installations on new multi-storey buildings. Moreover, policies are in place to implement energy audit passports for new public or commercial buildings.

- In the industrial sector, the focus is on increasing energy efficiency, implementing environmental, social, and corporate governance principles, and promoting green and low-carbon development. Efforts are also directed towards wastewater treatment, circular water supply, and modernizing existing treatment facilities.

- Furthermore, the agriculture sector is prioritizing goals such as doubling farmer and rural household incomes, achieving annual growth in agricultural production, and increasing water use efficiency.

- Waste management policies aim to increase recycling rates, reduce landfill dependency, and improve landfill conditions.

- In the water sector, reforms are underway to enhance water management efficiency, conserve water resources, and modernize wastewater systems.

Additionally, efforts are being made to increase access to drinking water and adopt water-saving technologies in agriculture.

- In the forestry sector, targets focus on expanding forest land to combat desertification and erosion, while promoting sustainable land use planning and ecosystem services.

Through these sector-specific policies, Uzbekistan is advancing its commitment to green growth and sustainable development. Along with policy analysis, current challenges in various sectors were identified. To improve efficiency and meet broader goals, it is concluded that the government should set sector-specific emissions reduction targets which has not been done so far.

The key objective of this paper was to conduct a thorough analysis of Uzbekistan's progress towards greening its economy by employing the SWOT analytical tool.

The result of the analysis show that Uzbekistan exhibits a multitude of **strengths** conducive to the advancement of a green economy, as highlighted by its sustained economic growth, significant potential for a green energy mix, abundant natural resources, and steadfast commitment towards environmental sustainability. The country's stable economic trajectory, coupled with its proficient debt management and robust credit ratings, provides a solid foundation for attracting investments in renewable energy and sustainable infrastructure. Moreover, Uzbekistan's vast potential in solar and wind power, coupled with rich natural resources, offers ample opportunities for diversifying energy sources and promoting eco-friendly practices. The government's strong commitment to green transition, evident through the implementation of countrywide and sectoral policies and strategies towards green economy and decorbanization. However, the challenge lies in ensuring the effective enforcement of environmental regulations and integrating climate targets across all sectors to fully capitalize on these strengths.

**Weaknesses** identified in the country's transition towards a green economy challenge across governance, private sector dynamics, investment landscape, urban development, infrastructure, data management, and capacity building. The highly centralized governance system limits the autonomy and effectiveness of municipal governments, hindering local climate action efforts. The dominance of SOEs in key

sectors suppresses competition, innovation, and private sector growth, continuing socioeconomic inequality. Additionally, the prevalence of the shadow economy undermines formal sector development and government revenue streams. The scarcity of domestic investors in green initiatives underscores a lack of regulatory support, financial incentives, and engagement from financial institutions. Inefficient urban growth policies exacerbate environmental issues and fail to address population discontent, while infrastructure challenges impede reliable service delivery and modernization efforts. Fragmented data collection and poor capacity building further obstruct progress towards a green economy, highlighting the need for comprehensive reforms and strategic investments in human capital and institutional frameworks.

Analysis further identifies the **opportunities** that could significantly bolster transition to a green economy and mitigate existing weaknesses. International collaboration, particularly with organizations such as the World Bank, ADB, UNDP, and EBRD, offers essential financial and technical support, enabling the implementation of sustainable projects. Moreover, with 53% of the population being under 30 years old, Uzbekistan possesses a demographic advantage ripe for future labor force growth and innovation. By investing in youth education and involving them in green initiatives, Uzbekistan can harness this potential to drive meaningful progress in sustainable development. Additionally, the potential issuance of green bonds and the exploration of green markets provide avenues for financing renewable energy projects and stimulating economic growth. The adoption of circular economy principles further offers opportunities to generate economic growth while reducing waste and environmental impact. Collaborating with global entities and implementing innovative technologies can support Uzbekistan's transition towards a circular economy. These opportunities underscore the potential for Uzbekistan to capitalize on international collaboration, demographic advantages, financial instruments, and emerging markets to advance its green economy agenda and achieve sustainable development goals.

**Threats** identified are related to various areas that could impede Uzbekistan's transition to a green economy. Risks associated with the labor market transformation, such as job displacement and skills mismatches, may lead to economic uncertainty and exacerbate poverty, particularly affecting households led by women who play a crucial role in agriculture. Moving from fossil fuels to renewable energy faces hurdles due to

the upfront costs of adopting renewable technologies and the expenses associated with large-scale energy storage systems.

***Recommendations***

Based on a thorough review of literature and policies from credible sources, the SWOT analysis facilitated the development of specific recommendations tailored to Uzbekistan's unique context. These recommendations primarily stem from identifying weaknesses and threats linked to gaps in enabling conditions, as identified through a literature review, which facilitate progress towards a green economy.

It is observed from various sources that Uzbekistan's centralized governance system poses some limitations on the capacities of municipal (regional) governments, hindering their effectiveness in planning and implementing local climate actions. By partially decentralizing decision-making related to the green economy, the capabilities of regional governments can be enhanced. This process involves redefining the roles, responsibilities, and accountabilities of subnational administrations and building local capacities in urban planning, environmental regulation, and the implementation of green initiatives through targeted training programs.

Moreover, state dominance in Uzbekistan’s economy, particularly the prevalence of SOEs was found to be limiting competition and innovation. The government’s commitment to reforming SOEs by depoliticizing and professionalizing management and supervisory board appointments is crucial. Restricting SOEs to critical sectors like energy, telecommunications, and transportation, while promoting competition in other sectors, could drive efficiency and reduce the financial strain on the state budget. Furthermore, fostering a more competitive environment can stimulate private sector investment in green initiatives.

Another significant challenge is the shadow economy, which poses obstacles to regulatory oversight and sustainable development financing in Uzbekistan. Simplifying tax regulations, reducing bureaucratic hurdles, and improving the overall business environment can encourage informal businesses to transition to the formal sector, thereby increasing tax revenues and regulatory compliance. This shift is

essential for creating a transparent and accountable economic environment conducive to green investments.

The limited number of domestic investors in green initiatives is another idenfitifed weakness. Developing a robust regulatory framework for green finance instruments and providing financial incentives, such as green bonds and tax breaks, can attract private sector participation. Encouraging dialogue between financial institutions, investors, and government agencies about the risks and potential returns of green finance would build confidence and stimulate domestic investments.

Outdated building codes, stagnant city master plans, and inefficient infrastructure also impede green practices in Uzbekistan. Efficient urban planning and infrastructure upgrades are critical for reducing the environmental footprint of cities and enhancing their resilience to climate change. Furthermore, developing comprehensive plans to upgrade infrastructure with sustainable options will address service disruptions and reduce emissions. Investment in modern and resilient infrastructure is key to supporting long-term sustainable development goals.

Effective monitoring of progress and resource allocation requires reliable data. Establishing a coherent framework for environmental and economic indicators and consolidating data into a single accessible database will facilitate informed decision-making for green economy.

Another recommendation is addressing the significant shortage of skills and capacity, which poses a substantial barrier to the green transition. Collaborating with universities to expand training programs related to green initiatives and incentivizing students to pursue relevant fields will help bridge this gap. Enhancing vocational training programs will create a skilled workforce ready to meet the demands of a sustainable future. Capacity building is essential for ensuring that the workforce has the necessary skills to implement and maintain green technologies and practices.

Similarly, economic transformation will bring changes in labor market demands, potentially leading to job losses and skills mismatches. Implementing policies that support job transitions and skill development in emerging green industries can mitigate

these risks. Social safety nets and retraining programs will help individuals adapt to changing job demands, ensuring a smoother transition. Special attention should be given to vulnerable groups, such as women in agriculture, to ensure equitable support during the green transition.

Despite decreasing fossil fuel subsidies in Uzbekistan, transitioning to renewable energy remains challenging due to high upfront costs. Providing financial incentives for renewable energy investments and developing large-scale energy storage systems will facilitate this transition. Promoting public-private partnerships and leveraging international funding can offset the initial expenses. Ensuring affordability and accessibility of renewable energy technologies is critical for widespread adoption.

Moreover, the government should prioritize developing a comprehensive strategic framework for implementing circular economy principles. This framework would guide sectors in adopting practices that promote reuse, recycling, and resource efficiency throughout the production and consumption cycles. To enforce these principles effectively, Uzbekistan should establish corresponding regulations. These regulations could include setting minimum requirements for recycling and waste reduction in industries, as well as implementing mandatory eco-labeling to inform consumers about the environmental footprint of products.

The industrial sector's increasing greenhouse gas emissions pose significant challenges to Uzbekistan's green economy goals. Targeted interventions, such as implementing cleaner technologies and improving energy efficiency in industries like glass, cement, ammonia production (those with highest GHG), are important. Monitoring and regulating emissions from the industrial sector will help meet climate mitigation and resource efficiency goals for further development of green economy.

In conclusion, while Uzbekistan has made significant progress in advancing its green economy agenda in recent years, there remains ample room for further progress. Addressing the identified issues in this study could provide policymakers and stakeholders with valuable insights and foster informed decision making with regard to Uzbekistan's green economy development.

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## APPENDICES

**APPENDIX A:** Export data from Uzbekistan to EU27

**APPENDIX B:** Methodology of EPI

**APPENDIX C:** Reviewed documents list

**APPENDIX A**: Export data from Uzbekistan to EU27

| PRODUCT/PERIOD | 2022 | 2021 | 2020 | 2019 | 2018 | AAGR | Overall Growth Rate | Times increase | Share in whole export in 2022 | Share in whole export in 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| 01 Products of agriculture, hunting and related services | 16 013 749 | 17 370 022 | 10 252 673 | 13 227 027 | 9 209 866 | 21% | 0,74 | 2 | 1,893% | 5,478% |
| 02 Products of forestry, logging and related services | 23 | 26 143 | 67 944 | 6 | | | | | 0,000% | |
| 03 Fish and other fishing products; aquaculture products; support services to fishing | 22 | | | | | | | | 0,000% | |
| 05 Coal and lignite | 799 651 | 111 | 40 | | | | | | 0,095% | |
| 06 Crude petroleum and natural gas | | | | | | | | | | |
| 07 Metal ores | 2 030 958 | 5 576 | 2 686 | 3 260 | 3 501 | 9102% | 57911% | 580 | 0,240% | 0,002% |
| 08 Other mining and quarrying products | 11 137 500 | 29 380 384 | 3 557 | 24 475 | 24 606 | 206435% | 45163% | 453 | 1,316% | 0,015% |
| 10 Food products | 35 702 253 | 30 360 175 | 22 379 299 | 25 765 388 | 18 649 534 | 20% | 91% | 2 | 4,220% | 11,093% |
| 11 Beverages | 304 510 | 342 781 | 292 114 | 109 680 | 56 930 | 66% | 435% | 5 | 0,036% | 0,034% |
| 12 Tobacco products | 40 609 | 76 518 | 8 645 | 22 842 | 105 648 | 149% | -62% | 0 | 0,005% | 0,063% |
| 13 Textiles | 135 074 837 | 109 249 838 | 59 015 325 | 39 996 914 | 39 420 374 | 39% | 243% | 3 | 15,965% | 23,448% |
| 14 Wearing apparel | 23 994 806 | 5 816 615 | 7 363 361 | 13 755 650 | 6 081 289 | 93% | 295% | 4 | 2,836% | 3,617% |
| 15 Leather and related products | 9 443 937 | 6 975 950 | 4 981 978 | 6 433 841 | 4 247 540 | 26% | 122% | 2 | 1,116% | 2,527% |
| 16 Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials | 927 628 | 19 671 | 24 402 | 6 939 | 9 162 | 1206% | 10025% | 101 | 0,110% | 0,005% |
| 17 Paper and paper products | 6 257 641 | 5 400 113 | 6 688 036 | 4 026 945 | 1 384 914 | 63% | 352% | 5 | 0,740% | 0,824% |
| 18 Printing and recording services | 2 110 | | 1 409 | | 1 955 | | 8% | 1 | 0,000% | 0,001% |
| 19 Coke and refined petroleum products | 5 505 214 | 6 768 388 | 3 028 655 | 4 868 229 | 8 965 913 | 5% | -39% | 1 | 0,651% | 5,333% |
| 20 Chemicals and chemical products | 301 982 912 | 104 534 952 | 40 741 192 | 30 505 349 | 45 257 152 | 87% | 567% | 7 | 35,692% | 26,920% |
| 21 Basic pharmaceutical products and pharmaceutical preparations | 226 672 | 784 313 | 86 506 | 2 951 | 7 309 | 877% | 3001% | 31 | 0,027% | 0,004% |
| 22 Rubber and plastic products | 126 145 | 501 720 | 52 600 | 53 427 | 50 299 | 196% | 151% | 3 | 0,015% | 0,030% |
| 23 Other non-metallic mineral products | 3 603 655 | 278 840 | 74 503 | 108 093 | 60 058 | 379% | 5900% | 60 | 0,426% | 0,036% |
| 24 Basic metals | 270 222 480 | 142 162 363 | 32 560 057 | 38 528 025 | 26 272 942 | 114% | 929% | 10 | 31,938% | 15,628% |
| 25 Fabricated metal products, except machinery and equipment | 3 268 593 | 4 843 135 | 2 368 129 | 257 057 | 313 561 | 219% | 942% | 10 | 0,386% | 0,187% |
| 26 Computer, electronic and optical products | 3 867 149 | 1 078 382 | 896 543 | 3 671 447 | 778 656 | 144% | 397% | 5 | 0,457% | 0,463% |
| 27 Electrical equipment | 5 424 058 | 375 787 | 1 160 216 | 261 588 | 309 623 | 401% | 1652% | 18 | 0,641% | 0,184% |
| 28 Machinery and equipment n.e.c. | 1 428 444 | 2 423 433 | 1 006 728 | 1 574 913 | 347 903 | 104% | 311% | 4 | 0,169% | 0,207% |
| 29 Motor vehicles, trailers and semi-trailers | 687 055 | 176 444 | 629 127 | 135 314 | 348 474 | 130% | 97% | 2 | 0,081% | 0,207% |
| 30 Other transport equipment | 1 294 508 | 972 815 | 268 128 | 961 098 | 1 092 480 | 53% | 18% | 1 | 0,153% | 0,650% |
| 31 Furniture | 152 195 | 4 407 | 75 336 | 18 506 | 5 241 | 955% | 2804% | 29 | 0,018% | 0,003% |
| 32 Other manufactured goods | 895 311 | 674 855 | 564 207 | 1 020 953 | 853 848 | 7% | 5% | 1 | 0,106% | 0,508% |
| 35 Electricity, gas, steam and air conditioning | | | | | | | | | | |
| 37 Sewerage services; sewage sludge | | | | | | | | | | |
| 38 Waste collection, treatment and disposal services; materials recovery services | 4 071 763 | 4 810 788 | 2 212 868 | 1 684 363 | 1 451 350 | 37% | 181% | 3 | 0,481% | 0,863% |
| 58 Publishing services | 213 229 | 14 547 | 1 628 516 | 938 269 | 502 485 | 357% | -58% | 0 | 0,025% | 0,299% |
| 59 Motion picture, video and television programme production services, sound recording and music publishing | 13 547 | 21 899 | 151 | 4 176 | 834 | 3667% | 1524% | 16 | 0,002% | 0,000% |
| 71 Architectural and engineering services; technical testing and analysis services | 18 | | | 49 | | | | | 0,000% | |
| 74 Other professional, scientific and technical services | | | | | | | | | | |
| 90 Creative, arts and entertainment services | 12 617 | 2 202 | 2 432 | 20 998 | 922 | 638% | 1268% | 14 | 0,001% | 0,001% |
| 91 Library, archive, museum and other cultural services | 569 | 99 | | 80 578 | - | | | | 0,000% | 0,000% |
| 96 Other personal services | 902 | 11 367 | 21 830 | 16 115 | 35 662 | -40% | -97% | 0 | 0,000% | 0,021% |
| TOTAL | **846 083 565** | **476 908 203** | **199 693 991** | **189 771 138** | **168 116 739** | **59%** | **403%** | **5** | **100%** | **100%** |

**APPENDIX B**: Methodology of EPI

| Methodology of EPI | |
|---|---|
| EPI Rank/EPI Score | The 2022 EPI provides a quantitative basis for comparing, analyzing, and understanding environmental performance for 180 countries. We score and rank these countries on their environmental performance using the most recent year of data available and calculate how these scores have changed over the previous decade. |
| Projected GHG Emissions in 2050 | The projected emissions levels in 2050 indicator captures whether countries are on track to reach zero emissions of four greenhouse gases by 2050. These greenhouse gases include carbon dioxide, methane, fluorinated gases, and nitrous oxide. We calculate the average rate of increase or decrease in emissions over ten years (2010 – 2019) and extrapolate this trend to 2050, projecting the level of emissions in that same year. Extrapolation is an appropriate way to gauge which countries have begun adequately reducing emissions and highlight which countries are not on track to meet the 2050 climate target. Projected 2050 emissions equal to or below zero receive the maximum score. |
| Waste management | The Waste Management issue category recognizes the threats of solid waste to human and environmental health. It is based on three indicators: controlled solid waste, recycling rates, and ocean plastic pollution. |
| Air quality | direct impacts of air pollution on human health in each country. It consists of seven indicators: PM2.5 exposure, household solid fuels, ozone exposure, nitrogen oxides exposure, sulfur dioxide exposure, carbon monoxide exposure, and volatile organic compound exposure. |
| Wastewater treatment Rank/Water Resources | We measure wastewater treatment as the proportion of wastewater that undergoes at least primary treatment in each country, multiplied by the proportion of the population connected to a wastewater collection system. A score of 100 indicates that a country has 100% of its population connected to a sewer system and 100% of household wastewater is treated; a score of 0 indicates that no wastewater is reported as treated within a country.<br>The Water Resources issue category measures the extent to which humans are mitigating our threats to aquatic ecosystems. It is based on one indicator: wastewater treatment. |

https://epi.yale.edu/epi-results/2022/component/wrs

## **APPENDIX C**: Reviewed documents list

| # | Document title | Document number and type | Date of publication (month/day/year) |
|---|---|---|---|
| 1 | On measures to improve the efficiency of water resources use | Resolution of the President of the Republic of Uzbekistan, No. 3823 | 2/7/2018 |
| 2 | On the ratification of the Paris Agreement | Law No.491 of the Republic of Uzbekistan | 02/10/2018 |
| 3 | On approving the green economy transition strategy for 2019-2030 | Decree of the President of the Republic of Uzbekistan, No. 4477 of 04.10.2019 | 4/10/2019 |
| 4 | Concept for forest management development | Resolution of the President of the Republic of Uzbekistan, No. 4850 | 6/10/2020 |
| 5 | On approval the water sector development concept of Uzbekistan for 2020-2030 | Decree of the President of the Republic of Uzbekistan No. 6024 | 10/7/2020 |
| 6 | On measures to improve the effectiveness of reforms aimed at the transition of Uzbekistan to a “green” economy by 2030 (hereinafter green strategy action plan 2030) | Resolution of the President of the Republic of Uzbekistan, No.436 | 2/12/2022 |
| 7 | Regarding additional measures for the complex socio-economic development and further improvement of the living standard of the population in 2022 — 2026 in Khorezm region | Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 154 | 4/4/2022 |
| 8 | On additional measures for implementation of energy-saving technologies and development of small power renewable energy sources | Decree of the President of the Republic of Uzbekistan No. No. 220 | 09/09/2022 |
| 9 | On strengthening the role of parliaments in accelerating the achievement of sustainable development goals | Resolution of the President of the Republic of Uzbekistan | 12/14/2022 |
| 10 | On urgent measures to increase the efficiency of water resources use | Resolution of the President of the Republic of Uzbekistan, No. 107 | 01/04/2023 |
| 11 | On the strategy "Uzbekistan - 2030" | Decree of the President of the Republic of Uzbekistan No. No. 158 | 11/9/2023 |
| 12 | On additional measures to introduce market mechanisms in the fuel and energy sector | Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, No. 204 dated 04.16.2024 | 04/16/2024 |
| 13 | On measures for the implementation of the “Innovative carbon resources use for energy reforms | Resolution of the President of the Republic of Uzbekistan, No. No. 271 | 08.08.2023 |
| 14 | On additional measures to improve state regulation in the field of construction | Order of the President of the Republic of Uzbekistan No. No. 5577 | 14/11/2018 |
| 15 | On measures for implementation of the strategy of actions on the five priority directions of the development of the republic of Uzbekistan in 2017-2021 (national action strategy for 2017-2021) | Decree of the President of the Republic of Uzbekistan No. No. 5024 | 15/08/2017 |
| 16 | On measures to accelerate the implementation of renewable energy sources and energy-saving technologies in 2023 | Resolution of the President of the Republic of Uzbekistan, No. PP-57 | 16/02/2023 |
| 17 | On approval of the strategy for municipal solid waste management in the Republic of Uzbekistan for the period 2019-2028 | Resolution of the President of the Republic of Uzbekistan, No. 4291 | 17/04/2019 |
| 18 | On state support measures for the organization of the production of electric cars | Resolution of the President of the Republic of Uzbekistan, No. 443 | 19/12/2022 |
| 19 | On measures for the effective organization of public administration in the field of water management in the framework of administrative reform dated 20.06.2023 | Decree of the President of the Republic of Uzbekistan No. 101 | 20/06/2023 |
| 20 | On additional measures to accelerate implementation of national goals and tasks in the field of sustainable development in the period until 2030 | Resolution of Cabinet of Ministers No. 83 | 21/02/2022 |
| 21 | On the use of renewable energy sources | Law No. 539 of the Republic of Uzbekistan | 21/05/2019 |
| 22 | On measures to implement national goals and tasks for sustainable development until 2030 | Resolution of Cabinet of Ministers N.841 | 23/10/2018 |
| 23 | Agricultural development strategy of the republic of Uzbekistan for 2020-2030 | Resolution of the President of the Republic of Uzbekistan, No. 5853 | 23/10/2019 |
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| 28 | Concept of providing the Republic of Uzbekistan with electrical energy for 2020-2030 | Resolution of the Cabinet of Ministers | 30/04/2020 |
| 29 | On measures for rapid development of tourism of Samarkand city and Samarkand region in 2017-2019 | Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 450 | 30/06/2017 |
| 30 | Approval of the environmental protection concept of the republic of Uzbekistan in the period until 2030 | Decree of the President of the Republic of Uzbekistan No. No. 5863 | 30/10/2019 |
| 31 | Regarding measures organizing the activity of the central asia university of environment and climate change (Green university) | Resolution of the President of the Republic of Uzbekistan, PP-174 | 31/05/2023 |

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**PUBLICATIONS, PRESENTATIONS AND PATENTS ON THE THESIS:**

- **Adkhamova, D.** (2023). IDENTIFYING KEY ISSUES IN UZBEKISTAN'S LABOR MARKET FOR SUSTAINABLE DEVELOPMENT. *Science and Innovation*, *2*(11), 19-29.