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AZERBAIJAN'S TRANSITION TO GREEN AND INCLUSIVE GROWTH - A COMPARATIVE ASSESSMENT WITH THE CENTRAL ASIAN COUNTRIES

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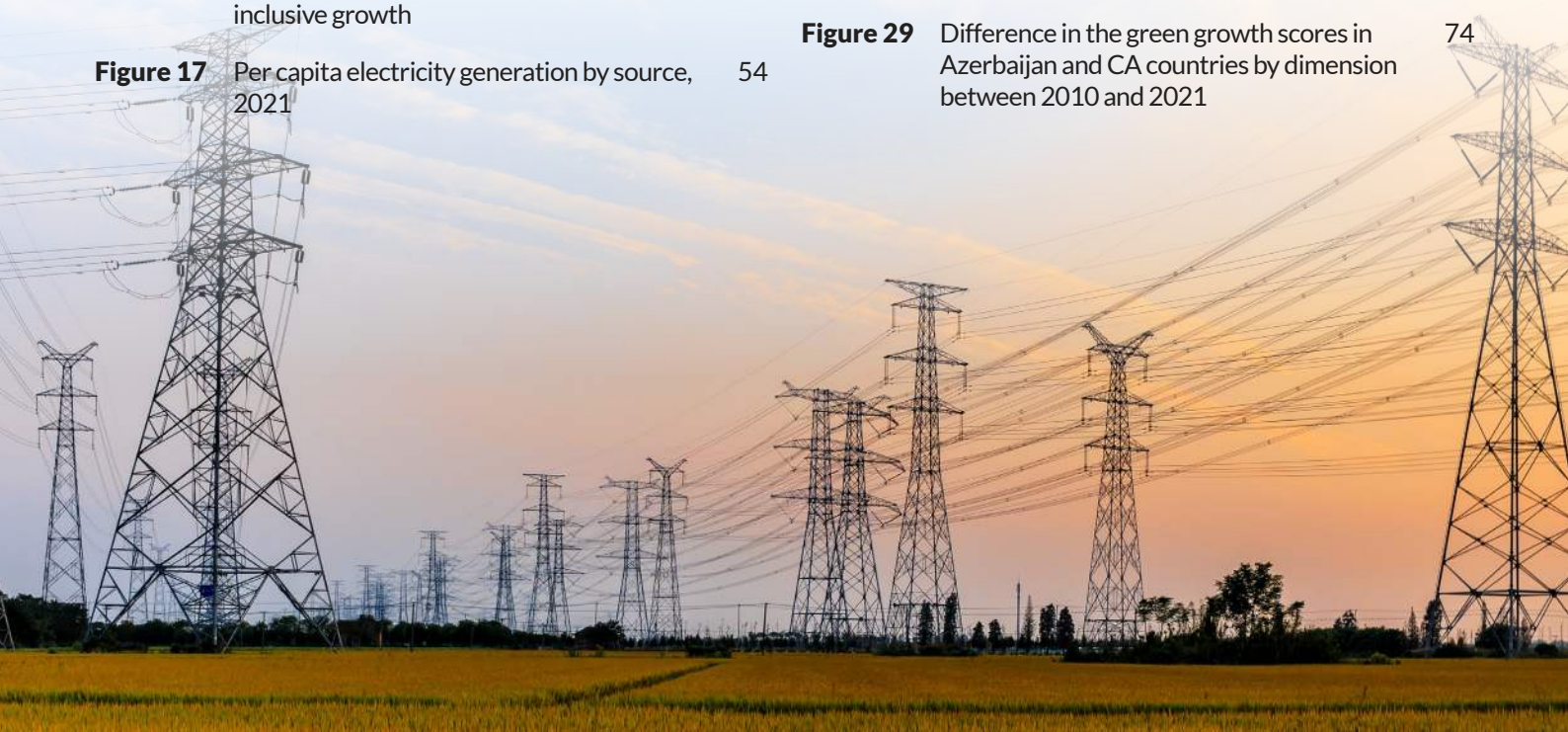


Tables

Acronyms and Abbreviations

4G	Fourth-generation wireless
AB	Access to Basic Services and Resources
ADB	Asian Development Bank
ADAP	Adaptation
AFOLU	Agriculture, Forestry, and Other Land Use
BAU	Business as Usual
BE	Biodiversity and Ecosystem Protection
BP	British Petroleum
CA	Central Asian countries
CCS	Carbon Capture and Storage
CF_4	Carbon Tetrafluoride
CH_4	Methane
CIS	Commonwealth of Independent States
CO_2	Carbon Dioxide
COVID-19	Coronavirus Disease
CV	Cultural and Social Value
DALY	Disability-Adjusted Life Year
DMC	Domestic Material Consumption
ECON	Economic diversification
EE	Efficient and Sustainable Energy
EQ	Environmental Quality
ESRU	Efficient and Sustainable Resource Use
EU	European Union
EW	Efficient and Sustainable Water Use
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FDI	Foreign direct investments
F-gas	Fluorinated gases
GB	Gender Balance
GDP	Gross Domestic Product
GE	GHG Emissions Reduction
GEO	Green Economic Opportunities
GGGI	Global Green Growth Institute
GGPM	Green Growth Performance Measurement
GHG	Greenhouse Gas
GJ	Green Employment
GN	Green Innovation
GT	Green Trade
GV	Green Investment
GW	Gigawatts
HFCs	Hydrofluorocarbons
HUMA	Human development and skills
ICT	Information Technologies and Telecommunications
IHME	Institute for Health Metrics and Evaluation
IHR	International Health Regulations
ILO	International Labor Organization
INDC	Intended Nationally Determined Contributions
INNO	Green Innovation
IPPU	Industrial Processes and Product Use
IRENA	International Renewable Energy Agency
ITU	International Telecommunication Union
KBA	Key Biodiversity Areas
KWh	Kilowatt-hour
LT-LEDS	Long-Term Low Emission Development Strategy

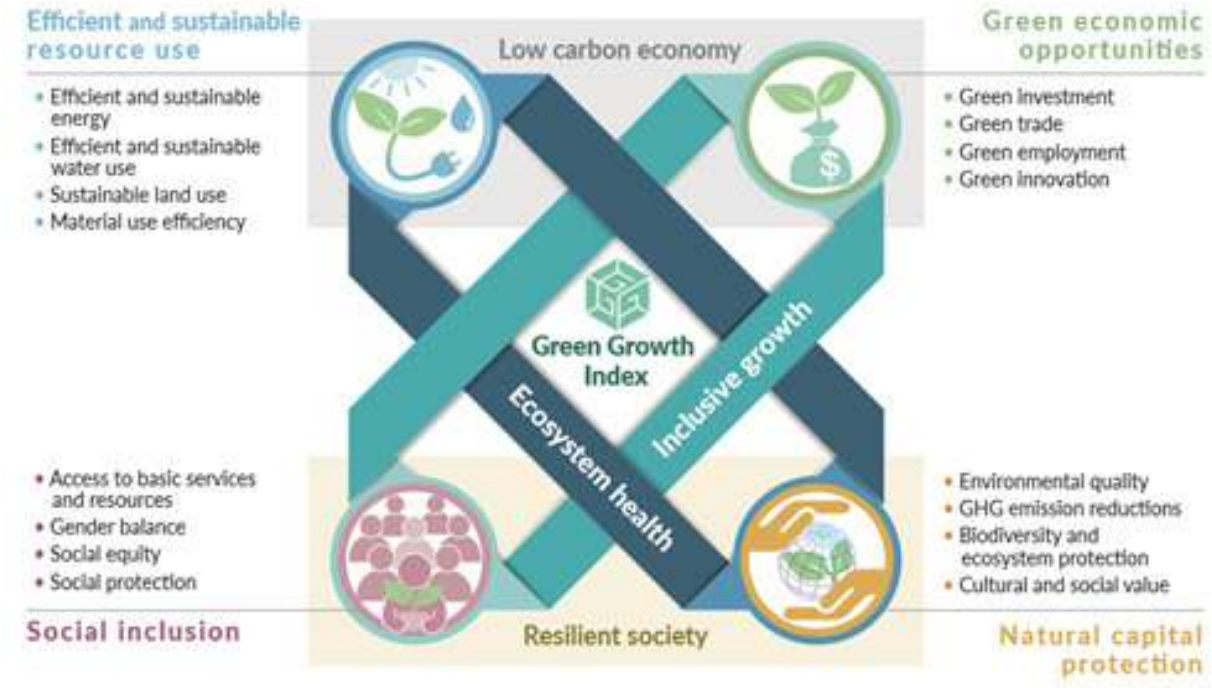
LULUCF	Land Use, Land-Use Change and Forestry
ME	Material Use Efficiency
MF	Material Footprint
MHI	Mandatory Health Insurance
MITI	Mitigation
MJ	Megajoule
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MSWM	Municipal Solid Waste Management
MTDP	Medium-term Development Program
MW	Megawatt
NAP	National Adaptation Plan
N_2O	Nitrous oxide
NBSAP	National Strategy of the Republic of Azerbaijan on Conservation and Sustainable Use of Biodiversity
NCP	Natural Capital Protection
NDC	National Determined Contributions
NDP	National Development Plan
NEET	Not in Education, Employment, or Training
NMT	Non-motorized Modes of Transportation
NPSD	National Priorities for Socio-Economic Development for the year 2030
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
PA	Protected Area
PFCs	Perfluorocarbons
PM2.5	Particulate matter with a diameter of less than 2.5 micrometers
PPP	Purchasing Power Parity
R&D	Research & Development
SDGs	Sustainable Development Goals
SDP	Strategic Development Plan until 2025
SE	Social Equity
SF6	Sulfur hexafluoride
SI	Social Inclusion
SL	Sustainable Land Use
SMEs	Small and Medium Entrepreneurship
SP	Social Protection
TABIB	The Management Union of Medical Territorial Units in Azerbaijan
TVET	Technical and vocational education and training
TWh	Terawatt-hour
UHC	Universal Health Coverage
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNSTATS	United Nations Statistics Division
USD	United States Dollar
WB	The World Bank
WHO	World Health Organization
WITS	World Integrated Solution
WIPO	World Intellectual Property Organization

Executive Summary

1 To respond to the economic impacts of the global oil crisis in 2014-2015 and meet international sustainability commitments, Azerbaijan and several Central Asian (CA) countries updated and improved policies, strategies, and plans to diversify their economies. Azerbaijan and most CA countries have abundant natural fossil resources, and increasing the share of renewables in the energy mix is a big challenge. This is because less than 10 percent of per capita electricity generation in Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan comes from renewable sources. However, given their potential for solar, wind, biomass, and geothermal energy, Azerbaijan and the CA countries have significant potential to shift to a low-carbon and green economy. The transition to green and inclusive growth that builds on efficient and sustainable resource use (ESRU), natural capital protection (NCP), green economic opportunities (GEO), and social inclusion (SI) offers prospects to diversify economies and support sustainable development. Azerbaijan's transition will help to overcome the challenges in achieving its development priorities, which were identified in this study, including economic diversification, green innovation, human skills and development, and land-water-food nexus.

2 This study assessed Azerbaijan's performance in transitioning to green and inclusive growth by applying the green growth framework developed by the Global Green Growth Institute (GGGI) for its Green Growth Index. The framework consists of four dimensions (ESRU, NCP, GEO, and SI), each building on four sustainability pillars (see Figure A). Five green growth indicators were identified for each pillar, giving a total of eighty (80) indicators to assess green growth performance. Qualitative and quantitative assessments were applied to the green growth indicators. In the former, checklist tables were used to describe the relevance of the green growth indicators in Azerbaijan's national and sectoral policies. In the latter, three quantitative approaches were used: (i) benchmarking of the green growth indicators against top-performing countries to identify Azerbaijan's policy gaps in these indicators and assess its green growth performance vis-à-vis best performers (ii) systematic data-coding and mixed analyses of most relevant national socio-economic and environmental policies of Azerbaijan and the CA countries to assess policy emphasis on the green growth indicators, and (iii) conducting aggregation, scatter and correlation analyses of the benchmarked indicators scores in each pillar and dimension, as well as the Green Growth Index, to assess Azerbaijan's green and inclusive growth performance and compare it with those of the CA countries.

Figure A. GGGI's Framework for the Green Growth Index



Source: Acosta et al. 2019 [i]

[i] Acosta, L.A., et al. (2019). Green Growth Index: Concepts, Methods and Applications, GGGI Technical report No. 5, Green Growth Performance Measurement (GGPM) Program, Global Green Growth Institute, Seoul.
https://greengrowthindex.gggi.org/wp-content/uploads/2019/12/Green-Growth-Index-Technical-Report_20191213.pdf

3 The checklist tables used to assess the indicators' relevance to national and sectoral policies provide information on policy gaps for tracking performance and their potential impacts on Azerbaijan's transition to green and inclusive growth.

Among the four pillars of efficient and sustainable resource use, efficient and sustainable water use and material use efficiency are the least relevant in national policies and sectoral roadmaps. Tracking efficient and sustainable water use performance, mainly in the agricultural sector, is critical to reducing environmental degradation in Azerbaijan. Unsustainable extraction and use of raw materials harm the environment, leading to soil and water degradation, ecosystem and biodiversity loss, and harmful emissions. Environmental quality and biodiversity and ecosystem protection in the natural capital protection dimension are least relevant in national policies and sectoral roadmaps. High interdependence exists between environmental quality and biodiversity and ecosystem services, as well as the capacity of the forest and other ecosystems to mitigate climate impacts. Moreover, the quality of the environment, including land, water, and air, is essential for agricultural productivity and food security, human health and well-being, indigenous, and cultural heritage.

In green economic opportunities dimensions, green trade and employment are the pillars least covered in national policies and sectoral roadmaps. They are essential for the green growth transition in Azerbaijan, where fossil energy exports steer the economic growth and fossil energy production absorbs a small share of the labor force. Gender balance is the social inclusion pillar least covered in the national policies and sectoral roadmaps. Azerbaijan has a history of empowering women, and considerable progress has been achieved in ensuring gender equality in the economic, health, and education sectors. However, women's labor participation in the private and public sectors remains extremely limited. Women's economic and political empowerment would enhance their human rights, including reducing domestic violence.

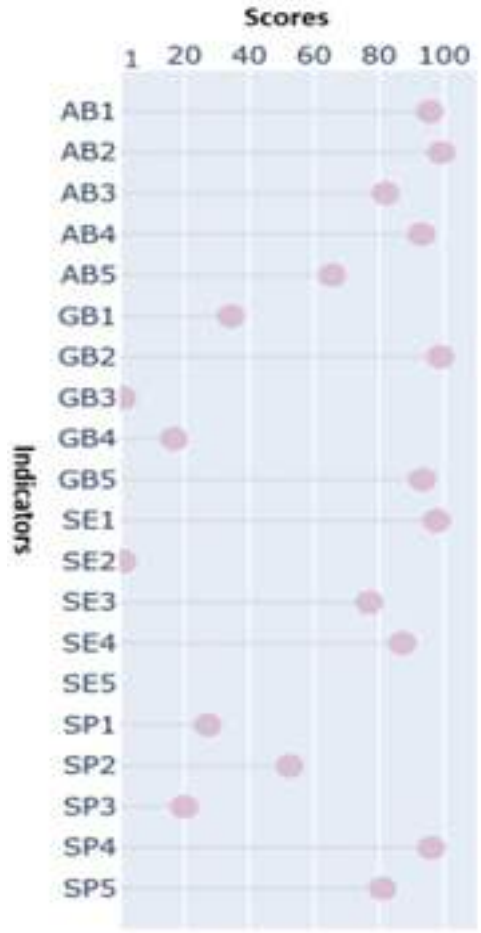
4 The benchmarked green growth indicators show a stark variation in Azerbaijan's performance across pillars and dimensions, with those in material use efficiency in the ESRU, environmental quality in the NCP, and access to basic services and social equity in the SI dimension having at least three high-scoring indicators. Green trade has only two indicators with high scores in the GEO dimension. Almost half of the eighty green growth indicators have scores below 50, posing challenges to the green growth transition. In ESRU, low scores in the share of renewables to total consumption and share of renewable electricity would delay the achievement of a low-carbon economy, an important precondition to the green growth transition. The challenge could be addressed by increasing green investment in Azerbaijan's renewable resources, which remained untapped, reducing economic dependence on fossil energy, and enhancing economic diversification in non-fossil sectors. Water is scarce in Azerbaijan, so low scores in efficient and sustainable water use indicators pose a significant challenge to water-intensive sectors like agriculture and energy and the sustainability of biodiversity and the ecosystem. Green innovation in wastewater treatment and efficient irrigation systems could help reduce freshwater withdrawal and the level of water stress. Economic diversification entails building industries and infrastructure, which could challenge Azerbaijan's high score in material use efficiency. Tracking domestic material consumption and material footprint performances would be critical for ensuring a green growth transition.

NCP's low cultural and social values scores indicate that Azerbaijan's natural capital resources are not currently tapped to generate green finance. The country has a rich and unique biodiversity and ecosystem, which could be tapped with appropriate conservation measures and an effective biodiversity monitoring system to create opportunities for green financing to support the green growth transition. Biodiversity conservation policies help to expand coastal and marine protected areas (PAs), which offer an important source of income and livelihood from sustainable eco-tourism. Transboundary pollution in Azerbaijan's water resources, including major rivers that provide freshwater drinking sources and coastal areas that are important for biodiversity, poses a challenge in protecting environmental quality. Transboundary PAs are essential to closely monitor performance on water-related environmental quality. Azerbaijan's forests, whose decline is attributed to its use for firewood and fire incidence, could be more protected under PAs. Due to its reliance on oil and natural gas to provide domestic energy to the ten million population, scores on GHG emissions per capita and carbon intensity of energy production are low in Azerbaijan. This could impact not only the achievement of its climate commitments but also its foreign trade. Reducing methane is the condition for the European Commission to more than double its natural gas imports from Azerbaijan over the coming years.

Diversifying the economy needs investments and innovations. Most low-scoring green growth indicators are in the GEO dimension, particularly green investment and innovation. The lack of investment in environmental resource management in critical sectors could slow down the development of a knowledge-based economy, which is necessary to support economic diversification in renewable, agriculture, and tourism, the sectors with the most considerable potential to create green employment in Azerbaijan. Increasing the share of R&D expenditure will increase the ability of universities and research institutions to develop much-needed skills and innovation, particularly in the energy sector. Green innovation will be needed to move into high-technology renewable energy industries, but Azerbaijan's innovation outputs are not comparable to its innovation investments+. Progress in green innovation is closely intertwined with the rate of investments not only in developing human skills and technology but also in enabling SMEs to establish businesses and absorb innovations, particularly in the renewable energy sector. Employment in renewable energy is presently limited to hydropower. The share of youth and adults with information and communication technology (ICT) skills have low scores. ICT is driving economic diversification in Azerbaijan because, after oil and gas, it is the most profitable sector and the most significant foreign direct investment (FDI) recipient. Strategic policies to shift FDIs from the fossil to the ICT sector would help build a digital knowledge-based economy, which could create green employment in different sectors.

The SI dimension has the most high-scoring green growth indicators (see Figure B). All indicators for access to basic services and resources have high scores, which align Azerbaijan's performance with other upper-middle-income countries. Compared to its neighboring countries, Azerbaijan's population currently has a young age structure, and about half of its workforce aged 15-34 only reached secondary education. Keeping high scores in social equity indicators will require Azerbaijan to overcome the challenges of empowering the youth with innovative skills, enabling them to find employment in high-income sectors, and reducing income inequality and youth unemployment. Property rights score is lower than other indicators of access to basic services and resources. Addressing current gaps in the property rights law and improving enforcement of its provisions would create a better enabling environment for economic diversification and green innovation. Foreign investment and new SMEs will be attracted where private ownership of capital and assets is secured. Gender balance showed the highest number of indicators with low scores, including indicators for the number of women in national parliaments, equal gender pay, and maternity cash benefits. Gender stereotypes, particularly in rural areas, continue to define women's roles according to cultural and traditional norms, hindering public office participation, self-employment, and entrepreneurship. Women's parliamentary representation is low, with a ratio of 1:230,000 female compared to 1:51,000 male population, due to a lack of financial resources for costly election campaigns and lack of training and skills for gaining political confidence, in addition to public tolerance of gender stereotypes. The number of women entrepreneurs, primarily located in cities and engaged in agricultural and trade-related businesses, is also low. Enhancing the role of women in urban and rural areas in creating green opportunities in high-value-added sectors requires improving their access to loans, digital skills, and appropriate education.

Figure B. Green growth indicators score in social inclusion dimension in Azerbaijan, 2021

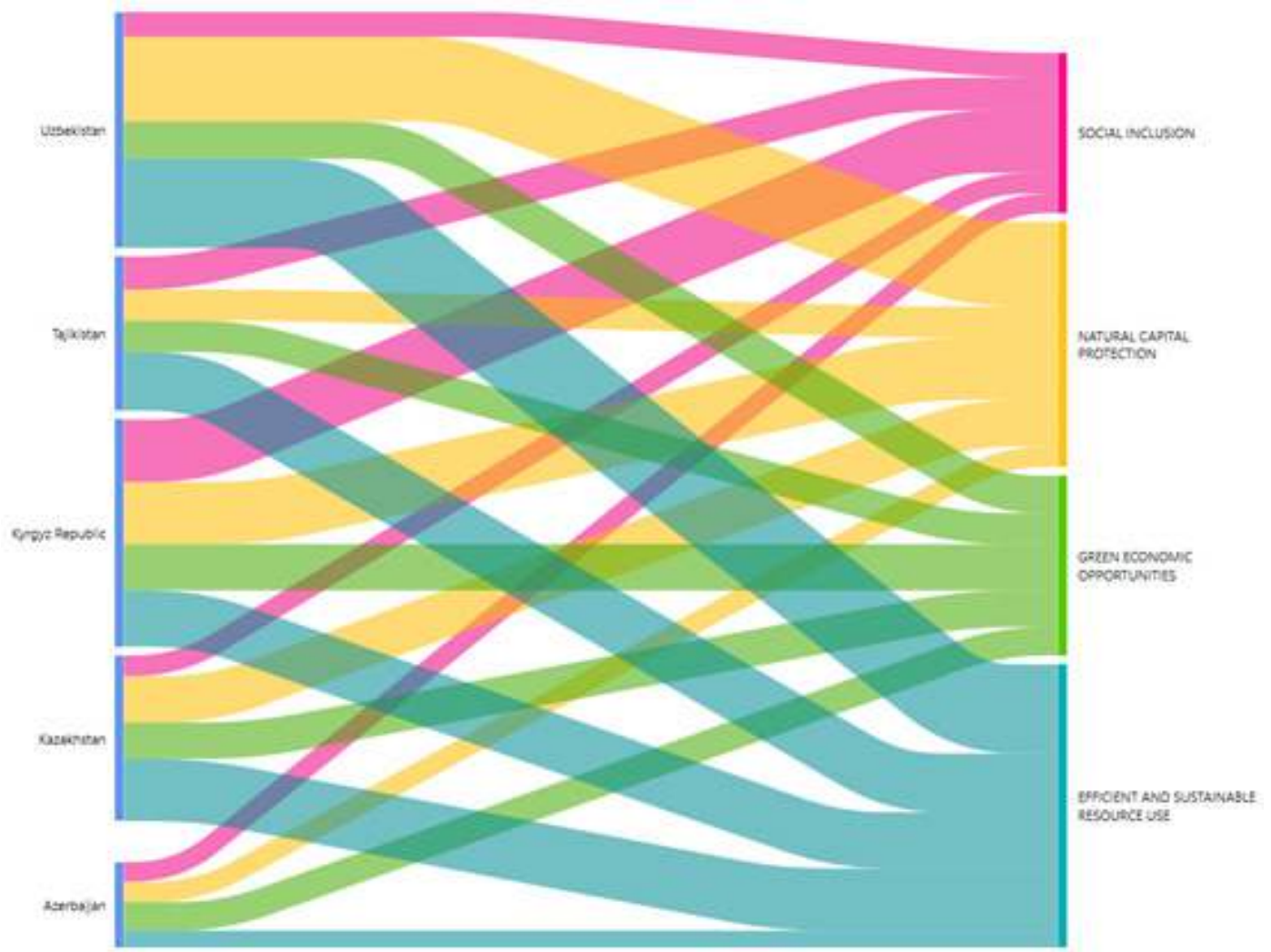


AB1	-	Access to safely manage water and sanitation (AB1).
AB2	-	Moderate/severe food insecurity (AB2).
AB3	-	Convenient access to public transport (AB3).
AB4	-	Population covered by 4G mobile network (AB4).
AB5	-	Property rights (AB5).
GB1	-	Women in national parliaments (GB1).
GB2	-	Women with financial accounts (GB2).
GB3	-	Equal gender pay (GB3).
GB4	-	Maternity cash benefits (GB4).
GB5	-	Tertiary enrollment gender parity (GB5).
SE1	-	Inequality in income (SE1).
SE2	-	Rural/urban access to clean fuels (SE2).
SE3	-	Youth unemployment disparity (SE3).
SE4	-	Old people dependency ratio (SE4).
SE5	-	Discrimination against disability (SE5).
SP1	-	Population receiving social assistance (SP1).
SP2	-	Universal health coverage (SP2).
SP3	-	People in inadequate housing (SP3).
SP4	-	Victims of intentional homicide (SP4).
SP5	-	Health regulation capacity (SP5).

Source: Authors own.

5 The co-occurrence coefficients measure how often issues relating to the green growth indicators were referenced in four main policy documents in Azerbaijan and the CA countries. Overall, the coefficients show that the green economic opportunities and social inclusion indicators are least referred to in the national policies across the countries. The Sankey visualization[ii] reveals that Azerbaijan's national policies show the slightest connection to the green growth indicators of the four green growth dimensions (see Figure C). Although their priorities vary, Uzbekistan and the Kyrgyz Republic have the longest edges (i.e., the blue vertical line in Figure C) and, thus, the greenest national policies. Uzbekistan's policies are heavily oriented toward natural capital protection and efficient and sustainable resource use. In contrast, the Kyrgyz Republic provides almost equal importance to all four green growth dimensions. Kazakhstan and Tajikistan emphasize efficient and sustainable resource use in their national policies. The degree of connections of this dimension to the national policies is almost equal to that of the Kyrgyz Republic. The Sankey diagram further confirms the less important attention to green economic opportunities and social inclusion in national policies. Relative frequencies of the co-occurrence of green growth indicators in the policy documents were computed for each country. On the one hand, the dimensions with the highest relative frequencies are natural capital protection in Azerbaijan and the Kyrgyz Republic, efficient and sustainable resource use in Kazakhstan and Tajikistan, and both dimensions in Uzbekistan. On the other hand, social inclusion in Azerbaijan, Kazakhstan, and Uzbekistan, and green economic opportunities in the Kyrgyz Republic and Tajikistan have the lowest relative frequencies.

Figure C. Sankey visualization of connections between national policies and green growth dimension by country



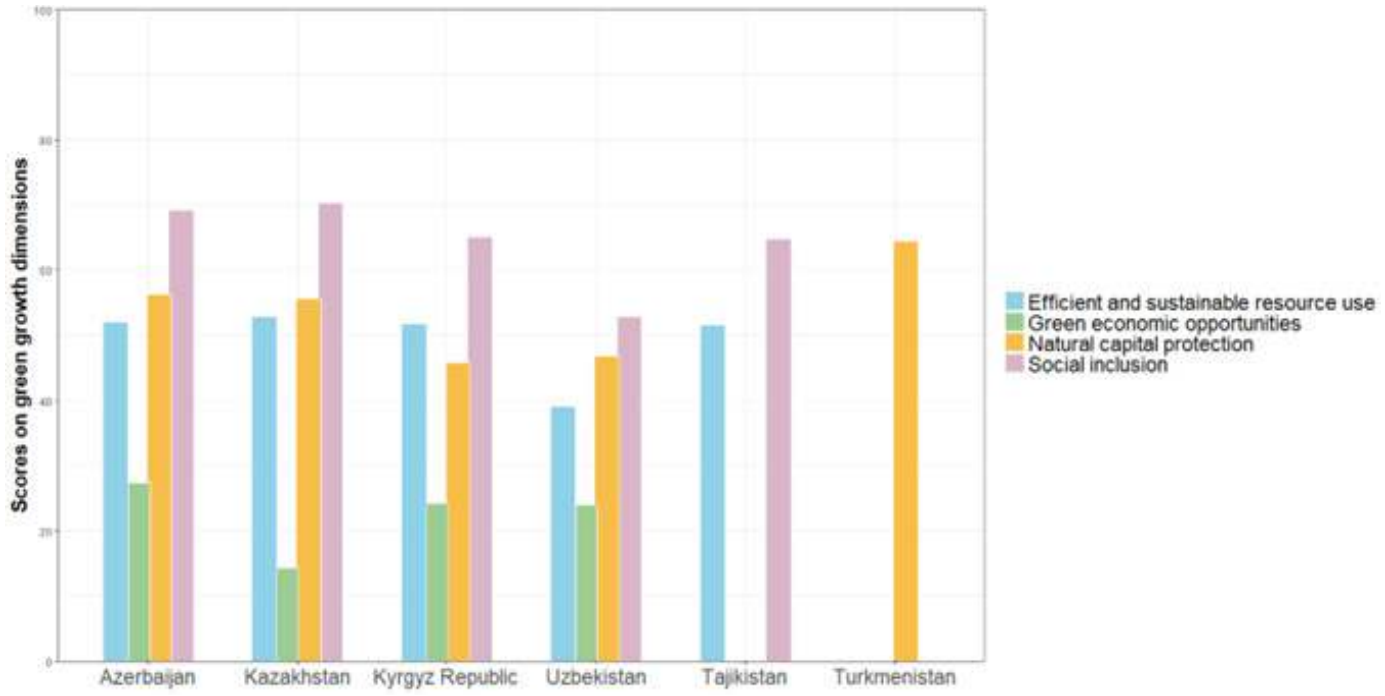
Source: Authors own.

[ii] The Sankey diagrams present data flows and connections, where data refer to the codes. Sankey applies a layout for its nodes and the edges connecting nodes to create an easily comprehensible data visualization. In this study, the nodes refer to the coded data of the green growth indicators, and the edges refer to the policy documents in Azerbaijan and CA countries. The Sankey diagrams thus provide a useful visualization of the greenness of the national policies according to the thickness of the data flows or connecting lines between the nodes and edges.

6 Comparing aggregated scores between Azerbaijan and the CA countries shows that the most considerable prospects to improve green growth performance are creating green economic opportunities, including green investment, innovation, employment, and trade (see Figure D). Providing an additional focus on green economic opportunities in policy documents and tracking changes in indicators' scores when implementing policies could help improve performance in this dimension. The dimension scores for efficient and sustainable resource use and natural capital protection are expected to improve in all countries as they update their NBSAPs and NDCs to enhance environmental coverage and targets as well as re-orienting national development plans and strategies to green economy to meet their commitments to the SDG, Paris Climate, and Biodiversity Targets. Opportunities for Azerbaijan and the CA countries to further improve performance in social inclusion will be in gender balance and social protection. Among the social inclusion pillars, however, gender balance is the least emphasized in the policy documents in all countries.

Correlation analysis was applied in this study to determine the statistical relationships between policy emphasis on the green growth indicators belonging to each dimension and improvement in dimension scores between 2010 and 2021. More than half of the correlations have high values, implying a strong relationship between them. Overall, Azerbaijan and the CA Countries have achieved a higher score in efficient and sustainable resource use than natural capital protection. This could be explained by the challenge they face and, thus, the policy emphasis they give in diversifying their fossil-based economies, which are vulnerable to changes in the global market, affected by green policies in trading partner countries, and their obligation to reduce GHG emissions. Azerbaijan's improvement in performance over time is slower than that of the CA countries, which can be enhanced by putting similar policy emphasis on efficient and sustainable resource use in the CA countries.

Figure D. Comparison of green growth performance of Azerbaijan and CA countries at the dimension and Index levels, 2021



Source: Authors own.

7 Conclusions and recommendations were provided on Azerbaijan's policy options, Azerbaijan and Central Asia's green growth transition, and the next step forward for this study. Not achieving Azerbaijan's development priorities for green growth transition will pose challenges to the country's ability to meet global sustainability commitments, including the SDGs, Paris Climate Agreement, and Aichi Biodiversity Targets.

Based on the assessments in this study, options were provided for Azerbaijan's transition to green and inclusive growth. First, the enormous opportunity for Azerbaijan to improve its performance will be in green economic opportunities by steering foreign investment and trade away from fossil products to promote green innovation and employment. Progress in green innovation is closely intertwined with the rate of investments not only in developing human skills and technology but also in enabling SMEs to establish businesses and absorb innovations to support economic diversification. Second, innovation and investments in efficient and sustainable water use are essential to reduce environmental degradation, address challenges in the land-water-food nexus, and support agricultural productivity and food security. Due to the transboundary nature of Azerbaijan's water resources, efficient and sustainable water use strategies will need to address the environmental quality of freshwater drinking sources and biodiversity in coastal areas. Third, Azerbaijan's untapped renewable resources, including solar, wind, biomass, and geothermal, offer enormous potential to reduce electricity generation from fossil sources and create green employment. Green innovation will need to move into high-technology renewable energy industries, and innovation outputs will need to be comparable to innovation investments. And fourth, an enabling environment will need to be created by enhancing property rights protection to attract foreign investment and new SMEs that will generate employment for the youth in high-income sectors.

With a Green Growth Index score of 48.58, Azerbaijan's green growth performance is better than its CA neighbors from 2010 to 2021. Nonetheless, they share some common challenges and opportunities for green growth transition: (i) creating green economic opportunities, which have the lowest scores and lack policy emphasis, offers the most considerable prospects to improve green growth performance; (ii) reducing dependence on fossil fuels and increasing renewables in the energy mix, which can be achieved through green investment in their vast renewable resources, will be vital to reducing emissions; (iii) performance in cultural and social values could be increased by tapping on their rich biodiversity and ecosystem, for example, through

sustainable eco-tourism; and (iv) policies should not shift policy emphasis away from social inclusion indicators but address them simultaneously with economic and environmental issues to ensure a green and inclusive growth transition.

Azerbaijan can learn from other CA countries' strategies for green growth transition. When updating its NBSAPs and NDCs, emphasis will need to be given to sustainability pillars with exceptionally low scores, including efficient and sustainable energy and water use, natural capital's cultural and social values, and green investment. Azerbaijan can learn from the Kyrgyz Republic and Tajikistan's updated NDCs, giving more emphasis on green investment. Moreover, the Kyrgyz Republic considers facilitating the achievement of gender equality and gender balance in the decision-making system on access to natural resources. Similarly, it can learn from the Kyrgyz Republic and Kazakhstan's NBSAPs, which consider issues across different dimensions.

Although Azerbaijan includes "green growth" as one of its priorities in the Strategic Roadmap for the Perspective of the National Economy, developing a policy or strategy dedicated to green growth will be valuable for identifying targets and tracking achievements in the green growth transition. In developing a national Green Growth (or Green Economy) Strategy, the Green Growth Index can provide the basis for identifying policy priorities based on the pillar and dimension scores and relevant green growth indicators for tracking performance based on sustainability targets. GGGI supports its member countries to develop a national Green Growth Index using a participative approach, with national experts from various ministries and line agencies selecting the green growth indicators for the Index through a series of seminars/webinars, workshops, and consultations. The participative approach is important to capacitate the national experts in understanding green growth, facilitate the inclusion of government-selected indicators into the green growth strategies and plans, establish a monitoring platform for collecting data for the green growth indicators, update the Green Growth Index, and encourage the use of the Green Growth Index to track green growth performance systematically. The green growth indicators and green growth performance assessed in this study provide the knowledge and materials for conducting a participative approach to develop the National Green Growth Index, which in turn will be valuable for developing or updating the National Green Growth (or Green Economy) Strategy, not only for Azerbaijan but also the CA countries.

01 INTRODUCTION

The South Caucasus (i.e., Georgia, Armenia, and Azerbaijan) and the Central Asian Countries (i.e., Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) experienced a new era of growth after the fall of the Soviet Union in the early 1990s. The abundant natural fossil resources – oil, gas, coal – largely steered the economic growth, turning Azerbaijan and a few other countries in the subregion into net exporters of fossil fuels and setting the next stage for rapid economic development. This development transformed Azerbaijan into an upper middle-income country by 2009; by early 2015, the poverty rate was down to 5 percent. The annual gross domestic product (GDP) per capita growth of -24 percent in 1993 was increased to about 8 percent as early as 1998 [1]. However, the fossil energy sector absorbed an insignificant share of the country's labor force. Fossil products and exports continued to dominate Azerbaijan's economy until 2019, but services and agriculture account for 49 percent and 36 percent of the total employment in the country [2].

The oil crisis in the period 2014-2015 revealed the economic vulnerability of the South Caucasus and Central Asian Countries that depended heavily on fossil products and exports to drive their economic growth. The sharp decline in the world markets' energy prices, economic downturns in foreign-traded countries, and the financial crisis have hurt these subregions' economies. These events have significantly decreased the inflow of foreign currency and distorted the import-export balance. [3] The governments swiftly responded by restructuring and closing troubled banks and tightening monetary policy. They recognized the urgent need to reduce fiscal dependence on oil revenues and diversify the economy by finding new drivers of non-oil growth to achieve macroeconomic stability and sustainable development. In Azerbaijan, for example, new national and sectoral strategies were implemented in 2016 to integrate social and economic development and develop human skills for the new market. The COVID-19 pandemic, however, hampered the economic recovery and diversification efforts in 2020.

In the face of the pandemic, Azerbaijan is challenged by the need to ramp up its efforts to diversify away from fossil fuels for several reasons. First, the government has committed itself to reduce its greenhouse gas (GHG) emissions. Due to its large energy sector, Azerbaijan belongs to the top 10 methane-emitting countries. Fugitive emissions, like unintentionally released methane from the oil and gas industry, are estimated at 13.8 percent of total GHG emissions in Azerbaijan in 2019 [4]. While carbon dioxide (CO_2) intensity significantly decreased in a few Central Asian countries like Turkmenistan and Uzbekistan, that of Azerbaijan increased slightly by two percent from 2020 to 2018 [5]. According to the World Bank's latest report [6], Azerbaijan's GHG emissions have already exceeded its 2030 Nationally Determined Commitment (NDC) target. The country is thus not on track to meet its near-term emission goals. Energy demand has risen rapidly, partly because urbanization increased and energy demand from the transport sector tripled[7]. Second, Azerbaijan's agriculture, human health, water, and coastal resources, forestry, and tourism sectors are very vulnerable to the impacts of climate change due to its physical and geographical characteristics. [8] Extreme events such as flooding, drought, and heat stress are expected to become more frequent in the country [9]. The government would reduce the country's vulnerability to climate change impacts by implementing adaptation and mitigation measures. Third, fossil resources are not renewables and are expected to run out in Azerbaijan in the next 30 years [10]. However, foreign demand for fossil products is already declining faster due to many countries' massive efforts to decrease GHG emissions. For example, Azerbaijan's oil exports to the European Union (EU) are expected to decline as the European countries continue to cut carbon emissions in line with their NDCs. [11] Although the Ukraine war increased the EU's short-term demand for natural gas from other countries, Azerbaijan needs foreign investors and international financial institutions to export to Europe [12]. And fourth, in the Azerbaijan 2030: National Priorities for Socio-Economic Development, published in 2021, the government included implementing a clean environment and a country of "green growth" as one of its five national priorities.[iii]

The Global Green Growth Institute (GGGI) defines green growth as follows:

> *Green growth is a development approach that seeks to deliver economic growth that is both environmentally sustainable and socially inclusive. It seeks opportunities for economic growth that are low-carbon and climate resilient, prevent or remediate pollution, maintain healthy and productive ecosystems, create green jobs, reduce poverty, and enhance social inclusion.* [13]

This report will take stock of the ongoing efforts towards green growth and Azerbaijan's opportunities, challenges, and options as it moves towards a net zero economy. Azerbaijan's performance will be compared with those of the Central Asian countries (referred to as the CA countries in this report) to identify strengths and weaknesses in the green growth transition. Like the CA countries, Azerbaijan relies heavily on natural gas, oil, and, to some extent, hydropower to drive its economy. The South Caucasus countries are not as relevant as CA countries for comparison because Armenia's nuclear power accounts for 35 percent of its energy sources (Azerbaijan does not have nuclear energy), and Georgia has no oil resources (32 percent of Azerbaijan's energy comes from oil).

[iii] The five priorities are (a) a steadily growing, competitive economy, (b) a dynamic, inclusive society based on social justice, (c) areas of modern innovations and competitive human capital, (d) the great return to the territories liberated from occupation, and (e) a clean environment and country of "green growth".

The report provides answers to the following research questions:

(a) What are the economic and environmental policies currently implemented in Azerbaijan to reduce emissions and facilitate low-carbon transition in different sectors? What are the outlined policy pledges, commitments, and trajectories during the net zero transition?

(b) What are the green growth opportunities and co-benefits of the low-c arbon transition and salient challenges that Azerbaijan may face during the low-carbon transition? How does Azerbaijan achieve its green growth goals compared to top-performing countries, particularly advanced economies?

(c) How are the existing policy exercises in item (a) above compared with other countries in the Central Asia subregion? How is Azerbaijan's green and inclusive growth performance compared to these countries?

(d) What are the policy options for Azerbaijan to promote opportunities, address related challenges, and mitigate costs? What policy options could it implement to achieve committed NDCs in the short run and a timely yet orderly net zero transition?

Both qualitative and quantitative approaches, applied to address these questions, are briefly introduced in Chapter 2 and explained in detail in Annex 1. The rest of the report is structured as follows: Chapter 3 focused on assessing Azerbaijan's transition to green and inclusive growth to provide answers to questions (a) and (b). Based on the

literature review and descriptive analysis, the national and sectoral policy contexts and development priorities were used to form the checklist criteria for identifying green growth indicators (chapter 3.1). A checklist approach was used to assess the relevance of green growth indicators. These indicators were used to determine the greenness and inclusiveness of the policies and priorities, identifying policy gaps that could hinder the country's low-carbon transition (chapter 3.2). Using these indicators, composite indices were computed for four green and inclusive growth dimensions, including efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. Normalization, benchmarking, and aggregation methods were used to compute scores for these composite indices, which inform about the opportunities, co-benefits, and challenges in Azerbaijan's low-carbon transition (chapter 3.3.). These also allowed a comparison of its performance in achieving green and inclusive growth goals with the top-performing countries. Chapter 4 compares Azerbaijan's policy goals and low-carbon actions with the CA countries to answer questions (c) and (d). The comparison helped to identify policy challenges (chapter 4.1) and to assess the "greenness" of policies (chapter 4.2) and the disparity in green growth performances (chapter 4.3) in Azerbaijan and the CA countries. Finally, chapter 5 provided conclusions and recommendations.

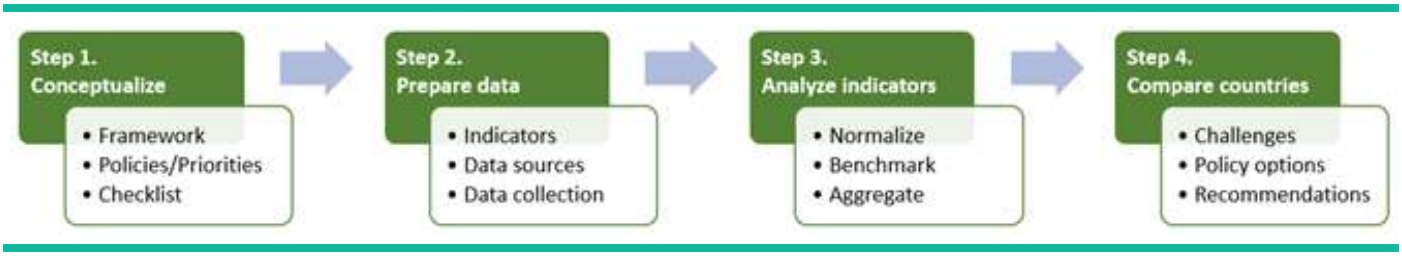
02 ANALYTICAL APPROACH

Four steps were followed to assess the performance of transitioning to green and inclusive growth in Azerbaijan (Figure 1):

- Step 1 refers to the conceptualization, which includes applying the green growth framework, assessing policy frameworks and priorities, and setting up checklist criteria for the indicator. The results are presented in chapter 3.1.
- Step 2 refers to the data preparation for the indicators selected from the previous step. This step includes assessing indicators' relevance to the checklist, identifying data sources and availability, and data collection and preparation. The results are presented in chapter 3.2.
- Step 3 refers to data analysis, which includes normalizing indicators and benchmarking against targets, aggregating scores, and interpreting normalized and aggregated scores. The results are presented in chapter 3.3.
- Step 4 refers to the comparative assessment with the CA countries to determine potential policy gaps for green growth transition. The results are presented in chapter 4.

Further information on these steps is presented in the corresponding sections and Annex 1.

Figure 1. Steps in the assessment methods

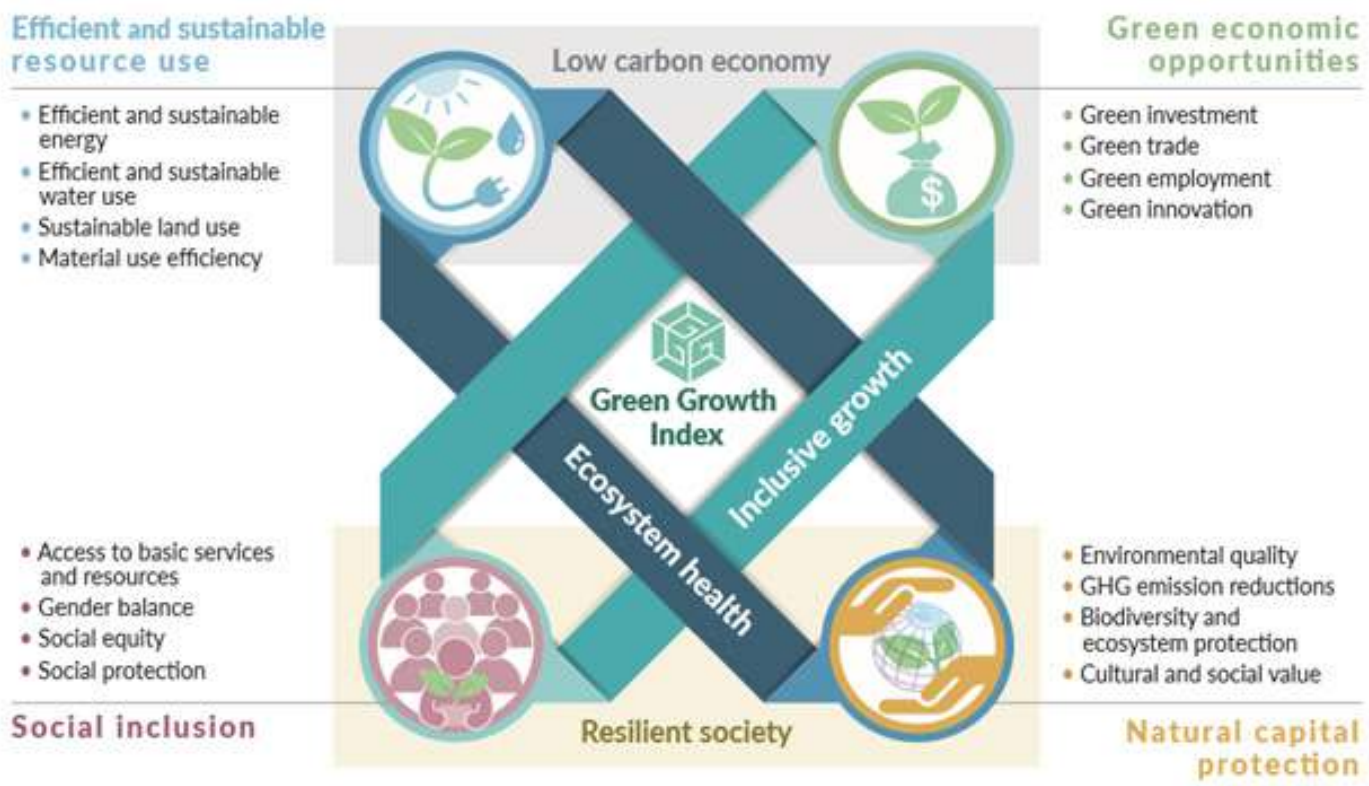


Source: Authors own.

These steps were guided by the green growth framework, which supported assessing the transition to green and inclusive growth (Figure 2). This framework helped align the indicators with the challenges and opportunities for green growth transition. The green growth framework consists of four dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. These dimensions are closely interlinked based on the concepts of the low carbon economy, resilient society, ecosystem health, and inclusive growth. These interlinkage details are described in the technical reports on the Green Growth Index.[14] The framework emphasizes that efficient and sustainable use of natural resources will produce more goods and services with fewer resources. This will, in turn, protect natural capital, including water, energy, land, and materials, as well as the ecosystem services they provide. A healthy ecosystem characterized by, for example, fertile soil, multifunctional forests, productive land and seas, good quality freshwater and clean air, and pollination increases economic productivity and creates new economic opportunities. The green growth framework also highlights the importance of protecting natural capital, which provides sources of economic growth such as green jobs, trade, and investment. Finally, social inclusion is considered a key mechanism to both the achievement and distribution of gains from green growth, where people are not only beneficiaries of economic growth but also contributors to creating economic opportunities.

[iv]The framework was developed by the Global Green Growth Institute (GGGI) in close collaboration with many international organizations. Details are available in Acosta, L.A., et al. (2019). Green Growth Index: Concepts, Methods, and Applications, GGGI Technical Report No. 5, Green Growth Performance Measurement (GGPM) Program, Global Green Growth Institute, Seoul.
https://greengrowthindex.gggi.org/wp-content/uploads/2019/12/Green-Growth-Index-Technical-Report_20191213.pdf

Figure 2. Green growth framework



Source: Acosta et al., 2019 [iv]

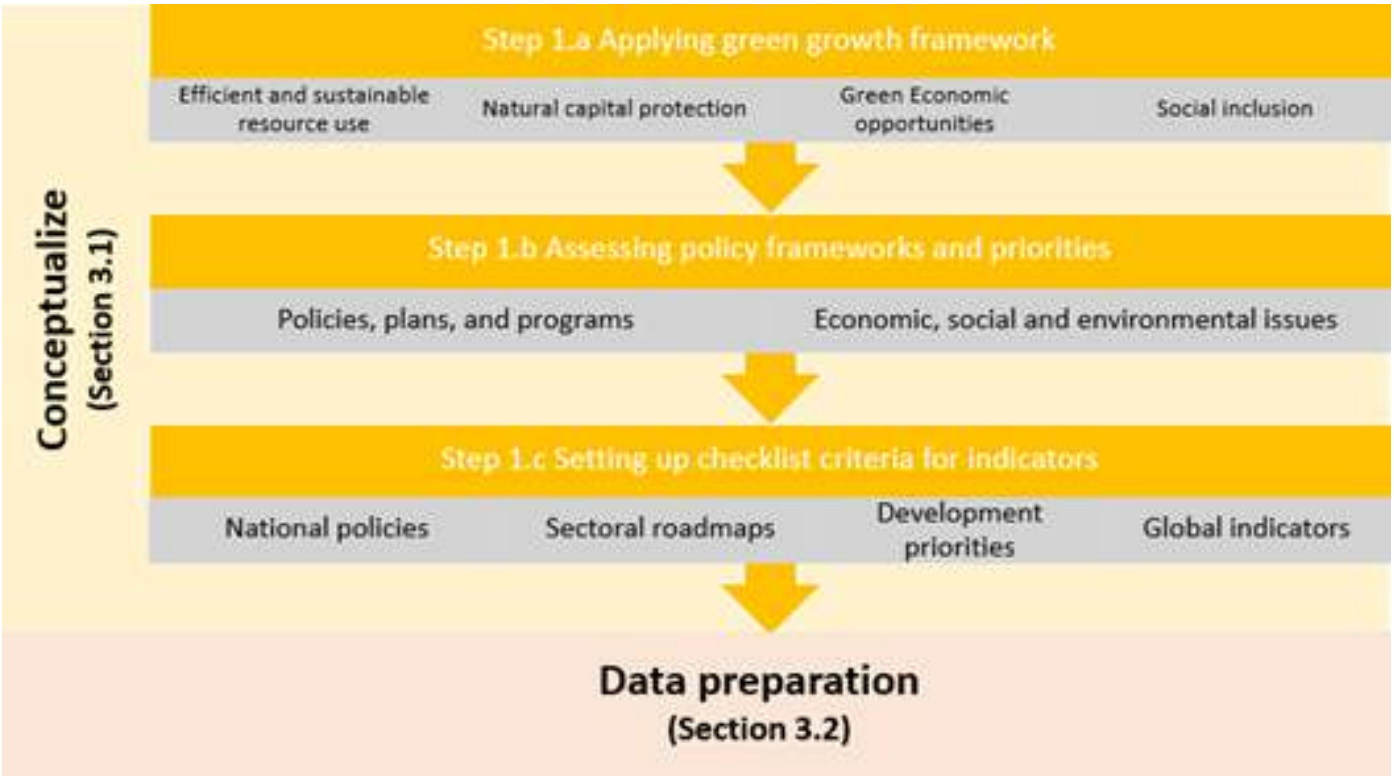
Four essential pillars represent each dimension in the green growth framework to transition to green and inclusive growth pathways. Efficient and sustainable resource use covers energy, water, land use, and waste and material use. Natural capital protection includes improving environmental quality, reducing GHG emissions, protecting biodiversity and ecosystem, and preserving cultural and social value. Investment, trade, innovation, and employment create green economic opportunities. Social inclusion includes access to basic services and resources, gender balance, social equity, and social protection.

03 AZERBAIJAN'S TRANSITION TO GREEN AND INCLUSIVE GROWTH

3.1 Setting the scene for a net zero economy in Azerbaijan

This section corresponds to Step 1 in the analytical approach (Figure 3). It assessed the national policies and sectoral roadmaps to identify issues relevant to the green growth dimensions (Step 1.a). The results of the assessment are discussed in section 3.1.1. Based on the assessments of the policy documents and relevant literature, four development priorities for Azerbaijan's green growth transition were identified in Step 1.b. and discussed in section 3.1.2. The checklist criteria, derived from Step 1.c. for identifying green and inclusive growth indicators for Azerbaijan, are presented in section 3.1.3. The knowledge generated in this section was used to prepare the data for the green growth indicators (chapter 3.2).

Figure 3. Conceptualization of green growth



Note: Complete diagram and description of analytical methods are in Annex 1.

3.1.1 Policy contexts

National policies set the rules, frameworks, or plans of action to achieve specific development goals. Roadmaps define strategic plans for achieving goals and include specific milestones indicating the distance from these goals. Policies and roadmaps thus describe the country's development pathways. The national policies and sectoral roadmaps relevant to achieving sustainable development are briefly described below. A review of the policies and roadmaps provided insights into the development priorities to achieve sustainable development (section 3.1.2). Moreover, using the green growth framework (Figure 2), the relevance of the policy goals and the roadmaps' strategies and milestones to green and inclusive growth were assessed, i.e., are they supporting the green growth transition? A set of indicators relevant to the green growth transition in Azerbaijan were identified and mapped against the goals, strategies, and milestones using a checklist approach in section 3.2.

a. National policies

In response to the oil crisis in 2014/2015 that slowed down Azerbaijan's growing economy, in 2016, the government developed the ***Strategic Roadmap for National Economy (and critical sectors)***, providing a strategic vision for 2020 and a long-term vision for 2025. The Strategic Roadmap emphasizes the need to build a resilient, diversified, and inclusive economy until 2020 and aims to improve people's living standards and develop human capital until and beyond 2025. [15] It recognizes the long-term transition to a new productivity-based growth approach while minimizing the adverse effects of the short-term oil crisis. Due to the COVID-19 pandemic, the implementation of the Strategic Roadmap continued in 2021 while waiting for the new action plan to be completed. [16]In the new action plan, called ***Azerbaijan 2030: National Priorities for Socio-Economic Development***, green growth has become one of the government's national priorities to promote socio-economic development in Azerbaijan in 2021. The Azerbaijan 2030 envisaged

supporting other socio-economic development priorities, including "a steadily growing, competitive economy; a dynamic, inclusive society based on social justice; and areas of modern innovations and competitive human capital" under a clean environment and green growth framework. [17] The strategy for the green growth transition includes developing innovations and technologies and creating more jobs. [18] Azerbaijan 2030 further strengthens the Strategic Roadmap's previous vision of diversifying the economy, eliminating dependence on oil, expanding the non-oil sector, and, at the same time, integrating environmental aspects. It emphasizes the need, on the one hand, to create a balance between social and economic development and, on the other hand, to protect the environment in the pursuit of achieving socio-economic development. The Azerbaijan 2030 is thus an essential policy framework to achieve sustainable growth by addressing Sustainable Development Goals (SDGs). It also supports the implementation of the country's ***Nationally Determined Contribution (NDC).*** [19]

Azerbaijan submitted its first NDC to the United Nations Framework Convention on Climate Change (UNFCCC) on the 1st of September 2017. It made commitments that "[b]y 2030 the Republic of Azerbaijan targets 35 percent reduction in the level of greenhouse gas emissions compared to 1990/base year as its contribution to the global climate change efforts". [20] At the Conference of the Parties (COP) 26, Azerbaijan announced a 40 percent GHG emission reduction target by 2050. [21] The NDC specified mitigation actions to reduce CO_2 and Non-CO_2 (methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), Carbon Tetrafluoride (CF_4)) emissions from four sectors, including energy (oil and gas), residential and commercial, transport, agriculture, waste, and land use, land-use change and forestry (LULUCF). The use of alternative and renewable energy resources is also envisaged across all these sectors. In the first NDC, while there were no specific adaptation actions, it was stated that Azerbaijan considers "to develop relevant adaptation measures for decreasing or minimizing the losses that may occur at national, local and community levels per sector" to reduce vulnerability from climate change impacts. [22] The National Adaptation Plan (NAP) and the Long-Term Low Emission Development Strategy (LT-LEDS) are currently being developed to support the NDC implementation. The NAP will set specific and time-bound actions for adaptation priorities, and the LEDS will define new sectoral abatement strategies for 2030 and 2050.[23]

So far, various ***energy laws*** have already been enacted to support the transition to a low-carbon economy, including, for example, the Law of the Azerbaijan Republic on the Use of Energy Resources (May 1996), the Law on the Use of Renewable Energy Sources in Electricity Generation (July 2021), and the Law on Alternative Use of Energy Resources and Energy Efficiency (August 2021). The Law on the Use of Renewable Sources in Electricity Generation establishes a mechanism for attracting private (foreign) investments in industrial development. The Law on Rational Use of Energy Resources and Energy Efficiency, replacing the Law on the Use of Energy Resources, aims to ensure energy reliability and security, encourage investment in efficient technologies, and strengthen the collaboration among energy sector actors.

The national policy to protect biodiversity and ecosystems is the ***National Strategy of the Republic of Azerbaijan on Conservation and Sustainable Use of Biodiversity for 2017-2020*** **(NBSAP),** published in October 2016. The strategy follows a cross-sectoral approach with the objectives of using genetic resources sustainably, conserving biodiversity for future generations, alleviating poverty, maintaining ecological balance, ensuring transition to a "green economy", promoting environmental education, restoring endemic and local fauna species, developing protected areas network, and reducing the threats to biodiversity. [24] The NBSAP thus provides the framework for integrating green growth in the 2030 National Priorities. While biodiversity and ecosystem contribute to climate change mitigation, it is also affected by climate change impacts. The strategy aimed to assess the impacts and identify measures to conserve and sustain biodiversity and ecosystem services. [25]

b. Sectoral Roadmaps

The Strategic Roadmap for National Economy has specific goals for critical sectors, including heavy industry and machinery manufacturing, utility services (electric energy, heating, water, and gas), consumer goods at the level of small and medium entrepreneurship (SMEs), manufactured and processed agricultural products, logistics and trade, financial services, affordable housing, vocational Education and training, telecommunications and Information technologies, and tourism. Although greening the economy was not the focus of the national Strategic Roadmap, its sectoral roadmaps support the transition to green growth by creating an enabling environment for green economic opportunities (e.g., innovations, human skills, efficient logistics, SMEs inclusion) and social inclusion (e.g., affordable housing). The sectoral roadmaps present a strategic vision until 2020, a long-term vision until 2025, and a target vision beyond 2025.

Table 1 lists the long-term and target visions for the sectoral roadmaps. Climate change is addressed across sectoral roadmaps. The actions and timeframes of these roadmaps will need to be updated and aligned with the full implementation of the NDC. [26]

Table 1. Visions in the relevant sectoral roadmaps

Sector	Long-term vision until 2025	Target vision beyond 2025
Heavy industry and machinery manufacturing	Enhance local enterprise capacities by forming a value chain along low and medium-value product segments, achieve full competitiveness of enterprises at the regional level, transform the country into a regional center of industry and machine-building	Become a part of the global value chain, participate in producing famous brands in high-value products and technical knowledge, export methods on efficient production and management to neighboring countries
Utility services (electric energy, heating, water, and gas)	Form an improved institutional environment and progressive management systems in public utilities, use modern technologies and specialized human skills, invest in diversifying sectoral generation and distribution systems	Achieve complete improvement of operational efficiency and service level in the electricity, water and sanitation, heat, and natural gas supply sectors
Consumer goods at the level of small and medium entrepreneurship (SME)	Further increase the competitiveness of SMEs, enhance the provision of basic consumer goods by SMEs, a significant increase in SMEs' share in GDP and employment	SMEs to contribute at least 60 percent of GDP and create a local SME network connected to global value chains
Manufacture and processing of agricultural products	Form a competitive agribusiness through a strong transition from traditional farming to market-oriented added value-creating intensive farming	Form a highly technologically developed and industry-oriented agriculture, compliant with environmental standards and effectively integrated into the global value chain system
Logistics and trade	Significantly improve trade infrastructure and regulatory incentives to enhance the country's attractiveness and become an important regional hub in this area	Effectively managing logistics and trade centers with strong connections with other countries to become an important regional hub
Financial services	Provide a wide range of financial services supported by an effective regulatory and legislative framework to form a balanced financial system	Form an attractive and regionally competitive financial sector for foreign investors
Vocational education and training	Form a vocational education system with functional vocational education and training institutions, where close cooperation relations with employers are established	Identify and attract potentially talented young people, provide priority sectors with an innovative and highly productive labor force, and build an internationally recognized competitive system
Information technologies and telecommunications (ICT)	Continue innovative reforms by increasing the range and volume of modern services, expanding the scope of the fast broadband network, implementing international standards in the telecommunications sector, improving the technical literacy of the society, and forming a digital economy	Become an ICT leader in the region by transforming infrastructure to meet society's growing demand, providing 95 percent of education facilities with fixed and mobile broadband networks, developing a technology-oriented education system
Specialized tourism industry	Transform the country into one of the most attractive tourism destinations in the region and the world	Become one of the top 20 tourist destinations in the world and effectively use existing tourism resources
Affordable housing	Plan reconstruction and development of cities, supporting sustainable urbanization	Continue to develop affordable housing and implement measures to improve illegal buildings

**Sources: Sectoral roadmaps*[27]

3.1.2 Identified development priorities

The four development priorities identified from the review of the national policies and sectoral roadmaps include economic diversification, green innovation, human skills and development, and land-water-food nexus. The priorities' relevance to sustainable development and challenges to green growth transition are discussed below.

a. Economic diversification

The energy sector brought economic growth and relative prosperity to Azerbaijan, with a substantial increase in oil and natural gas production contributing to 88 percent of Azerbaijan's exports in 2016. [28] Given the country's economic dependence on its hydrocarbon resources, economic diversification in energy and other related sectors is an important step to stabilize the economy. Economic diversification is crucial in creating a climate-resilient economy and overcoming the challenges of oil and pandemic crises. Azerbaijan's 2020 Strategic Roadmap for National Economy, which emphasized a new productivity-based growth approach, has set the stage for economic diversification. The Azerbaijan 2030: National Priorities for Socio-Economic Development further pursues economic diversification and, at the same time, strengthens social inclusiveness and green economic opportunities. Diversification is envisaged to come from developing the processing industries, expanding the accessibility of small and medium enterprises to financial resources, and stimulating foreign investment in the non-oil sector. [29] But

so far, Azerbaijan's exports and foreign direct investments (FDI) have remained heavily oriented toward oil and natural gas. Oil and natural gas contributed around 95 percent of the total export revenues in 2019, with EU countries accounting for 45 percent. [30] Between 2003 and 2017, the economy attracted over USD 32.7 billion in greenfield FDI projects, but 50 percent was directed toward the coal, oil, and natural gas sectors. [31] At the same time, significant current investment plans in wind projects are dwarfed by large-scale upstream oil and gas projects and pipelines.

In line with the government's current priorities to develop new trade routes and transport corridors, including establishing the Alat free trade zone and developing the international sea trade port and the Baku-Tbilisi-Kars railway, the transport sector attracted significant greenfield FDI. [32] Investments in the transport sector will support export diversification. For example, Azerbaijan connects Asia and Europe via the Caspian Sea, creating multiple advantages for Azerbaijan to build and develop economic ties through the maritime economy. New opportunities to develop tourism and fishery industries could be created. [33] But Azerbaijan's recent institutional changes have weakened transport and energy, which are vital infrastructure sectors. For example, the Ministry of Transport was merged with the Ministry of Communication and High Technologies in 2017, and the State Agency for Alternative and Renewable Energy Sources was dissolved in 2019. [34]

Private investors bringing capital and technology for value-added manufacturing will cause an additional boost to economic diversification. There will be enormous opportunities for the manufacturing sector to contribute to diversification. The share of manufacturing value added to Azerbaijan's GDP remained low at around 7 percent between 2000 and 2021. [35] But it will be essential to create an enabling environment to attract new business firms and facilitate their access to finance. This will, in turn, attract further investments and promote a more market-oriented behavior among state enterprises. Firms will need to re-align their business models with innovations and green technology. However, an appropriate institutional framework will be required to allow the financial sector to mobilize green finance for innovations and advanced technologies. The Agency for Development of Small and Medium Businesses, established in December 2017, is mandated to support SMEs in the form of information, advisory, training, education, and legal services, coordination with other government agencies, protection of the entrepreneurs' rights to ensure the launch of new businesses, etc. [36] However, while the government has strengthened the institutional framework, the limited knowledge of finance among SMEs and higher bank interest rates offered to SMEs remain critical bottlenecks to accessing finance. [37]

b. Green innovation

Modernizing human capital and establishing a digital economy will drive economic development and help achieve the goals in Azerbaijan 2030: National Priorities for Socio-Economic Development. [38] The Azerbaijan 2030 considers scientific and technological advancements essential in improving the share of alternative and renewable energy sources used for primary energy consumption across all sectors. Various policies support green innovation, including the Law on the Use of Renewable Energy Sources in Electricity Generation, the Law on the Rational Use of Energy Resources and Energy Efficiency, the National Action Plan on Energy Efficiency, and a roadmap for swiftly implementing eco-design and labeling requirements for energy-consuming products, etc. [39] They all aim to support the national goal of achieving 30 percent renewables in the energy mix by 2030. [40] As of 2019, the share of renewables in total energy consumption was only 1.62 percent. [41] There are thus many untapped opportunities for Azerbaijan to achieve green innovation in the renewable energy sector. Government measures to accelerate the use of alternative (renewable) energy sources include strengthening scientific and technical capacity, continuing specialist training, and mobilizing the private sector. [42]

In addition to renewables, other areas to introduce innovative green technologies are hydrocarbon extraction, energy, transport, water and sanitation, waste management, and land management (due to degradation). [43] According to the World Bank[44] , pursuing a modal shift from road to rail and developing non-motorized modes of transportation (NMT) is Azerbaijan's top priority to reduce emissions and promote green mobility. New technologies that reduce energy losses also contribute to reducing emissions. These include stopping leaks at production and transportation facilities using leak detection devices placed on aircraft, drones, and satellites. [45] In addition to economic opportunities for eco-tourism and fishery, the Caspian Sea offers green innovation from offshore renewable energy. Various studies revealed the attractive offshore potential of the Caspian Sea, even at a depth of fewer than 50 meters. [46] Other potentials include maritime security and surveillance focusing on digitalization and technical innovation, floating offshore wind, wave and tidal energy, and floating solar photovoltaic energy. [47] Based on a recent United Nations Economic Commission for Europe (UNECE) analysis [48], Azerbaijan's abundant renewable resources offer opportunities to produce low-carbon hydrogen based on water electrolysis using clean electricity and steam methane reforming with Carbon Capture and Storage (CCS).

But the level of innovation activity and performance in Azerbaijan is still low compared with the CA countries. An accurate assessment of innovative activity in Azerbaijan is challenged by the scarce national data on R&D and innovation and the lack of adherence to generally accepted

international norms. [49] The public sector provides about 80 percent of the funds for research and development (R&D), with the business sector providing only 20 percent despite the strong FDI-dominated oil and gas sector. [50] The lack of innovative technologies and financing for the innovative activity will be a big hurdle to reducing GHG emissions from Azerbaijan's oil and gas sectors. GHG emissions have increased by 19 percent since 2010, and CO_2 and methane emissions still account for 70 percent and 13.8 percent of the total GHG emissions in 2019. [51]

c. Human skills and development

Productivity gaps across sectors in Azerbaijan are evident in the disparate contribution to the labor market and the GDP output. The oil and gas sectors employ only one percent of the labor force while contributing 37 percent of the GDP; the industry sector employs 15 percent while contributing 49 percent of the GDP; the agriculture sector employs 36 percent while contributing less than 6 percent of the GDP; and the service sector employs 50 percent while contributing 42 percent of the GDP in 2019. [52] Although the unemployment rate has been low at 6.6 percent in 2019 [53], most job opportunities are in low-wage and low-productivity sectors like the agriculture and industry sectors. Although unemployment among the youth has declined since 2000, it remained high at 12.4 percent in 2019. [54] Lack of high education and modern skills contributes to low labor productivity and high unemployment rates, undermining Azerbaijan's capacity to create new businesses. Although primary and secondary enrollment rates are high, tertiary enrollment remained low at 35 percent in 2020. [55]

Moving into high-technology renewable energy industries and expanding other connected industries and services require advances in a knowledge-based economy. Recent empirical findings showed that a knowledge-based economy and technological innovations are positively linked with green growth, with inclusive growth favorably affecting organizational capital and vocational training.[56] Coordinating and complementing knowledge between public and private sectors facilitate the transfer of collected knowledge and build necessary human capital for the green economy. [57] Green employment is created through the private sector's higher demand for skilled labor in renewable energy and low carbon-intensive production. [58] Thus, the government will need to invest human capital to build a knowledge-based economy for a green growth transition. However, public spending on education (as a share of non-oil GDP) decreased from 6.4 percent in 2010 to 4.0 percent in Azerbaijan in 2017, while the number of students increased. [59] Consequently, technical and vocational education and training (TVET) quality is low, school buildings are poorly maintained, and teaching materials are outdated. [60] According to the ADB[61], to adequately meet the needs of the diversified economy, Azerbaijan will need to invest in infrastructure and human capital by providing adequate resources to ensure sustainability and enhancement. Moreover, establishing an effective institutional setup and facilitating private sector participation will be needed.

A knowledge-based economy is supported by human skills and a healthy workforce that drives innovation. During the transition period, some workers in Azerbaijan will lose their jobs and face economic difficulties affecting mental health. Thus, offering comprehensive financial and health protection systems would moderate economic risks and promote access to healthcare services, including mental health support. [62] The Management Union of Medical Territorial Units in Azerbaijan (TABIB) was created in 2018 to ensure the implementation of mandatory health insurance in the country. [63] But Azerbaijan's domestic general government health expenditure remained very low at 1.28 percent of the GDP in 2019. [64] Increasing health expenditure could create green jobs and shift workers' roles and skills in the health sector. In healthcare facilities, these new skills can be used to apply new technologies to minimize resource use and adopt green medical waste management. [65] Green innovation in a knowledge-based economy is thus inevitable across various economic and social sectors.

d. Land-water-food nexus

The agricultural and forest lands accounted for 57.8 and 13.7 percent of the total land area in Azerbaijan in 2020. [66] Like in the Central Asian countries, wind and water erosion, landslides, overgrazing, and soil exhaustion characterize land degradation in Azerbaijan, which contributes to a decrease in soil fertility and crop yields and an increase in rural poverty and outmigration. [67] Livestock production has increased significantly in Azerbaijan, with the livestock production index increasing from 34.6 in 1994 to 116 in 2020. [68] The pasturelands, which account for about a third of the country's land area, became overgrazed and degraded, reducing species diversity and habitat. [69] Moreover, land degradation from soil erosion affects 42 percent of the land area, which could reduce land productivity by 1.2 percent and GDP by 0.024 percent annually. [70] Azerbaijan is susceptible to land degradation because more than half of its territory is covered by mountains. Steep slopes and climatic conditions favor the development of erosive processes. [71] Heavy rainfalls and floods affect 300 km^2 of agricultural land, and erosion causes 0.5 million m^3 of soil losses annually. [72] Agricultural practices also contribute to soil erosion, including grazing in the mountains and forests, unsustainable logging, plowing slope lands, etc. [73] Forest areas, which can help reduce soil erosion and protect watershed areas, have steadily increased, albeit minimally, from 11.5 percent in 1992 to 13.7 percent in 2020. [74] The state owns and manages forests to provide watershed, soil protection, and climate-regulating services.[75]

Agricultural productivity also depends on water availability. Water resources in Azerbaijan account for about 15

percent of the total available water in the South Caucasus region, and about 75 percent of the surface water flows from these neighboring countries. [76] The Kura River, which flows from Turkey through Georgia and Azerbaijan to the Caspian Sea, is the primary water source in Azerbaijan. Still, availability has declined due to intensive agriculture and climate change impacts. [77] The Araxes River, which flows along the border with Iran, is the second most crucial surface water source. Like the Kura River, the water supply from this river has been shrinking due to its diversion to many reservoirs. [78] Moreover, the industries established during the Soviet era around the Kura and Aras watersheds are causing severe transboundary pollution in these rivers. [79] But local industries are also polluting the small rivers due to the lack of wastewater treatments. The share of safely treated domestic wastewater flows was only 57 percent in 2020. [80] However, not all wastewater treatment facilities are properly functioning. [81] Municipal water supply also depends on surface water sources due to inadequate wastewater treatment. Polluted surface water is causing high costs to the provision of utility services.[82]

However, the main obstacles to improving agricultural productivity are inefficient irrigation systems and inadequate water resource management. [83] About 30 percent of the agricultural land area was equipped with irrigation in 2020. [84] The share of agriculture in water withdrawal increased from 67 in 1992 to 92 percent in 2019, mainly coming from surface water (84 percent). [85] Over half of the irrigated land continues to rely on surface irrigation, predominantly inefficient irrigation systems along furrows and overflow, causing soil and water losses. [86] Water losses during water transportation remain essentially unchanged at around 32 percent. [87] Moreover, inadequate drainage has led to high levels of salinization and waterlogging. [88] About 44 percent of the irrigated land suffers from salinity, reducing crop yields by 23 percent with low salinity, 47 percent with average salinity, and as high as 85.0 percent with strong salinity. [89] Azerbaijan is importing wheat to ensure food security. Improving agricultural productivity will improve food security from domestic production. But in Azerbaijan, low income relative to the increasing cost of living and high unemployment contribute to household food insecurity, particularly in the rural areas.[90]

3.1.3 Checklist criteria for the green growth indicators

Indicators measure performance in achieving goals. A checklist approach was applied to assess, on the one hand, the relevance of the green growth indicators to the goals, strategies, and milestones in national policies and sectoral roadmaps and, on the other hand, the gaps in considering them in the policies and roadmaps. The five criteria used in the checklist are described below.

Criteria 1: National policies, including Azerbaijan 2030, Strategic Roadmap, Energy laws, NDC, and NBSAP, relevant to sustainable development and climate actions, provide information on the goals and targets of the government to overcome challenges and maximize opportunities. The more policies cover green growth indicators, the more they align with the green growth transition.

Criteria 2: The sectoral roadmaps' strategies and milestones need alignment with the indicators to support the green growth transition. The roadmaps considered in the checklist are listed in Table 1.

Criteria 3: The development priorities identified for Azerbaijan, including economic diversification, green innovation, human skills and development, and land-water-food nexus, provide information on the challenges and opportunities for green growth transition.

Criteria 4: Climate actions can be aimed at reducing GHG emissions through mitigation or increasing the resilience of the society and ecosystem through adaptation. They are included in the checklist to emphasize the significance of green growth indicators in measuring green growth performance in Azerbaijan.

Criteria 5: Sustainable Development Goals (SDGs) are essential in the checklist because they support green and inclusive growth. Due to the lack of indicators for green economic opportunities in the SDGs, the Global Green Growth Index was also considered in the list of criteria to address this gap in green growth indicators.

The criteria are mapped against the green growth indicators in a checklist matrix, as shown in Table 2. Two colors represent the checks: First, a green check indicates direct relevance, where indicators with their measurement units are explicitly part of the criteria. Second, a yellow check shows only indirect relevance, with no implicit mention of the indicator and its measurement unit. The following provides an interpretation of the checks for the different criteria.

- **Criteria 1 and 2 –** The green checks suggest that green and inclusive growth is vigorously pursued in Azerbaijan, where the indicators are used to measure performance in achieving green and inclusive growth goals. The yellow checks indicate that, while issues relevant to the green growth transition are recognized, they are not purposely pursued or addressed. No checks indicate gaps in national policies and sectoral roadmaps, which could slow or hinder the transition.
- **Criteria 3 –** The checks for the development

priorities are used to inform the relevance of the green growth indicators to challenges and opportunities identified in Azerbaijan's economic diversification, green innovation, human development and skills, and land-water-food nexus. Only yellow checks are used in these criteria because the discussion on development priorities focused on highlighting challenges and opportunities.

- **Criteria 4 –** The green checks inform the significance of the green growth indicators on climate mitigation and adaptation. Mitigation contributes to a low-carbon economy, and adaptation builds a resilient society, enabling a green growth transition. The yellow checks indicate that the green growth indicators are only indirectly relevant to mitigation and/or adaptation.
- **Criteria 5 –** The green checks inform that the green growth indicators are included in the SDGs and Green Growth Index. The yellow checks indicate that, although not in the SDGs and Green Growth Index, the indicators are nonetheless relevant to sustainable development and green growth.

On the one hand, many checks (particularly the green ones) on Criteria 1 and 2 indicate that Azerbaijan is clearly pursuing green growth. On the other hand, many checks on Criteria 3-5 inform about the value of using the indicators to track progress in the green growth transition.

Table 2 Checklist matrix of the green growth indicators and criteria.

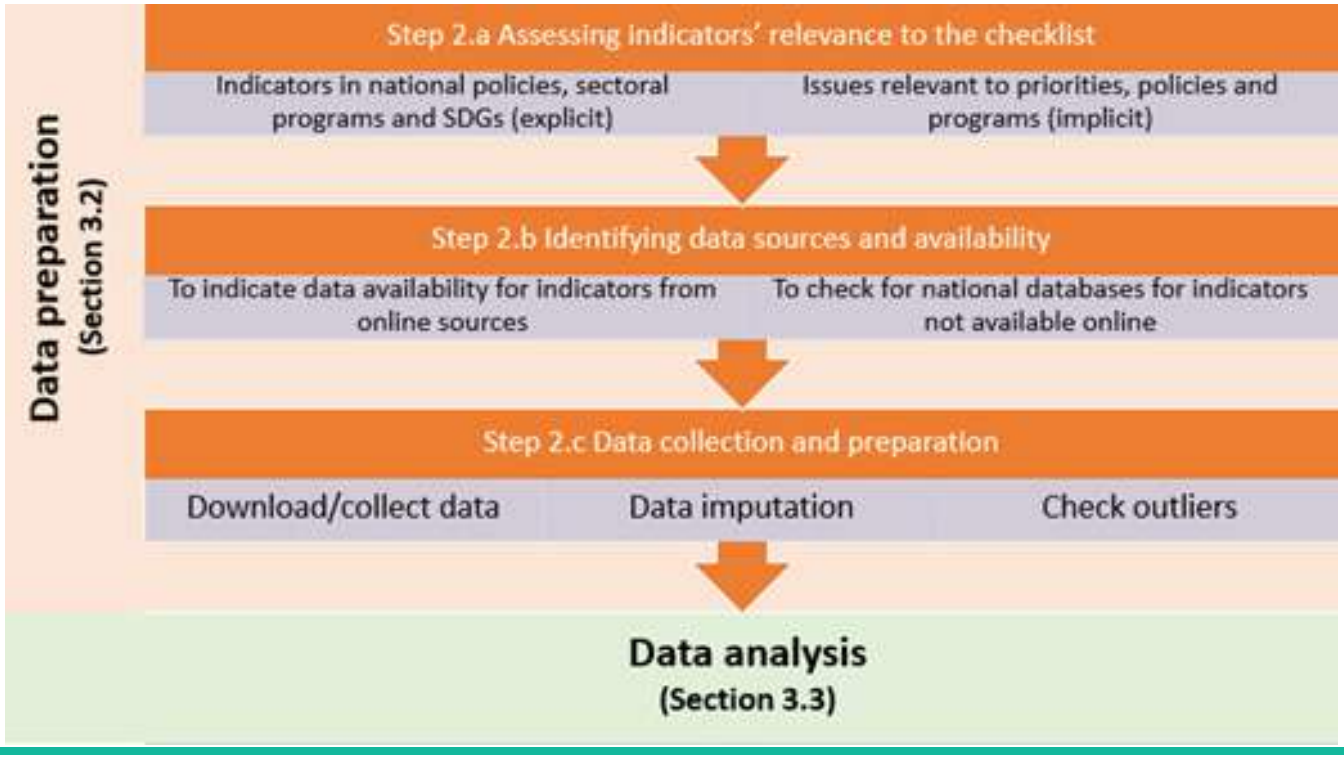
Indicator code and short name	National policies (Criteria 1)					Sectoral roadmaps (Criteria 2)	Development priorities (Criteria 3)				Climate actions (Criteria 4)		Global issues (Criteria 5)	
	Azerbaijan 2030	Strategic Roadmap	Energy laws	NDC	NBSAP		ECON	INNO	HUMA	NEXU	MITI	ADAP	GG Index	SDGs
EE1 – primary energy supply per GDP	✓	✓	✓	✓		✓	✓	✓			✓		✓	✓
EE2 – share of renewables	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓
EE3 – logistics performance	✓	✓		✓		✓	✓				✓	✓	✓	✓
EE4 – share renewable electricity	✓		✓	✓		✓	✓				✓	✓		✓
EE5 – electric transmission losses				✓		✓					✓	✓		

Legend: ✓ direct relevance, explicit mention of the indicator with the same measurement unit; ✓ Indirect relevance, implicit mention of the indicator with no relevant unit Notes: NDC-Nationally Determined Contribution, NBSAP - National Strategy on Conservation and Sustainable Use of Biodiversity, ECON-economic diversification, INNO - green innovation, HUMA - human development and skills, and NEXU-land-water-food nexus, MITI mitigation, ADAP-adaptation, GG Index - Green Growth Index, SDGs - Sustainable Development Goals. The list of sectoral roadmaps is in Table 1.

3.2 Indicators for green and inclusive growth

This section corresponds to Step 2 in the analytical approach (Figure 4). It assessed the relevance of the green growth indicators based on the checklist criteria identified in Step 1 (Figure 3) and as described in section 3.1.3. Detailed information on the green and inclusive growth indicators is presented in Annex 2. The knowledge generated from assessing the checklist matrix for each of the four green growth dimensions, including efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion, helps justify the inclusion of the indicators for performance measurement and identifying policy gaps in tracking performance in green and inclusive growth in Azerbaijan. The assessment results from Step 2.a are discussed in section 3.2.1. The indicators' data available from different online sources were assessed to check whether they could be included in the computation of performance scores, as described in the data analysis (section 3.3). The assessment results from Step 2.b. are discussed in section 3.2.2. Finally, the indicators' data were collected and prepared for data analysis. The information on imputed data is given in section 3.2.2.

Figure 4. Data preparation of green growth indicators



Note: Complete diagram and description of analytical methods are in Annex 1.

3.2.1 Azerbaijan's green and inclusive growth indicators

a. Efficient and sustainable resource use

Table 3 presents the checklist for the green growth indicators included in the efficient and sustainable resource use dimension. The indicators for the pillar on efficient and sustainable energy include primary energy supply per GDP (EE1), the share of renewables (EE2), logistics performance (EE3), the share of renewable electricity (EE4), and electric transmission losses (EE5). The indicators for the pillar on efficient and sustainable water use include water use efficiency (EW1), level of water stress (EW2), sustainable fisheries (EW3), the share of surface irrigation (EW4), and renewable water per capita (EW5). The indicators for sustainable land use include nutrient balance per hectare (SL1), the share of organic agriculture (SL2), the share of ruminant livestock (SL3), agricultural production per hectare (SL4), and forest area change rate (SL5). And finally, the indicators for waste and material use efficiency include material consumption per GDP (ME1), material footprint per capita (ME2), average food loss and waste (ME3), the share of solid waste recycled (ME4), and ratio treated wastewater (ME5).

Among all indicators, those for efficient and sustainable energy are well represented in national policies. Azerbaijan 2030 implicitly mentioned the relevance of all efficient and sustainable energy, except for the electric power transmission and distribution losses (EE5). However, this indicator is covered in the NDC, which aims to prevent gas leakages during oil-gas processing and distribution networks. Oil accounts for 32 percent of electricity generation in Azerbaijan (see Chapter 4). Moreover, it is considered well in the sectoral roadmap for developing utilities (electricity and thermal energy, water, and gas). The NDC covers all indicators for efficient and sustainable energy, albeit only implicitly, as no specific target indicators are mentioned in the document. In contrast, not all indicators are represented in the energy laws. One indicator of efficient and sustainable energy is explicitly mentioned in the National Strategic Roadmap, where the share of renewable energy types in the country's energy balance will increase after 2025. Energy balance considers supply and demand, so the share of renewables to total final energy consumption (EE2) is represented in this national policy document. Moreover, EE2 is regarded in the NBSAP, where "expanding the use of alternative and renewable energy sources in the regions for conservation of biodiversity" was mentioned.

Due to the cross-sectoral approach in the sectoral roadmaps, several emphasize the relevance of the five indicators for efficient and sustainable energy. [91]

The green growth indicators for the other three pillars (i.e., water, land, and material use) are well covered in the sectoral roadmaps but not in the national policies. While the NBSAP has covered all five sustainable land use indicators, none is mentioned in Azerbaijan 2030. Sustainable land use is essential for supporting non-oil production and trade diversification in Azerbaijan. For example, improving forest, graze, and cropland management will improve biodiversity protection without sacrificing monetary benefits and lower GHG emissions through carbon storage. [92]There is a lack of sustainable water use and material use efficiency indicators in the checklist matrix, most of which represent SDG indicators and are included in the Green Growth Index. Moreover, many indicators for sustainable water use and material use efficiency are relevant to adaptation to climate change. These or similar indicators will be useful to consider in the updated NDC and sectoral strategies. Located between the Caspian and the Black Seas and with a 713 km long coastline on the Caspian Sea, it will be critical for Azerbaijan to monitor the sustainable use and protection of its water resources. SDG indicators for sustainable consumption of its natural resources, such as domestic material consumption (ME1) and material footprint (ME2), will also enable Azerbaijan to assess the absolute level of resource use and allow it to distinguish consumption driven by domestic demand and driven by the export market.

b. Natural capital protection

Table 4 presents the checklist matrix for the green growth indicators in the natural capital protection dimension. The indicators for the pillar on environmental quality include air pollution PM2.5 (EQ1), disability-adjusted life year (DALY) rate due to unsafe water (EQ2), waste generation per capita (EQ3), coastal pollution, chlorophyll-a deviations (EQ4), and DALY rate due to air pollution (EQ5). The indicators for GHG emissions reduction include CO2 emissions per capita (GE1), non-CO2 emissions per capita, excluding agriculture, forest, and land use (AFOLU) (GE2), non-CO2 emissions per capita for AFOLU (GE3), the carbon intensity of energy production (GE4), and CO2 emissions per added value in manufacturing (GE5). The indicators for the pillar on biodiversity and ecosystem protection include the share of key biodiversity areas in protected areas (PAs) (BE1), the share of forest area (BE2), the share of naturally generating forest (BE3), the share of forest in legally PAs (BE4), and change in the water-related ecosystem (BE5). And finally, the indicators for the pillar on cultural and social value include the red list index (CV1), the share of terrestrial and marine PAs (CV2), monitoring environment in tourism (CV3), the share of plant genetic resources (CV4), and the share of cultural goods in exports (CV5).

Due to the direct linkages of GHG emissions to efficient and sustainable energy, the indicators for GHG emissions reduction in the natural capital protection dimension are also well represented in the national policies. The Law of the Azerbaijan Republic on Energy mentioned issues related to the carbon intensity of energy production (GE4) indicator for GHG emissions reduction. The Law on the Use of Renewable Energy Sources in Electricity Generation and the Law on the Rational Use of Energy Resources and Energy Efficiency did not mention emissions. The first NDC referred to reducing emissions (GE1, GE2, GE3) and, indirectly, carbon intensity in energy production (GE4) through modernizing electricity and thermal heating production. Carbon dioxide emissions per unit of manufacturing value added (GE5), an SDG indicator, is not mentioned in the first NDC. Like in the efficient and sustainable energy dimension, several indicators are covered in the sectoral roadmaps. In particular, the roadmap for the Development of the Specialized Tourism Industry refers to all indicators of social and cultural values and two indicators for biodiversity and ecosystem services.

The NBSAP only covers a few important indicators for protecting natural capital. For the indicators on environmental quality, only the DALY rate due to unsafe water resources (EQ2) is indirectly covered, i.e., "pollution inland water bodies will be reduced". Like in the efficient and sustainable water use, the indicators for protecting coastline areas, for example, the SDG indicator on chlorophyll-a deviations, are not considered in the NBSAP. Only two indicators for biodiversity and ecosystem protection are mentioned in the NBSAP, including forest area as a proportion of total land area (BE2) and change in the extent of (inland) water-related ecosystems over time (BE5). When updating the NBSAP, the protection of biodiversity and ecosystem services in coastal and marine areas will be beneficial. These indicators have been recently added to the SDG database and are relevant measures to track performance in climate change adaptation. Overall, many indicators for the natural capital protection dimension are relevant to adaptation because they increase ecosystem resilience.

Table 3. Checklist for the relevance of the indicators to the criteria for efficient and sustainable resource use

Indicator code and short name	National policies (Criteria 1)					Sectoral roadmaps (Criteria 2)	Development priorities (Criteria 3)				Climate actions (Criteria 4)		Global issues (Criteria 5)	
	Azerbaijan 2030	Strategic Roadmap	Energy laws	NDC	NBSAP		ECON	INNO	HUMA	NEXU	MITI	ADAP	GG Index	SDGs
EE1 – primary energy supply per GDP	✓	✓	✓	✓		✓	✓	✓			✓		✓	✓
EE2 – share of renewables	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓
EE3 – logistics performance	✓	✓		✓		✓	✓				✓	✓	✓	✓
EE4 – share renewable electricity	✓		✓	✓		✓	✓				✓	✓		✓
EE5 – electric transmission losses				✓		✓					✓	✓		
EW1 – water use efficiency	✓					✓		✓			✓	✓	✓	✓
EW2 – level of water stress										✓		✓	✓	✓
EW3 – sustainable fisheries					✓							✓	✓	✓
EW4 – share of surface irrigation						✓		✓				✓		✓
EW5 – renewable water per capita										✓		✓		
SL1 – nutrient balance per hectare					✓	✓						✓	✓	✓
SL2 – share organic agriculture		✓			✓	✓					✓	✓	✓	✓
SL3 – share ruminant livestock				✓	✓	✓				✓	✓		✓	
SL4 – agriculture production per hectare		✓			✓	✓				✓		✓		
SL5 – forest area change rate				✓	✓	✓				✓	✓	✓		✓
ME1 – material consumption per GDP											✓	✓	✓	✓
ME2 – material footprint per capita											✓	✓	✓	✓
ME3 – average food loss and waste		✓				✓					✓	✓	✓	✓
ME4 – share of solid waste recycled	✓	✓		✓		✓					✓	✓		✓
ME5 – ratio treated wastewater	✓	✓				✓				✓		✓		✓

Legend: ✓ *direct relevance, explicit mention of the indicator with the same measurement unit;* ✓ *indirect relevance, implicit mention of the indicator with no relevant unit*
Notes: *NDC – Nationally Determined Contribution, NBSAP - National Strategy on Conservation and Sustainable Use of Biodiversity, ECON – economic diversification, INNO – green innovation, HUMA – human development and skills, and NEXU – land-water-food nexus, MITI – mitigation, ADAP – adaptation, GG Index – Green Growth Index, SDGs – Sustainable Development Goals. The list of sectoral roadmaps is in Table 1.*

Table 4. Checklist for the relevance of the indicators to the criteria for natural capital protection

Indicator code and short name	National policies (Criteria 1)					Sectoral roadmaps (Criteria 2)	Development priorities (Criteria 3)				Climate actions (Criteria 4)		Global issues (Criteria 5)	
	Azerbaijan 2030	Strategic Roadmap	Energy laws	NDC	NBSAP		ECON	INNO	HUMA	NEXU	MITI	ADAP	GG Index	SDGs
EQ1 – air pollution PM2.5	✓	✓									✓	✓	✓	✓
EQ2 – DALY rate due to unsafe water										✓		✓	✓	✓
EQ3 – waste generation per capita						✓					✓	✓	✓	✓
EQ4 – coastal pollution, chlorophyll-a deviations					✓	✓				✓		✓		✓
EQ5 – DALY rate due to air pollution	✓										✓	✓		✓
GE1 – CO_2 emissions per capita	✓	✓		✓		✓	✓				✓	✓	✓	✓
GE2 – Non-CO_2 emissions per capita, excluding AFOLU	✓	✓		✓			✓				✓	✓	✓	✓
GE3 – Non-CO_2 emissions per capita for AFOLU	✓	✓		✓		✓	✓				✓	✓	✓	✓
GE4 – carbon intensity of energy production	✓	✓	✓	✓			✓				✓	✓		✓
GE5 – CO_2 emissions per added value in manufacturing	✓	✓				✓		✓			✓	✓		✓
BE1 – share key biodiversity areas in PAs					✓						✓	✓	✓	✓
BE2 – share of forest area				✓	✓	✓				✓	✓	✓	✓	✓
BE3 – share naturally generating forest											✓	✓		✓
BE4 – share of forest in legally PAs					✓					✓	✓	✓		✓
BE5 – change in water-related ecosystem					✓	✓						✓		✓
CV1 – red list index					✓	✓						✓	✓	✓
CV2 – share of terrestrial and marine PAs					✓	✓				✓	✓	✓	✓	✓
CV3 – monitoring environment in tourism					✓	✓						✓		✓
CV4 – share plant genetic resources					✓	✓						✓		✓
CV5 – share of cultural goods in exports						✓						✓		✓

Legend: ✓ *direct relevance, explicit mention of the indicator with the same measurement unit;* ✓ *indirect relevance, implicit mention of the indicator with no relevant unit*
Notes: *NDC – Nationally Determined Contribution, NBSAP - National Strategy on Conservation and Sustainable Use of Biodiversity, ECON – economic diversification, INNO – green innovation, HUMA – human development and skills, and NEXU – land-water-food nexus, MITI – mitigation, ADAP – adaptation, GG Index – Green Growth Index, SDGs – Sustainable Development Goals. The list of sectoral roadmaps is in Table 1.*

c. Green economic opportunities

Table 5 presents the checklist matrix for the green growth indicators in the green economic opportunities dimension. The indicators for the pillar on green investment include financial flows for renewables (GV1), installed renewable electricity (GV2), recipient of official development assistance (ODA) for biodiversity (GV3), financing for water resource management (GV4), and agriculture government expenditure (GV5). The indicators for the pillar on green trade include share export environmental goods (GT1), share export environmental technologies (GT2), share hazardous waste exports (GT3), share high technology exports (GT4), and CO2 emissions embedded in trade (GT5). The indicators for the pillar on green employment include the share green employment manufacturing (GJ1), renewable energy employment (GJ2), share youth and adults with ICT skills (GJ3), firms offering formal training (GJ4), and schools with access to the internet (GJ5). And finally, the indicators for the pillar of green innovation include share patents env technology (GN1), new business density (GN2), share medium/high-tech manufacturing value added (GN3), collaboration in R&D (GN4), and share R&D expenditure (GN5).

The issues related to most indicators in the green economic opportunities dimension are mentioned in Azerbaijan 2030. All five indicators for green innovation and four for green trade are discussed concerning promoting the proliferation of environmentally friendly technologies and developing highly profitable science-intensive medium- and high-tech industries. For green employment, the indicators are implicitly suggested by increasing employment in the private sector and providing training to adapt the labor force to the market, which the policy aimed to "green" (e.g., increase non-oil products and high-tech products). While the National Strategic Roadmap has mentioned fewer indicators than Azerbaijan 2030, the former directly includes two green growth indicators – ease of doing business (GN2) and share of R&D to total expenditure (GN5). Only one indicator appeared relevant in Azerbaijan's NDC and NBSAP. The sectoral roadmaps address many issues related to the indicators for green economic opportunities.

d. Social inclusion

Table 6 presents the checklist matrix for the green growth indicators included in the social inclusion dimension. The indicators for the pillar on access to basic services and resources include access to safely manage water and sanitation (AB1), moderate/severe food insecurity, convenient access to public transport (AB3), the population covered by 4G mobile network (AB4), and property rights (AB5). The indicators for the pillar on gender balance include women in national parliaments (GB1), females with financial accounts (GB2), equal gender pay (GB3), maternity cash benefits (GB4), and tertiary enrolment gender parity (GB5). The indicators for the pillar on social equity include inequality in income (SE1), rural/urban access to clean fuels (SE2), youth unemployment disparity (SE3), the old people dependency ratio (SE4), and discrimination against disability (SE5). And finally, the indicators for the pillar on social protection include population-given social assistance (SP1), universal health coverage (SP2), people in inadequate housing (SP3), victims of intentional homicide (SP4), and health regulation capacity (SP5).

The Azerbaijan 2030 and National Strategic Roadmap covered many indicators for social inclusion. The latter policy document even explicitly mentioned the importance of tracking performance on income equality based on the Palma ratio (SE1). There are, however, gaps in both national policies as far as indicators for human and gender rights are concerned. Property rights (AB5) provide a stable and secure environment for enterprises to invest and engage in developing high technologies and producing green products. They also facilitate the participation of smallholder farmers in the sustainable use of resources. The rights of women to participate in the green growth transition are not well supported in both Azerbaijan 2030 and National Strategic Roadmap; for example, the role of women in contributing to green growth policies by holding seats in the government (GB1); the right of women to have not only financial capacity but also financial freedom to have their accounts (GB2) that will allow them to open their own business; and the benefits for women to receive maternal support when they take care of their newborns (GB4). The issues relating to human security (SP4) that provide an enabling environment for citizens' participation in the green economy are not mentioned in national policies or sectoral roadmaps. The above issues on human and gender rights are all represented in the SDG indicators.

Table 5. Checklist for the relevance of the indicators to the criteria for green economic opportunities

Indicator code and short name	National policies (Criteria 1)					Sectoral roadmaps (Criteria 2)	Development priorities (Criteria 3)				Climate actions (Criteria 4)		Global issues (Criteria 5)	
	Azerbaijan 2030	Strategic Roadmap	Energy laws	NDC	NBSAP		ECON	INNO	HUMA	NEXU	MITI	ADAP	GG Index	SDGs
GV1 – financial flows for renewables	✓	✓				✓	✓	✓			✓			✓
GV2 – installed renewable electricity	✓		✓	✓		✓		✓			✓	✓		✓
GV3 – ODA for biodiversity, recipient					✓			✓			✓	✓		✓
GV4 – water resource mgt, financing						✓		✓		✓		✓		✓
GV5 – agriculture government expenditure						✓	✓			✓	✓	✓		✓
GT1 – share export environmental goods	✓						✓				✓	✓	✓	✓
GT2 – share export environmental technologies	✓						✓				✓	✓		✓
GT3 – share hazardous waste exports											✓	✓		✓
GT4 – share high technology exports	✓	✓				✓	✓				✓	✓		✓
GT5 – CO2 emissions embedded in trade	✓					✓	✓				✓			✓
GJ1 – share green employment manufacturing									✓		✓	✓	✓	✓
GJ2 – renewable energy employment	✓								✓		✓	✓		✓
GJ3 – share youth and adults with ICT skills	✓	✓				✓			✓			✓		✓
GJ4 – firms offering formal training	✓	✓				✓			✓			✓		✓
GJ5 – schools with access to internet	✓	✓				✓						✓		✓
GN1 – share patents env technology	✓							✓			✓	✓	✓	✓
GN2 – new business density	✓	✓				✓		✓			✓	✓		✓
GN3 – share medium/high-tech manufacturing value added	✓	✓				✓	✓				✓	✓		✓
GN4 – collaboration in R&D	✓					✓		✓			✓	✓		✓
GN5 – share R&D expenditure	✓	✓				✓		✓			✓	✓		✓

Legend: ✓ *direct relevance, explicit mention of the indicator with the same measurement unit;* ✓ *indirect relevance, implicit mention of the indicator with no relevant unit*
Notes: *NDC – Nationally Determined Contribution, NBSAP - National Strategy on Conservation and Sustainable Use of Biodiversity, ECON – economic diversification, INNO – green innovation, HUMA – human development and skills, and NEXU – land-water-food nexus, MITI – mitigation, ADAP – adaptation, GG Index – Green Growth Index, SDGs – Sustainable Development Goals. The list of sectoral roadmaps is in Table 1.*

Table 6. Checklist for the relevance of the indicators to the criteria for social inclusion

Indicator code and short name	National policies (Criteria 1)					Sectoral roadmaps (Criteria 2)	Development priorities (Criteria 3)				Climate actions (Criteria 4)		Global issues (Criteria 5)	
	Azerbaijan 2030	Strategic Roadmap	Energy laws	NDC	NBSAP		ECON	INNO	HUMA	NEXU	MITI	ADAP	GG Index	SDGs
AB1 – access to safely manage water and sanitation		☑				☑				☑		☑	☑	☑
AB2 – moderate/severe food insecurity		☑				☑				☑		☑		☑
AB3 – convenient access to public transport	☑			☑				☑			☑	☑		☑
AB4 – population covered by 4G mobile network	☑	☑				☑		☑			☑	☑		☑
AB5 – property rights						☑						☑		☑
GB1 – women in national parliaments												☑	☑	☑
GB2 – female with financial accounts						☑						☑	☑	☑
GB3 – equal gender pay	☑											☑	☑	☑
GB4 – maternity cash benefits												☑		☑
GB5 – tertiary enrolment gender parity		☑							☑			☑		☑
SE1 – inequality in income	☑	☑				☑			☑			☑	☑	☑
SE2 – rural/urban access to clean fuels	☑					☑			☑		☑	☑		☑
SE3 – youth unemployment disparity	☑	☑				☑			☑			☑		☑
SE4 – old people dependency ratio		☑							☑			☑		☑
SE5 – discrimination against disability	☑								☑			☑		☑
SP1 – population-given social assistance	☑	☑							☑			☑		☑
SP2 – universal health coverage	☑	☑							☑			☑	☑	☑
SP3 – people in inadequate housing	☑	☑				☑						☑	☑	☑
SP4 – victims of intentional homicide												☑		☑
SP5 – health regulation capacity						☑						☑		☑

Legend: ☑ *direct relevance, explicit mention of the indicator with the same measurement unit;* ☑ *indirect relevance, implicit mention of the indicator with no relevant unit*
Notes: *NDC – Nationally Determined Contribution, NBSAP - National Strategy on Conservation and Sustainable Use of Biodiversity, ECON – economic diversification, INNO – green innovation, HUMA – human development and skills, and NEXU – land-water-food nexus, MITI – mitigation, ADAP – adaptation, GG Index – Green Growth Index, SDGs – Sustainable Development Goals. The list of sectoral* **roadmaps is in Table 1.**

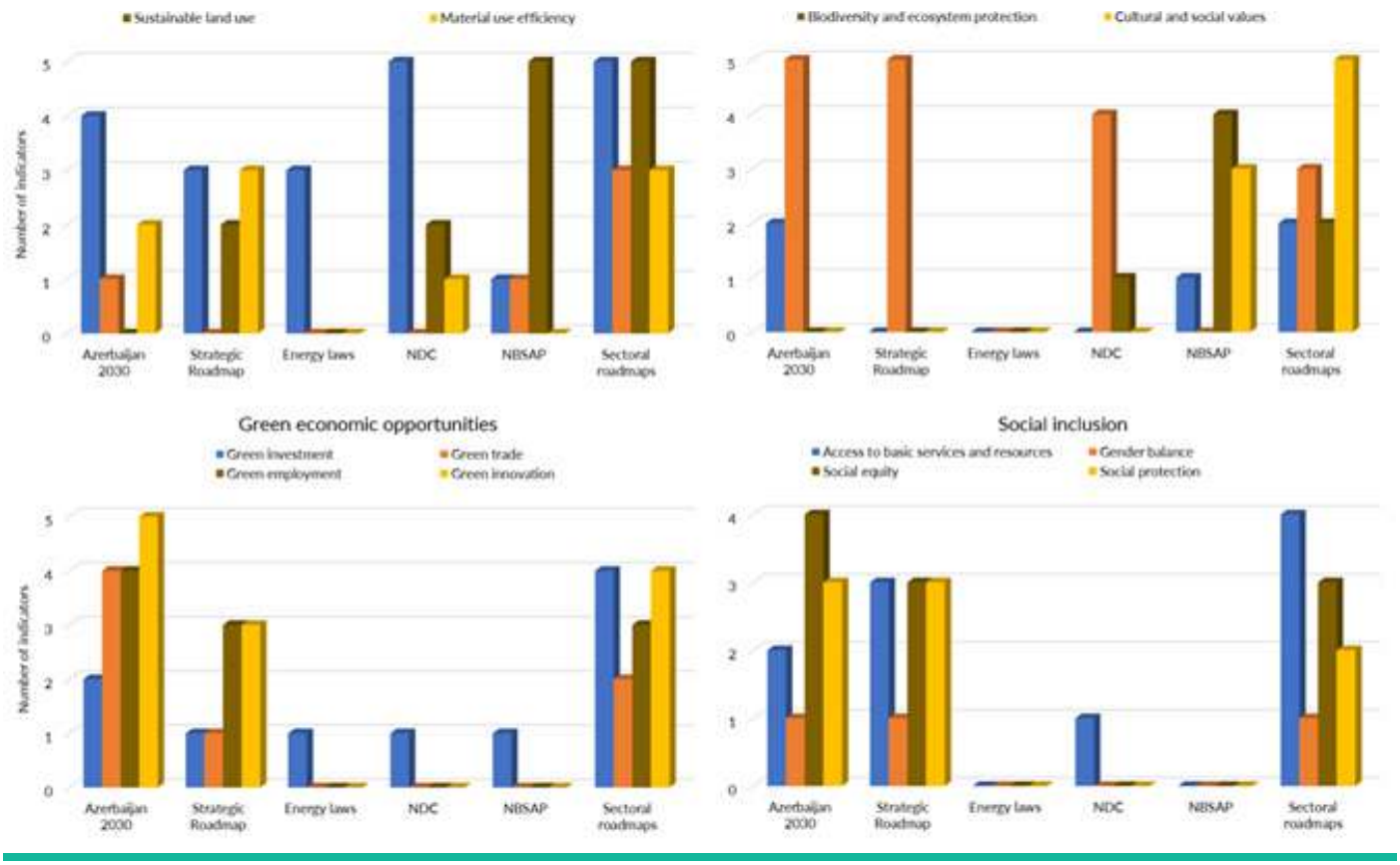
e. Policy gaps in green and inclusive growth indicators

Figure 5 summarizes the information presented in the checklist matrices. It informs about the gaps in green and inclusive growth indicators in national policies and sectoral roadmaps for each pillar in the four dimensions. Among the four pillars of **efficient and sustainable resource use**, the least emphasis is given to efficient and sustainable water use and material use efficiency in national policies and sectoral roadmaps. Tracking efficient and sustainable water use performance, mainly in the agricultural sector, is critical to reducing environmental degradation in Azerbaijan. For example, reducing the use of surface irrigation systems (EW4) will reduce water loss and soil erosion, contributing to a better performance in other green growth indicators, including agricultural productivity (SL4) and food security (AB2). Moreover, it will address the land-water-food nexus, one of the four development priorities. This implies that water use efficiency will positively impact access to basic services and resources. Table 7 shows that renewable water per capita (EW5) is the efficient and sustainable water use indicator not covered in national policies and sectoral roadmaps. This indicator informs about the level of water availability in the country, where the lower the renewable per capita, the more necessary to use water sustainably and efficiently in Azerbaijan. The renewable per capita in Azerbaijan is around the same level as the average of the CA countries but significantly lower than the global average. Rainfall is scanty in Azerbaijan, and the primary groundwater sources are rivers originating outside the country, including the Kura, Araz, and Samur rivers. In addition to the pollution problem, the water levels in these rivers have been declining in recent years. [93] The renewable water per capita declined by around 388 m^3 per year from 2010 to 2021 (Table 7). The level of water stress (EW2), representing freshwater withdrawal as a proportion of available freshwater resources, further showed that water availability in the country is deteriorating from 48 percent in 2010 to 56 percent in 2019. [94] Wastewater treatment could increase water availability, but the ratio of treated to non-treated municipal wastewater (ME5) remained very low at 0.32. [95] Moreover, several facilities are not adequately functioning, causing water pollution.

Regarding material use efficiency, reducing the extraction rate of natural resources, as represented by domestic material consumption (ME1) and material footprint (ME2) indicators , will positively impact biodiversity and ecosystem protection. Extracting and using raw materials affect the environment, including soil and water degradation, ecosystem and biodiversity loss, and harmful emissions. Materials thus need to be extracted sustainably by reducing damaging impacts and used efficiently by producing more from fewer resources or recycling to extend their utilities. Domestic material consumption, measuring the materials extracted in the country and imported from abroad for use (e.g., food, industry, etc.) in the national economy, was lower in Azerbaijan compared with the CA countries and the global average (Table 7). However, a slight increase was observed in Azerbaijan in the last decade, while there was an overall decline in the latter. Material footprint, measuring the flow of the global material supply chain from extraction, processing, and consumption of environmental resources , [96] was also significantly lower in Azerbaijan compared with the CA countries and global average and showed only a slight increase of 1.13 kg per unit of GDP between 2010 and 2021. Although Azerbaijan is performing comparatively well in the material use efficiency indicators, it will be helpful to consider them in national or sectoral targets because they are both SDG indicators for sustainable production and consumption (SDG 12). In Azerbaijan, one of the biggest industries, for example, oil extracting, transporting, and processing, negatively impacts land, air, and water, with pollution reaching a dangerous level for human health. [97] Oil production severely polluted about 30,000 hectares in Azerbaijan's Absheron Peninsula, half of the area with serious environmental problems. [98]

v The domestic material consumption (DMC) reports the actual amount of material in an economy, material footprint (MF) the virtual amount required across the whole supply chain to service final demand. The DMC reports the actual amount of material in an economy, MF the virtual amount required across the whole supply chain to service final demand. (UNSTATS metadata 2022). MF is a consumption-based indicator of resource use, defined as a global allocation of used raw material extraction to the final demand of an economy (Wiedmann et al., 2013).

Figure 5. Number of relevant green and inclusive growth indicators in Criteria 1 and 2 by pillars



Source: Authors own.

Among the four pillars of **natural capital protection**, environmental quality and biodiversity and ecosystem protection were least emphasized in national policies and sectoral roadmaps (Figure 5). The quality of the environment, including land, water, and air, is essential for agricultural productivity and food security, human health and well-being, indigenous and cultural heritage, and all forms of life dependent on them. There exists a high interdependency between environmental quality and biodiversity and ecosystem services. Moreover, the capacity of the forest and other ecosystems to mitigate climate impacts is also influenced by the quality of the environment. Finally, recognizing natural capital's cultural and social values will promote environmental preservation. The sustainable protection of natural resources requires all four pillars – environmental quality, GHG emissions reduction, biodiversity and ecosystem protection, and social and cultural values, to be addressed simultaneously. Two green growth indicators of natural capital protection were not mentioned in national policies and sectoral roadmaps (Table 7), including the DALY rate due to unsafe water (EQ2) and the share of naturally generating forests (BE3).

Keeping water resources safe and clean is a big challenge in Azerbaijan because the Kura River, the primary drinking water source in many cities and regions, flows polluted from Georgia and Armenia. [99] The country's water quality is also affected by poor wastewater treatment facilities, extraction and processing of oil products, and soil pollution and erosion from unsustainable agricultural practices. Although the DALY rate due to unsafe water (EQ2) was comparatively lower than the CA subregion and global average, it has not significantly decreased since 2010, remaining at 156 DALY lost per 100,000 persons in 2019. As for the share of naturally generating forests (BE3), there was a slight increase from 71.51 percent in 2010 to 73 percent in 2020 but remained comparatively lower than the CA subregion and global average. Most forests are located on steep mountain slopes, contributing to stabilizing the soil and purifying water resources in the country. [100] The destruction of forest areas and a unique national reserve (Basitchay) in previously Armenia-occupied territories was Azerbaijan's "most serious environmental problems". [101]

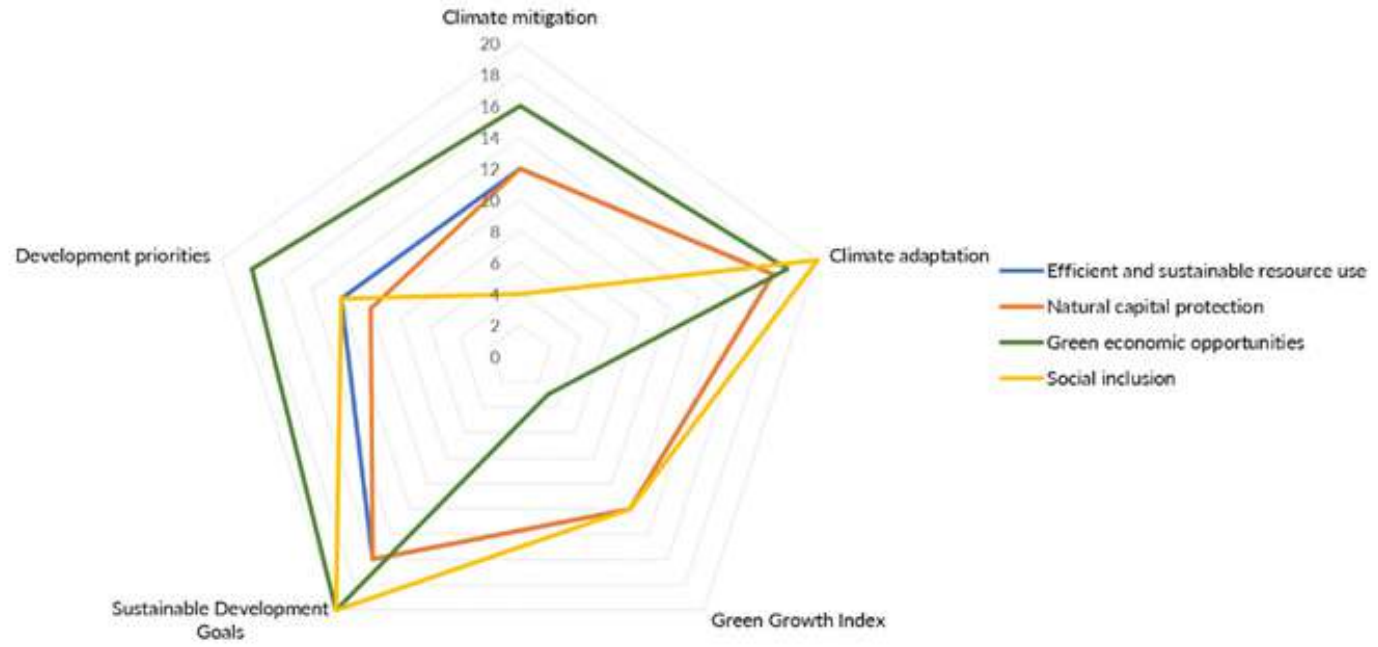
Table 7. Green growth indicators not covered in national policies and sectoral roadmaps

Indicators	Dimension	Azerbaijan		Average CA countries		Global average	
		2010	2020	2010	2020	2010	2020
Renewable water per capita (EW5), m^3 per inhabitant per year	ESRU	3838.93	3451.03	4103.75	3505.00	18779.42	16841.39
Material consumption per GDP (ME1), Kg per unit of GDP	ESRU	1.44	1.59	4.59	3.99	2.63	2.46
Material footprint per capita (ME2), Tons per capita	ESRU	4.72	5.85	10.03	11.48	13.24	13.98
DALY rate due to unsafe water (EQ2), Lost per 100,000 persons	NCP	177.05	156.48*	292.78	189.65	1095.87	766.94
Share of naturally generating forest (BE3), Percent of forest land	NCP	71.51	73.00	77.53	76.28	83.93	83.58
Share of hazardous waste exports (GT3), Tons per GDP	GEO	23.95	75.04	13346.13	10177.70	741.64	807.41
Share of green employment in manufacturing (GJ1), Percent	GEO	0.13	0.10	0.02	0.03	0.05	0.05
Women in national parliaments (GB1), Percent of the total number of seats	SI	11.38	16.81	19.92	21.26	17.30	22.21
Maternity cash benefits (GB4), Percent of mothers with newborns	SI	14.00	16.00	35.98	37.63	66.38	52.18
Victims of intentional homicide (SP4), Number per 100,000 population	SI	2.20	1.91	4.99	1.77	8.24	6.76

Notes: *ESRU – efficient and sustainable resource use, NCP – natural capital protection, GEO – green economic opportunities, and SI – social inclusion. The most recent data for these indicators are as follows: 2021 for GB1, 2019 for EW5 and EQ2, 2018 for GJ1, 2017 for ME1, and 2015 for ME2.*

The pillars least covered in national policies and sectoral roadmaps in ***green economic opportunities*** are green trade and employment (Figure 5). These pillars are essential for the green growth transition in Azerbaijan, where fossil energy exports largely steer the economic growth and fossil energy production absorbs a small share of the labor force. Economic diversification should promote exports of sustainable and green products from the economic sectors contributing most to employment, for example, the industry sector 15 percent, the agriculture sector 36 percent, and the service sector 50 percent (Chapter 3.1.2 Identified development priorities). And the labor force should be adapted to the innovative skills required to diversify the economy and increase environmental export goods. The share of export of environmental goods to total export was insignificant at 0.18 percent in 2019. [102] The two green growth indicators not mentioned in national policies and sectoral roadmaps are the share of hazardous waste [vi]exports (GT3) per unit of GDP and the share of green employment in manufacturing (GJ1) to total manufacturing employment (Table 7). While significantly lower than the CA subregion average, Azerbaijan's hazardous waste exports showed an increasing trend in the last decade. The share of green employment in the manufacturing sector had been higher in Azerbaijan compared with the CA subregion and global average. Nonetheless, it was still low at only 0.10 in 2018 and showed a decline from 2010. In 2021, the renewable energy sector employed about 4.25 thousand jobs, albeit coming mainly from hydropower. [103]Hydropower, contributing 2 percent to the total primary energy supply and 8 percent (2 TWh) to the electricity supply in 2018 [104], is Azerbaijan's largest renewable energy source with further potential. Other renewables remained to be exploited – solar energy with 23 000 MW technical potential due to 2,400- 3,200 sunshine hours and 1,500-2,000 kWh/m^2 solar intensity annually, wind energy with 3,000 MW technical potential due to the windy Caspian Sea coast, and geothermal energy with up to 800 MW technical potential due to 11 geothermal zones holding water of 30°C to 100°C. [105] Green employment would be increased by harnessing these renewable energy potentials. The indicators for green economic opportunities are relevant to both mitigation and adaptation, either directly or indirectly, because they support the transition to a low-carbon economy and the conservation of ecosystem health by promoting green technologies and developing human skills. Although there is a lack of SDG indicators related to green economic opportunities, many green growth indicators in this dimension are indirectly related to the SDGs (i.e., support achievement of the SDG indicator targets). The green economic opportunities indicators showed the most considerable direct and indirect relevance to the SDGs, climate mitigation, and development priorities (Figure 6).

Figure 6. Number of relevant green growth indicators in Criteria 3, 4, and 5 by dimensions



Note: The figure is based on the entries from the checklist matrices in Table 3-6. The number refers to the indicators count for each dimension, with a maximum of 20 indicators in each criterion, except for the Green Growth Index. Twelve (12) are the maximum indicators for each Index pillar. For the development priorities, one count is assigned to an indicator if at least one of the four priorities has a check. The maximum count for this criterion is thus also 20. The larger the area on the web, the more indicators are relevant to the development priorities, climate mitigation and adaptation, Sustainable Development Goals, and Green Growth Index.

In addition to providing an enabling environment for people's participation in greening the economy, ***social inclusion*** is crucial to people's adaptation, particularly the poor and vulnerable, to climate change impacts. A safe, healthy, educated, and employed population will be able to cope with the adverse impacts of climate change, empowering them to continue contributing to the green growth transition. Gender balance and, partly, social protection are the pillars least covered in the national policies and sectoral roadmaps (Figure 5). Prohibition of sex discrimination and equal rights of husband and wife are anchored in the Republic of Azerbaijan's Constitution (1995). [106] Azerbaijan has a history of empowering women; it was the first Muslim-majority country to give women equal rights to vote and be elected, and enact liberal laws against domestic violence, anti-trafficking, etc., more than a century ago. [107] The Law on Guarantees of Gender Equality (2006) strives for equal rights in employment and education, economic and social relations, and politics between men and women. [108] Significant progress has been achieved in ensuring gender equality in the economic, health, and education sectors. Women in national parliaments (GB1) and maternity cash benefits (GB4) are the two gender balance indicators not mentioned in national policies and sectoral roadmaps (Table 7). Women remain underrepresented in senior-level public service and judicial positions. [109] The parliament seats occupied by women were low at 17 percent in 2021, increasing only by 6 percent in the last decade and remaining lower than the CA subregion and global average. Policies recommended to improve women's empowerment in top decision-making are using a quota system, conducting public campaigns, and decentralizing municipal levels. [110] In 2020, a State Policy on Women was enacted to ensure women's equal representation in the government [111], which is expected to improve gender balance in the national parliament (GB1). Regarding the percentage of mothers with newborns receiving cash benefits (GB4), the share of 16 percent in Azerbaijan was significantly lower than the CA subregion and global average in 2020. The Azerbaijan Government committed itself to ILO's Maternity Protection Convention in October 2010, providing pregnancy and maternity benefits. [112] Maternity cash benefits are provided only to employed women because they depend on employer insurance contributions. [113] Self-employed women and female entrepreneurs increased from three percent in 2004 to 35.37 percent in 2020, which can be attributed to the sectoral roadmap for the production of consumer goods providing support for SMEs and start-ups. [114] Women registered entrepreneurs receive maternity benefits after paying social security contributions at least six months before the maternity leave. [115] In addition to maternity benefits, recent reports suggest that women's paid employment contributes to reducing domestic violence. [116]

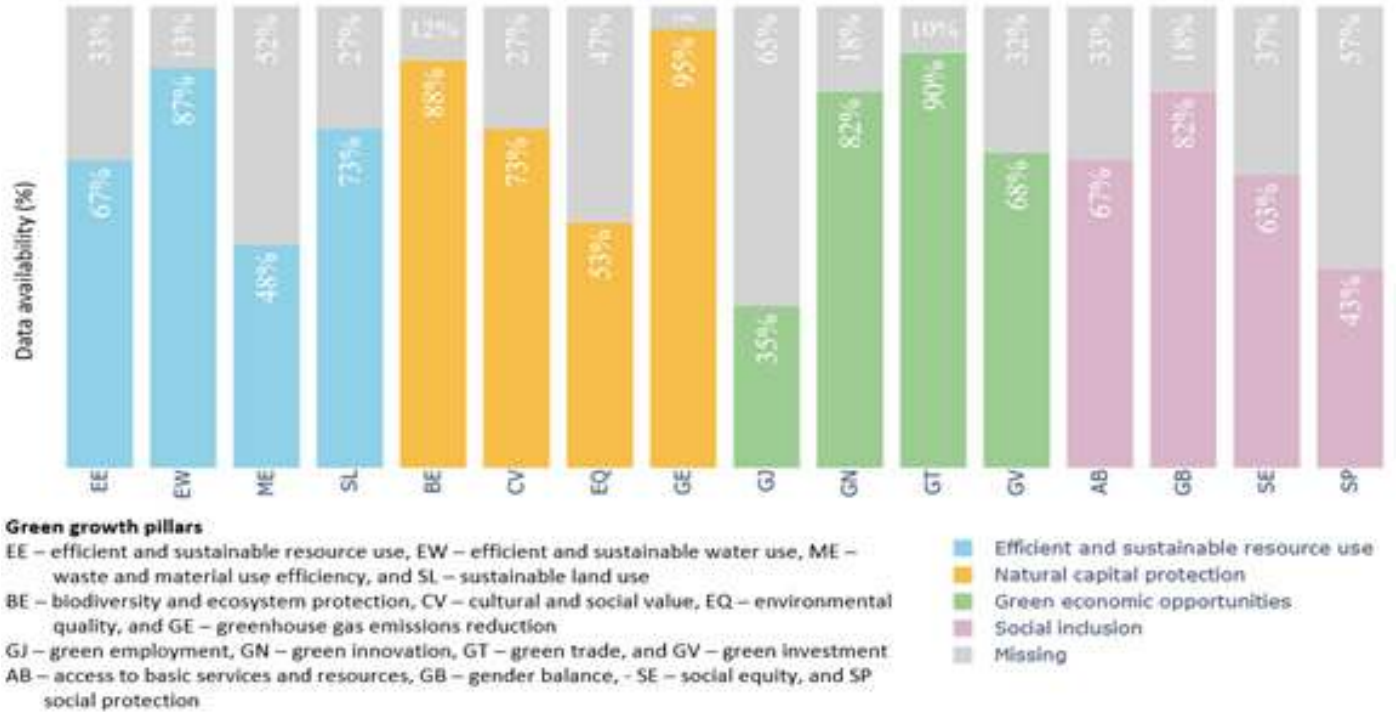
The number of intentional homicide victims (SP4) per 100,000 population under the social protection pillar is an important indicator for social inclusion, which was not mentioned in national policies and sectoral roadmaps. A recent World Bank study [117] links homicide indicators to social cohesion, representing the "purpose, trust, and willingness to cooperate within and between groups and with governments in the interests of common prosperity". A safe and secure community allows people, including the poor and vulnerable, to contribute to the green growth transition by getting an opportunity to participate in green

employment, build green entrepreneurs, promote green and inclusive initiatives, etc. The Law on the Prevention of Domestic Violence (2010) specifies principles and measures for preventing domestic violence and supporting persons affected by domestic violence in Azerbaijan. [118]Domestic violence is a critical issue in Azerbaijan and many other countries, particularly violence against women. "The rate of women killed increases as the overall rate of homicides decreases" globally, highlighting the need to differentiate "femicide", intentional crime against women, from homicide. [119] Similar to the CA subregion and global average, the number of victims of intentional homicide (SP4) declined in Azerbaijan (Table 7). However, the numbers do not represent actual occurrences due to low reporting rates in the country, particularly concerning domestic violence. [120] "Violence, including domestic violence, is still an ongoing issue" in Azerbaijan, which could hinder social inclusion and slow down the green and inclusive growth transition. Social inclusion indicators are most relevant to climate adaptation after green economic opportunities. Together with green economic opportunities, social inclusion indicators have the highest relevance to the SDGs (Figure 6).

3.2.2 Data availability and gaps for the indicators

Figure 7 presents the data availability and gaps for the pillars for the period 2010-2021. Details on the data sources, availability and imputation for each green and inclusive growth indicator are presented in Annex 2. The pillars with the most extensive data availability include GHG emissions reduction (GE) and green trade (GT), with at least 90 percent of the data available from 2010 to 2021. The pillars where at least 80 percent of the data are available for the indicators include biodiversity and ecosystem protection (BE), efficient and sustainable water use (EW), green innovation (GN), and gender balance (GB). In contrast, green employment (GJ), social protection (SP), and material use efficiency (ME) are the pillars with the largest data gaps, where more than 50 percent of the data are missing between 2010 and 2021. For green employment, the indicators causing the data gaps are the share of youth and adults with ICT skills (GJ3), firms offering formal training (GJ4), and schools with access to internet (GJ5). Missing data were replaced by imputed data, derived from simple extrapolation and interpolation of the available data. The years requiring imputation for each indicator are presented in Annex 2. As discussed in section 3.3.3 Robustness check), data imputation did not significantly affect the scores. For social protection and material use efficiency, in addition to the missing data for some indicators, one indicator in each pillar was not included in the analysis due to the absence of data from 2010 to 2021, thus not allowing data imputation. These indicators include the share of solid waste recycled (ME4) and discrimination against disability (SE5).

Figure 7. Summary of data availability and gaps by pillars, 2010-2021

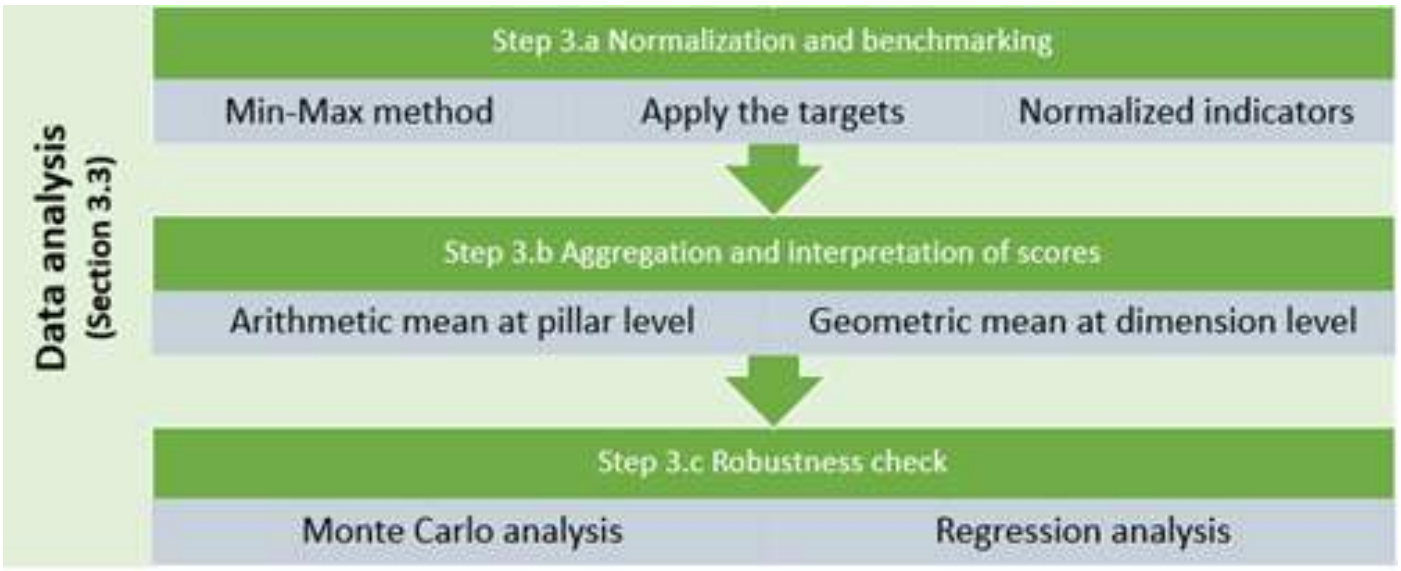


Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

3.3 Azerbaijan's transition to a green and inclusive growth economy

This section corresponds to Step 3 in the analytical approach (Figure 8). It presents the green and inclusive growth indicators' normalized values, computed by applying the min-max method and benchmarking sustainability targets (Step 3.a). Normalization transforms the indicators' raw data into a uniform scale between 0 and 100, and benchmarking allows the normalized values to be compared with the sustainability targets, where 100 indicates achieving the targets for the given indicators. The results from Step 3.a are discussed in section 3.3.1. The normalized values are aggregated to assess performance at the pillar and dimension levels (Step 3.b). The aggregated scores are presented as distance to sustainability targets (pillar level) and trend in green growth performance (dimension level) to allow performance across different pillars and dimensions over time. The results from Step 3.b are discussed in section 3.3.2. Finally, robustness checks using Monte Carlo and regression analyses are applied to check the sensitivity of the pillar and dimension scores to changes in the indicators' raw data and the explanatory power of the pillars in their respective dimensions (Step 3.c). The results from Step 3.c are discussed in section 3.3.3.

Figure 8. Data analysis of the green growth indicators



Note: Complete diagram and description of analytical methods are in Annex 1.

3.3.1 Green and inclusive growth performance indicators

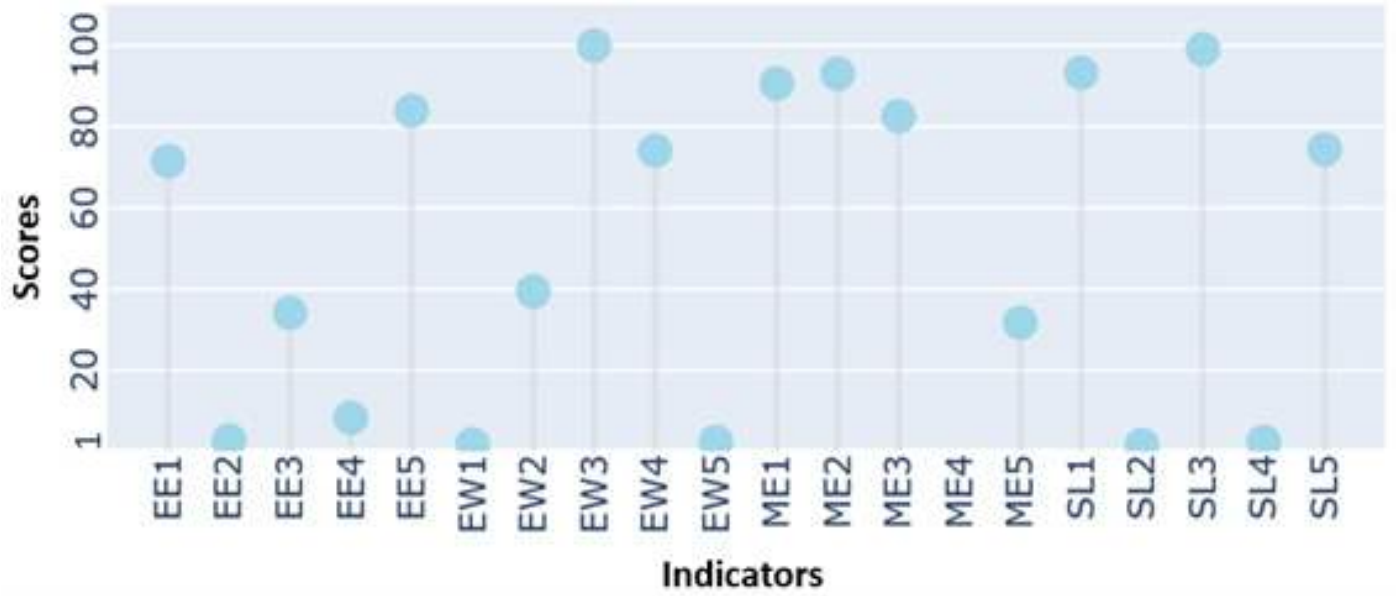
Analyzing performance in green and inclusive growth using the indicators entails transforming the raw data with different measurement units into one scale, also called normalization. The most common method for normalizing indicator values is the min-max, using the indicator's minimum and maximum values in time-series data (see Annex 1 for details). Normalization allows comparison of performance across indicators, presented in this section, and aggregation of indicator values at the pillar and dimension levels, discussed in section 3.3.2. The min-max method can include lower and upper bounds, improving the analytical interpretation of the normalized values. By having a lower bound of one (1) in the min-max equation, a country's lowest score for an indicator is 1. If the lower bound value is not assigned, the default value from the min-max is zero (0), which is not realistic for indicators with non-zero values. A zero could be misinterpreted as an absence of performance on the indicator, which is often not the case. Including an upper bound is useful in measuring performance against a target, also called benchmarking, because it enhances the policy relevance of the scores. Two types of targets were used to benchmark the green and inclusive growth indicators: (1) average values of the five top-performing countries, allowing comparison of performance globally, and (2) sustainability targets if the values of the first target are low and not aligned with the SDG targets. Out of the 80 indicators, 44 use the average values of the five top-performing countries for benchmarking. The use of global databases in benchmarking provides a larger pool of data, improving the accuracy of the min-max normalization approach.[121]

As mentioned above, normalizing indicators' raw data and benchmarking them against the targets yield normalized scores between 1 and 100. A score of 100, the highest possible score for an indicator, indicates that the green growth performance is at par with the global top performers. In assessing performance, reference was made to the checklist matrices. For example, the indicators frequently covered in national policies and sectoral roadmaps are expected to have high or very high scores. If there is no apparent alignment between the scores and checklist matrices, possible reasons for this were given in the analysis.

a. Efficient and sustainable resource use

Figure 9 presents the normalized scores for 19 efficient and sustainable resource use indicators. Eight (8) indicators have high and very high scores, and 11 have low and very low scores. No indicator has moderate scores. There is no available data on the share of solid waste recycled (ME4) from online sources for Azerbaijan; thus, no score could be computed. "Municipal Solid Waste Management (MSWM) is one of the major environmental problems in urban cities in Azerbaijan today" [122], so the country could be expected to perform poorly in ME4.

Figure 9. Green growth performance in efficient and sustainable resource use in Azerbaijan, 2021



Legend:
EE1 – primary energy supply per GDP, EE2 – share of renewables, EE3 – logistics performance, EE4 – share of renewable electricity, EE5 – electric transmission losses, EW1 – water use efficiency, EW2 – level of water stress, EW3 – sustainable fisheries ,EW4 – share of surface irrigation ,EW5 – renewable water per capita

SL1 – nutrient balance per hectare, SL2 – share of organic agriculture, SL3 – share of ruminant livestock, SL4 – agriculture production per hectare,, SL5 – forest area change rateME1 – domestic material consumption per GDP, ME2 – material footprint per capita, ME3 – average food loss and waste, ME4 – share of solid waste recycled, ME5 – ratio treated wastewater

Notes: The scores refer to the indicators' normalized values, ranging from 1 to 100. Because the indicators were benchmarked against the sustainability targets, a score of 100 implies that the target for a given indicator was achieved.
Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

Among the four pillars for efficient and sustainable resource use, sustainable land use and waste and material use efficiency have the most significant number of indicators with high and very high scores. Between these two pillars, Azerbaijan performs better in waste and material use efficiency with three indicators scoring very high (above 90), including total domestic material consumption per GDP (ME1), total material footprint per capita (ME2), and an average of food loss to production and food waste to consumption (ME3). ME1 and ME2 indicators are not covered in national policies and sectoral roadmaps (Table 3), yet Azerbaijan performs very well on them. Azerbaijan's economy mainly relies on primary sectors like oil and natural gas production, which are not material intensive, unlike manufacturing industries and construction infrastructure. [123] Moreover, an empirical study suggested a high association between GDP growth and a higher increase in material footprint [124], which could imply that a country like Azerbaijan with a relatively lower GDP (ranked 89th with a GDP of $54,622 million in 2021) [125]expects a lower material footprint. ***But as the country aims for economic diversification that will entail building industries and infrastructure, tracking domestic material consumption and material footprint performances will be critical for ensuring a green growth transition.***

Regarding the sustainable land use pillar, they include nutrient balance per unit area (SL1) with a score of 93, the share of ruminant livestock population to the agricultural area (SL3) with a score of 99, and annual forest area change rate (SL5) with a score of 74. All three indicators are well-tracked in national policies and sectoral roadmaps. The other two pillars – efficient and sustainable energy and water use, have only two indicators with high and very high scores. On the one hand, national policies and sectoral roadmaps sufficiently cover primary energy supply per GDP (EE1) and electric transmission losses (EE5). On the other hand, sustainable fisheries (EW3) and share of surface irrigation (EW4) are mentioned once in national policy or sectoral roadmap. ***Appropriate policy attention on the efficient energy and sustainable land use indicators appears to contribute to excellent performance, providing opportunities to support green growth transition.***

Among the three efficient and sustainable energy indicators with low and very low scores, the share of renewables (EE2) has the lowest score of 2.73. The other two indicators are logistics performance (EE3), particularly on the quality of trade and transport-related infrastructure, with a score of 34.14, and share of renewable electricity (EE4), with a score of 8.29. All three indicators are covered in several national policies and sectoral roadmaps. They are essential indicators for tracking Azerbaijan's performance in reducing economic dependence on fossil energy and enhancing economic diversification in non-fossil sectors. ***The poor performance in the share of renewables to total consumption, share of renewable electricity, and logistics performance reveals that the country still has a long way to go to achieve a low-carbon economy, which could delay the green growth transition.*** Increasing the share of renewables to total energy final consumption, which stood at 1.62 in 2019, will have favorable effects on the logistics performance (EE3) by enhancing clean transport system and share of renewable electricity (EE4) by expanding solar and wind energy sources. Emphasizing these indicators across different national policies and sectoral roadmaps will help track performance in achieving 30 percent renewables in the country's energy mix by 2030.

After energy, water is the sector that requires immediate measures to improve green growth performance in the efficient and sustainable resource use dimension. The checklist matrix highlighted the need for more attention to sustainable water use issues in the national policies and sectoral strategies (Table 3). This is particularly urgent for three indicators due to their low and very low scores, including water use efficiency (EW1) and renewable water per capita (EW5), with scores of only circa two (2). Water is scarce in the country, and the trend has declined from 4,641 to 3,451 m^3 per capita annually from 1992 to 2019. Inefficient water use, particularly in the agriculture sector, worsens the problem. The level of water stress (EW2), due to increasing freshwater withdrawal as a proportion of available freshwater resources, has a score of 39.42. ***Barriers to green growth transition due to sustainable and efficient water use issues could be reduced by improving performance in other pillars, including waste and material use efficiency and sustainable land use.*** For example, improving the ratio of treated to non-treated municipal wastewater (ME5), which currently has a score of 31.7, could increase available freshwater resources. Similarly, promoting sustainable land use through organic farming and improving land use productivity by increasing yield per hectare could support sustainable and efficient water use. However, the scores for the share organic agriculture (SL2) and agriculture production per hectare (SL4) are both very low at around two (2). These indicators (i.e., ME5, SL2, and SL4) are sufficiently covered in national policies and sectoral roadmaps, indicating potential for future improvement.

b. Natural capital protection

Figure 10 presents the normalized scores for 20 indicators for natural capital protection, where 12 have high and very high scores, one (1) indicator has a moderate score, and seven (7) have low and very low scores.

Figure 10. Green growth performance in natural capital protection in Azerbaijan, 2021

BE1 – share of key biodiversity areas in PAs, BE2 – share of forest area, BE3 – share of naturally generating forest, BE4 – share of forest in legally PAs, BE5 – change in water-related ecosystem, CV1 – red list index, CV2 – share of terrestrial and marine PAs, CV3 – monitoring environment in tourism, CV4 – share of plant genetic resources, CV5 – share of cultural goods in exports

EQ1 – air pollution PM2.5, EQ2 – DALY rate due to unsafe water, EQ3 – waste generation per capita, EQ4 – coastal pollution, chlorophyll-a deviations, EQ5 – DALY rate due to air pollution , GE1 – CO2 emissions per capita, GE2 – Non-CO2 emissions per capita, excluding AFOLU, GE3 – Non-CO2 emissions per capita for AFOLU, GE4 – carbon intensity of energy production, GE5 – CO2 emissions per added value in manufacturing

Notes: The scores refer to the indicators' normalized values, ranging from 1 to 100. Because the indicators were benchmarked against the sustainability targets, a score of 100 implies that the target for a given indicator was achieved.
Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

The best-performing pillars in the natural capital protection dimension are environmental quality and GHG emissions reduction, each with four indicators with high and very high scores. Regarding environmental quality, the scores for DALY rate due to unsafe water (EQ2) and coastal pollution, chlorophyll-a deviations (EQ4) are very high at over 95, and those for air pollution PM2.5 (EQ1) and waste generation per capita (EQ3) are high with at least 80. Except for the EQ2, all indicators are covered in one or two national policies or sectoral roadmaps. Considering the water pollution problems in Azerbaijan, providing safely managed drinking services to the Azerbaijanis is critical to reducing health risks for the population. Green and inclusive growth indicators related to water quality, including the DALY rate due to unsafe water (EQ2), need to be monitored. Disability-adjusted life years (or DALY) measures the loss of a healthy life year. The DALY lost per 100,000 persons, which stood at about 156 in 2019, remained relatively high for an upper middle-income country like Azerbaijan. Safely managed drinking water services are unequally accessed in urban and rural areas, with 96 percent of the urban and 78 percent of the rural population in 2020. [126]This hinders achieving the target of zero DALY rate due to unsafe water (EQ2) in the country. The SDG indicator on coastal pollution based on chlorophyll-a deviations (EQ4) is satellite-based data collected through remote sensing. The indicator should be linked with pollution generation and waste data ,[127]mainly collected on-site. Although Azerbaijan performs well on coastal pollution, chlorophyll-a deviations (EQ4), a recent study suggests that "competition over extracting the energy resources of the Caspian Sea together with the major anthropogenic changes in the coastal zones have resulted in increased pollution and environmental degradation of the sea". [128]***The transboundary nature of Azerbaijan's water resources, including major rivers that provide freshwater drinking sources and coastal areas that are important for biodiversity, poses a challenge in protecting environmental quality and enhancing green growth.*** It is thus essential to closely monitor performance on water-related environmental quality indicators.

Azerbaijan's indicator scores in reducing GHG emissions are high and very high, including CO^2 emissions per capita (GE1), Non-CO^2 emissions per capita for AFOLU (GE3), the carbon intensity of energy production (GE4), and CO^2 emissions per added value in manufacturing (GE5). The country's "GHG emissions are chiefly generated during oil and natural gas production, including wells, drilling, testing, and commissioning, oil refining, gas processing, oil transport, natural gas transportation and storage, and distribution". [129]Natural gas and oil account for over two-thirds and less than one-third, respectively, of Azerbaijan's total domestic energy consumption. [130]Among the different fossil energy sources, the CO^2 emission per unit of energy produced is the lowest from natural gas. "Most oil production occurs offshore in the Caspian Sea and is exported to the West." [131]Relying primarily on natural gas to provide domestic energy to the 10 million population[132], scores on CO^2 emissions per capita (GE1) and carbon intensity of energy production (GE4) are low in Azerbaijan. A recent study suggested that agricultural production and increasing agricultural value-added negatively affect CO2 emissions in Azerbaijan. [133]***A low-carbon economy can be promoted through economic diversification in agriculture value-added, food processing, and other manufacturing industries, supported by an energy mix of natural gas and renewables.*** Reducing dependence on oil produced from the Caspian Sea will avoid biodiversity and ecosystem degradation in the coastal and marine areas, where rich natural resources could support economic diversification. The biodiversity and ecosystem protection pillar has three indicators scoring high and very high, including the share of forest area (BE2), the share of naturally generating forest (BE3), and change in the water-related ecosystems (BE5). In contrast, the cultural and social values pillar has only one indicator with a very high score, namely the red list index (CV1). Connected to several bio-geographical areas, Azerbaijan has rich and unique biodiversity and ecosystem – hosting about 4,500 species of vascular plants with 5 percent endemic, containing species with origins from Europe, Central Asia, and Mediterranean regions (i.e., Caucasus Ecoregion, home to the 25 most endangered and diverse ecosystems on earth), sharing the Caspian Sea of very high endemic fish species with its neighboring countries, and thus building biological crossroads for animal and plan distribution from all directions. [134]***Putting in place appropriate conservation measures and an effective biodiversity monitoring system, the biodiversity and ecosystem resources could be tapped to create opportunities for green financing to support green growth transition in the country.***

The score for the share of terrestrial and marine protected areas (PAs) (CV2) is only moderate. The SDG target for the terrestrial PAs is 17 percent of the total land area, and the Aichi target for the marine PAs is 10 percent of the total territorial waters, with an average value of 13.5 percent for the terrestrial and marine PAs (CV2). [135]Azerbaijan's share of terrestrial PAs is 10.2 percent, covering 10 national parks, 11 state nature reserves, and 24 state nature sanctuaries . [136]The share of the marine protected area to total territorial waters is only 0.40 percent . [137]The Gizilaghaj State Reserve, established to protect migrant, swamp, and wild birds at the southwestern shore of the Caspian Sea in 1929, was upgraded and expanded to a National Park to include the first Marine Protected Area (MPA) with an area of 10,700 hectares in the Caspian Sea in 2018. [138]In November 2021, the Law on Accession to Protocol on Biodiversity Conservation for protecting the Caspian Sea's marine environment by the five shoreline states (i.e., Azerbaijan, Iran Republic, Kazakhstan, Russia, and Turkmenistan) was implemented to reduce degradation and nominate PAs. [139]***This law on biodiversity conservation in the Caspian Sea opened the opportunities to expand Azerbaijan's marine PAs. Coastal and marine areas offer an important income source from eco-tourism; hence, their protection is critical to creating local livelihood and promoting green and inclusive growth.***

The environmental quality and GHG emissions reduction indicators with low and very low scores are DALY rate due to air pollution (EQ5) and Non-CO2 emissions (CH^4, N^2O, and F-gas) in non-AFOLU sectors per capita (GE2). Both indicators are recognized as critical environmental issues in national policies. On the one hand, the low score for EQ5 at only 23 was due to the 20 micrograms per cubic meter

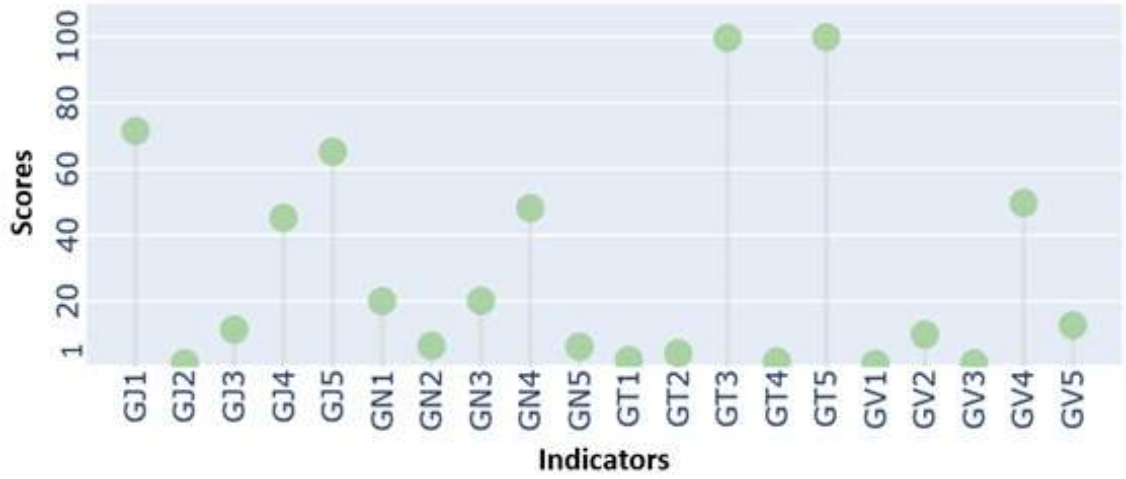
of fine particulate matter PM2.5 in 2017, exceeding the minimum annual mean levels of 10 micrograms per cubic meter suggested by the WHO. According to the World Bank, deaths from air pollution from wind-borne dust and hydrocarbon sources increased by 10-18 percent in Azerbaijan, which is higher than the Eastern and Central European average. [140]Hydrocarbon sources of air pollution include industrial gas wastes and transport systems. [141]On the other hand, the very low score for GE2 at only 1 was due to the very high methane emissions (CH^4), with Azerbaijan ranking seven among the top emitters of methane. [142]Methane is a hazardous air pollutant that causes 1 million premature deaths annually and is 80 times more potent than CO^2 in causing global warming over 20 years. [143]The government has thus a huge global responsibility to reduce methane emissions from its energy sector, which continues to dominate its economy. A memorandum of understanding (MoU) between Azerbaijan and the European Commission commits the former to reduce methane emissions throughout the entire gas supply chain. Reducing methane is the condition for the Commission to more than double its natural gas imports from Azerbaijan over the coming years. [144]***Performance in reducing PM2.5 and methane emissions, which cause risks to the population's health, will need to be significantly improved for Azerbaijan to ensure social inclusion while pursuing green growth.***

The pillar with the most indicators with low and very low scores is the cultural and social values in natural capital protection. These include monitoring environment in tourism (CV3), share plant genetic resources (CV4), and share of cultural goods in exports (CV5), which are covered in the NBSAP and/or sectoral roadmaps and, except for CV5, included in the SDGs. As previously mentioned, monitoring is important when using the marine environment to promote eco-tourism. According to the Secretariat of the Convention on Biological Diversity, Azerbaijan needs a consolidated biodiversity monitoring system for systematic reporting on the implementation of its NBSAP and Aichi Biodiversity Targets. [145]Although the country performs moderately in the share of terrestrial and marine PAs (CV2), it only scores low in the share of key biodiversity areas in PAs (BE1), with a score of 36.19, and the share of forest in legally PAs (BE4), with a score of 39.82 (BE1 and BE4 indicators are covered in the NBSAP). On the one hand, by expanding the marine PAs in the Caspian Sea, which is rich in biodiversity, the performance of BE1 could be improved. On the other hand, prioritizing forest areas in expanding the terrestrial PAs or reforestation in existing terrestrial PAs will improve BE4. In Azerbaijan, the decline in forest areas is attributed to its use for firewood and fire incidence. [146]Current forest areas providing critical ecosystem services (e.g., climate regulation, soil erosion protection, species habitat) could be protected by covering them under PAs. ***Improving performance in natural capital protection requires concurrent consideration of its four pillars, which are closely interlinked and reinforce each other. For example, key biodiversity areas' role in creating local tourism livelihood and mobilizing green finance will be ensured under the PA regime, which monitors the implementation and achievement of biodiversity targets.***

c. Green economic opportunities

Figure 11 shows that, out of the 20 indicators for green economic opportunities, only four (4) have high and very high scores, and three (3) have moderate scores. This dimension has the highest number of indicators with low and very low scores, with 13 indicators.

Figure 11. Green growth performance in green economic opportunities in Azerbaijan, 2021



Legend: GJ1 – share of green employment manufacturing, GJ2 – renewable energy employment, GJ3 – share of youth and adults with ICT skills, GJ4 – firms offering formal training, GJ5 – schools with access to internet, GN1 – share of patents env technology, GN2 – new business density ,GN3 – share of medium/ high-tech manufacturing value added, GN4 – collaboration in R&D, GN5 – share of R&D expenditure

GT1 – share of environmental goods exports, GT2 – share of environmental technologies exports, GT3 – share of hazardous waste exports, GT4 – share of high technology exports, GT5 – CO2 emissions embedded in trade , GV1 – financial flows for renewables, GV2 – installed renewable electricity, GV3 – ODA for biodiversity, recipient, GV4 – water resource management, financing, GV5 – agriculture government expenditure

Notes: The scores refer to the indicators' normalized values, ranging from 1 to 100. Because the indicators were benchmarked against the sustainability targets, a score of 100 implies that the target for a given indicator was achieved.
Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

Only four indicators in the two pillars have indicators with high and very high scores, including the share of green employment in manufacturing (GJ1) and schools with access to the internet (GJ5) for green employment, and the share of hazardous waste exports (GT3) and CO^2 emissions embedded in trade (GT5) for the green trade. Among these four indicators, GJ1 and GT3 are mentioned neither in national policies nor sectoral roadmaps. Tracking performance in green employment in manufacturing (GJ1) will be helpful when diversifying the economy because, in addition to agriculture and tourism, manufacturing is one of the key sectors offering diversification and employment potential. Five industrial parks have been operating in Azerbaijan since 2011. A new one, the Aghdam Industrial Park, is expected to operate by the end of 2023, creating more jobs in the "production of construction materials, packaging of agricultural products, canned fruits and vegetables, meat and dairy products, production and processing of feed and fertilizers, as well as refrigeration, storage, and other services". [147]The industrial parks are aimed to increase exports in high value-added manufacturing products. Tracking performance in the share of hazardous waste exports (GT3) to total exports will ensure that the industrial parks will produce environmental goods and adhere to the United Nations Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, to which Azerbaijan acceded in 2001[148]. For example, the World Bank's World Integrated Solution (WITS) recorded Azerbaijan's exports of plastic hazardous waste disposal bags to Germany, Georgia, and Israel in 2018, albeit only small at less than 1,000 kg. [149]***Increasing production and monitoring the export of green manufactured goods in industrial parks will ensure more green employment in the manufacturing sector.*** CO^2 emissions embedded in trade (GT5) refers to "emissions exported or imported as a percentage of domestic production emissions". [150]Azerbaijan was a consistent net exporter of goods produced with CO2 emissions from 1990 to 2001 but mainly became a net importer from 2001 to 2020[151]. This resulted in a very high score in the CO2 emissions embedded in trade (GT5) in 2021. This shows the country's success in initiating diversification to reduce the share of fossil exports in its total trade. The indicator on schools with access to the internet (GJ5) will inform about the country's performance in building digital skills, which are essential for youth's employment in green and innovative sectors.

The three indicators with moderate scores include firms offering formal training (GJ4), university-industry collaboration in R&D (GN4), and water resource management financing (GV4). The first and second indicators, with scores of about 48, are covered in national policies and sectoral roadmaps. In contrast, the third indicator, with a score of around 50, is only mentioned in a sectoral roadmap. Studies suggest that training is decisive in accessing global value chains, but this needs to be higher in Azerbaijan. Only 23 percent of SMEs offered formal training to their employees in 2013, with the share even lower in manufacturing SMEs at less than 10 percent. [152]The percentage of SMEs offering training increased to an average of 32 percent in 2019, which remained lower compared with large firms contributing 73 percent. [153]Collaboration in R&D between universities and industry is limited to the oil and gas sector funded by the government because universities have yet to meet the skills and provide the technology needed in the industry. [154]"Entrepreneurial University", with the capacity to enhance university-industry cooperation, apply innovative learning methods, and promote multidisciplinary approaches, is yet to be developed in Azerbaijan. [155]A study by the Asian Development Bank (ADB) suggested that improving the "nexus of education-science-industry" is crucial in developing technical and professional skills for higher value and more complex products and services. [156]Azerbaijan attracts foreign investors, but investments should be able to support university-industry collaboration. They will need to be shifted from the oil and gas sector to renewable energy, agriculture, and tourism, where the potential for SME development is the largest. [157]Managing water resources, one of the critical environmental challenges in Azerbaijan, should receive R&D and technology investment. ***The low participation of SMEs in providing formal training to employees, poor collaboration between university and industry in developing innovative skills and technology, and lack of investment in environmental resource management in critical sectors could slow down the development of a knowledge-based economy, which is needed to support economic diversification in renewable, agriculture, and tourism, the sectors with the most considerable potential to create green employment in Azerbaijan.***

The two pillars contributing to poor performance in green economic opportunities are green innovation and green investment, each with four indicators with low and very low scores. The green innovation indicators on the share of patents on environmental technology (GN1) and share of medium and high-tech manufacturing value added (GN3) have scores of about 20, while the new business density (GN2) and the share of R&D expenditure (GN5) have scores below 7. The low scores in GN1 and GN3 indicate that Azerbaijan has yet to develop a knowledge-based economy. According to the latest innovation assessment by the World Intellectual Property Organization (WIPO)[158] , although "Azerbaijan's performance is at expectations for its level of development", its innovation outputs (e.g., knowledge and technology creation, impact, diffusion) are less compared to innovation investments. The low technology creation, impact, and diffusion are reflected in the low share of patents on environmental technology (GN1), and the low share of medium and high-tech manufacturing value added (GN3). The very low share of R&D expenditure (GN5), only 0.22 percent of GDP, thwarts the ability of universities and research institutions to develop much-needed skills and innovation for economic diversification. Inadequate skills of Azerbaijan's workforce, coupled with poor access to finance, hinder business growth[159], contributing to a very low score on the indicator for new business density (GN2). SMEs'

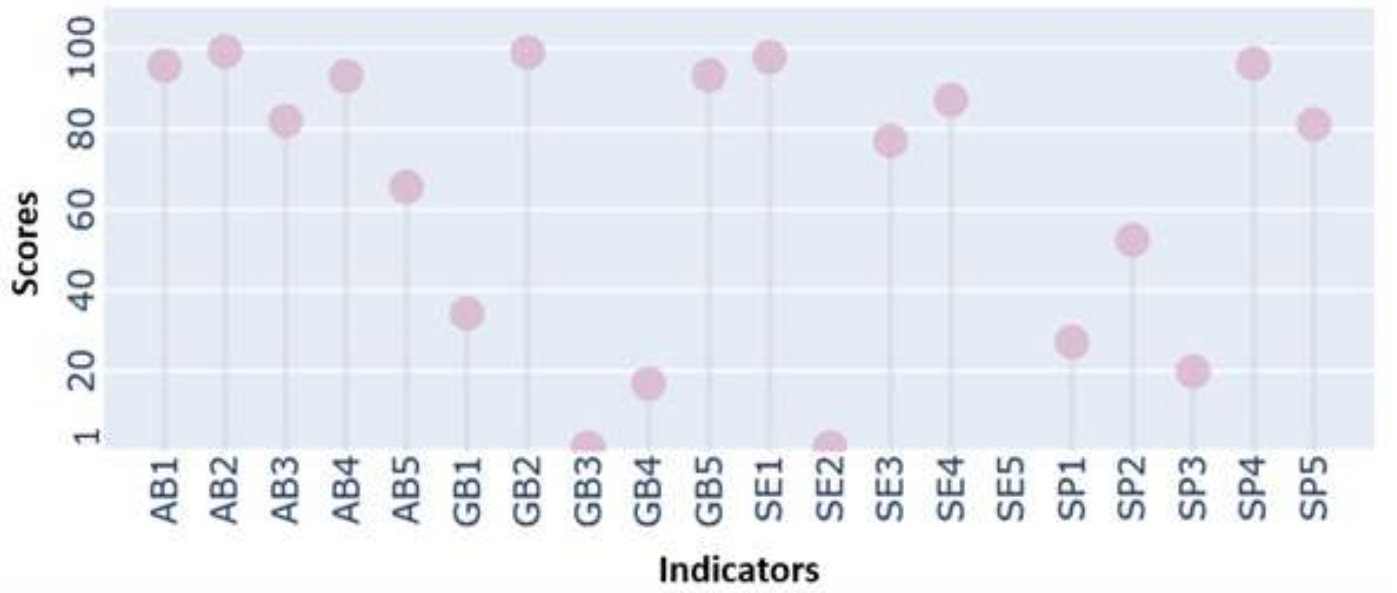
growth depends on access to finance, but domestic credit to the private sector decreased from 33 percent to 26 percent of Azerbaijan's GDP from 2016 to 2020. [160]***Progress in green innovation is closely intertwined with the rate of investments not only in developing human skills and technology but also in enabling SMEs to establish businesses and absorb innovations to support economic diversification.***

The green investment indicators have very low scores at less than 13, including financial flows for renewables (GV1), installed renewable electricity (GV2), receiving official development assistance (ODA) for biodiversity (GV3), and government expenditure in sustainable agriculture (GV5). These investments are critical in diversifying production and creating employment in the renewable, agriculture, and tourism sectors. Employment in renewable energy (GJ2), presently limited to hydropower, has a very low score of 1.23. The score for the share of youth and adults with information and communication technology (ICT) skills (GJ3) is also very low at 11.41. ICT enables greening economic sectors because its applications (e.g., smart electricity grid, smart transport systems, smart buildings, etc.) improve resource efficiency. [161]***The knowledge-based economy is increasingly digital, making ICT skills essential to the green growth transition. ICT is driving economic diversification in Azerbaijan because, after oil and gas, it is the most profitable sector and largest FDI recipient.*** [162]Thus, the country needs to invest in developing its workforce's ICT skills and improve performance in the share of youth and adults with ICT skills (GJ3).

d. Social inclusion

Figure 12 shows that Azerbaijan performs well in many social indicators, with 12 having high and very high scores. Only one indicator has a moderate score (i.e., universal health coverage (SP2)), and six indicators have low and very low scores. No data is available for discrimination against disability (SE5), so a score could not be computed for this indicator. About six (6) percent of the population have disabilities, which is relatively lower than in other countries. [163]One of the first countries to sign and ratify the Convention on the Rights of Persons with Disabilities (2008), Azerbaijan has taken necessary measures to support people with disabilities, including reinforcing the disability assessment system, enhancing access to education and other public services, and making public facilities accessible. [164]Although "broadly speaking, physical infrastructure is not adapted for people with diverse disabilities".[165]

Figure 12. Green growth performance in social inclusion in Azerbaijan, 2021



Legend: AB1 – access to safely manage water and sanitation, AB2 – moderate/severe food insecurity, AB3 – convenient access to public transport, AB4 – population covered by 4G mobile network, AB5 – property rights, GB1 – women in national parliaments, GB2 – female with financial accounts, GB3 – equal gender pay, GB4 – maternity cash benefits, GB5 – tertiary enrolment gender parity.

SE1 – inequality in income, SE2 – rural/urban access to clean fuels, SE3 – youth unemployment disparity, SE4 – old people dependency ratio, SE5 – discrimination against disability, SP1 – population-given social assistance, SP2 – universal health coverage, SP3 – people in inadequate housing, SP4 – victims of intentional homicide, SP5 – health regulation capacity.

Notes: The scores refer to the indicators' normalized values, ranging from 1 to 100. Because the indicators were benchmarked against the sustainability targets, a score of 100 implies that the target for a given indicator was achieved.
Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

All five indicators for access to basic services and resources have high and very high scores. The performance in this pillar aligns with other upper middle-income countries. Except for property rights (AB5), the indicators have scores above 80, including access to safely manage water and sanitation (AB1), moderate/severe food insecurity (AB2), convenient access to public transport (AB3), and the population covered by 4G mobile network (AB4). The score for AB5 is only 65.63, significantly lower than the other indicators in the pillar, because of the gaps in the property rights law and poor enforcement of its provisions.[166] ***Protecting property rights creates an enabling environment for economic diversification and green innovation, attracting foreign investment and new SMEs where private ownership of capital and assets are secured.*** Azerbaijan provides foreign investors with legal protection of their assets and property despite administrative impediments in setting up and doing business.[167] A recent study demonstrated that property rights' effect on FDI depends on democratic institutions, with the tendency for this dependence to increase over time.[168] Corruption, which impedes democracy, remains a significant challenge in Azerbaijan, which could explain the weak enforcement of property rights and discourage private investment.[169] Moreover, improving SME property rights protection entails strengthening private-to-public litigation in Azerbaijan, particularly establishing efficient enforcement mechanisms on court decisions in favor of business interests.[170]

After access to basic services and resources, social equity is the pillar with the most significant number of indicators scoring high and very high, including inequality in income (SE1), with a score of 97.79, youth unemployment disparity (SE3), with a score of 77.01, and old people dependency ratio (SE4), with a score of 81.67. The main sources of income for most Azerbaijanis are low-income sectors like agriculture. Various studies explain the low income inequality in the country. First, the low participation rates of affluent households in the household surveys and targeted public and private income transfers to low-income groups reduce inequality.[171] Second, the main income sources of the poorest (about 40 percent of the total population) are public salaries and social transfers [172], indicating an income redistribution mechanism. Third, the average wage rate is much higher than the minimum wage, and only a few people receive the minimum wage. [173] The youth unemployment disparity (SE3), measured as the ratio of youth 15-24 years old and above 25 years old who are unemployed, was used instead of the proportion of youth (aged 15-24 years) not in education, employment, or training (NEET). Time-series data on NEET, an SDG indicator, are unavailable from online sources. However, it was mentioned in the National Employment Strategy of the Republic of Azerbaijan for 2019-2030 (2018) that the NEET level in Azerbaijan was 23 percent in 2017, and the government aims to reduce it to 15 percent by 2030. [174] One of the reasons for the high NEET level is the youth's lack of education and skills. The old dependency ratio measures the ratio of the economically inactive population (65 years and above) to the working-age population (between 15 and 64 years). A higher ratio indicates that more old people need to be supported by employed people. Compared to its neighboring countries, Azerbaijan's population currently has a younger age structure. Still, the trend shows a gradual increase in the share of elderly people due to the "sex structure imbalance" towards the male population. [175] ***Keeping high and very high scores in social equity indicators will require Azerbaijan to overcome the challenges of empowering the youth with innovative skills, enabling them to find employment in high-income sectors (thus reducing income inequality and youth unemployment), and support the increasing elderly population.*** Recent data suggest that about half of the workforce with only secondary education (1.4 million) are aged 15-34 and most likely to get low-paid employment in the informal sector. [176]

The gender balance and social protection pillars have two indicators with high and very high scores. For gender balance, these include females with financial accounts (GB2), with a score of 98.95, and tertiary enrolment gender parity (GB5), with a score of 70.99. Financial inclusion through access to and use of financial services, including bank and mobile accounts, helps women to become self-employed and entrepreneurs. Self-employed women and female entrepreneurs increased over a decade, with women opening businesses growing by 32 percent between 2004 and 2020. [177] This positive trend can be attributed to the National Action Plan for Women 2000–2005, which includes strategies for promoting female entrepreneurship. However, women entrepreneurs remain a minority in business community (198.305 individual women entrepreneurs existed in 2020 [178]), are primarily located in cities, and focus on agricultural and trade-related businesses.[179] Enhancing the role of women in urban and rural areas in creating green opportunities in high value-added sectors requires improving access to loans, digital skills, and appropriate education, among others. Further, improving gender parity in education will contribute to women's economic empowerment. For social protection, the indicators with high and very high scores include victims of intentional homicide (SP4) at 96.2 and health regulation capacity (SP5) at 81.13. The victims of intentional homicides have declined from 8 to 2 per 100,000 people from 1992 to 2020, explaining the very high score for this indicator in Azerbaijan. But as discussed in the previous section, there are low reporting rates on domestic violence among women. The SP5 indicator refers to the International Health Regulations (IHR), a "legally binding agreement of 196 countries to build the capability to detect and report potential public health emergencies worldwide". [180] The indicator measures the country's ability to monitor, investigate, report, and respond to public health events, including pandemics, disasters, etc. Financial support was provided to businesses to overcome pandemic impacts, but it was insufficient to rescue many women entrepreneurs from business closures. [181] ***Social inclusion indicators, including several gender-oriented ones, do not reveal many gender specificities in Azerbaijan's economy and***

society, so high or very high scores do not necessarily reflect improvement in women's well-being. Gender stereotypes, particularly in rural areas, continue to define women's role according to cultural and traditional norms - with women taking significant responsibilities on household and farm chores (hindering self-employment and entrepreneurship), female entrepreneurship considered atypical development, fights for women's rights labeled as feminism are confronted with antipathy and domestic violence against women perceived as a family matter. The lack of SDG methodologies for global comparison hinders monitoring many gender-related issues critical to closing gender gaps. [182]

Poor performance in ensuring women's economic and social well-being in Azerbaijan is reflected in the low and very low scores in three gender balance indicators, including women in national parliaments (GB1), equal gender pay (GB3), and maternity cash benefits (GB4). Comparing 17 percent female parliamentary representation to the female population yields one (1) female representative for every 230,000 women, in contrast to 1 male representative for every 51,000 men. [183] Significant obstacles to women's political participation include public tolerance of gender stereotypes, lack of financial resources for costly election campaigns, and low political confidence due to a lack of training and skills. [184] The gender pay gap varies across sectors and employment types. Women mainly work in low value-added sectors where skills requirements and thus wage rates are low, including agriculture, trade, and services. In high value-added and technology-oriented activities, monthly wage gaps despite equal male and female qualifications are highest in professional, scientific, and technical activities at 57 percent, administrative and support service activities at 44 percent, and financial and insurance activities at 37 percent. [185] The small share of maternity cash benefits can be explained by the inability of some private firms, particularly SMEs, to provide maternal benefits and informal employment not providing any social benefits. [186] In 2015, about 62 percent of the informal workers in Azerbaijan were women. [187] Many SMEs operate low value-added businesses where gender wage gaps are also prevalent, for example, trade and repair of vehicles, with a 17 percent gender wage gap, transport and storage, with 36 percent gender wage gap, and other service activities (accommodation and food), with 29 percent gender wage gap. [188] The three remaining social inclusion indicators with low and very low scores are rural/urban access to clean fuels (SE2) under the social equity pillar and population-given social assistance (SP1) and unemployment cash benefits (SP3) under the social protection pillar. While clean fuels and technologies for cooking were accessible to 99 percent of the urban population, access was only available for 94 percent of the rural population in 2020. [189] Using cow manure and firewood as cooking fuel contributes to a decline in crop productivity (less organic fertilizer) and an increase in deforestation (illegal wood harvesting). Household pollution emitted from cooking using dung, crop waste, or charcoal causes health risks, particularly among women responsible for household chores. Rural development projects providing clean gas in rural areas of Azerbaijan contribute to forest protection and women's well-being. [190] ***Green growth transition will need to reach the rural-based sectors through agricultural diversification, clean energy innovation, and forest protection to improve the socio-economic condition of the poor population and vulnerable women. Poverty will also be reduced by ensuring the delivery of health and welfare services in the rural areas, home to many self-employed or informal workers who depend on subsistence agriculture.*** [191] Azerbaijan has improved its social protection management and delivery services, but the benefits rates remain inadequate to reduce poverty, and the coverage is not comprehensive to support workers in the informal economy. [192] These limitations became particularly evident during the COVID-19 pandemic. Mandatory health insurance (MHI) was introduced in Azerbaijan in 2021. The MHI coverage increased to 38 percent in 2022 [193], contributing to the moderate score in the universal health coverage (SP2) indicator. Improving performance in this indicator will require addressing remaining challenges, which were exacerbated during the pandemic, including "difficulties in accessing care, long waiting times, and shortages in staff, medicine and equipment". [194]

3.3.2 Performance in green and inclusive growth

The normalized scores of the green and inclusive growth indicators presented in section 3.3.1 were aggregated to provide an overall score for the pillars of the four green growth dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. The two most common and straightforward aggregation methods include linear aggregation using the arithmetic mean and geometric aggregation using the geometric mean. These two methods have different underlying assumptions. Linear aggregation allows full and constant compensability, i.e., low values in one indicator can be traded off (substituted) by high values in another. On the other hand, geometric aggregation allows only partial compensability, limiting the ability of the indicators with high scores to fully compensate those with low scores. The two methods were applied in the different aggregation models so that, as the level of aggregation increases, the level of substitutability decreases:

- Pillar level: Arithmetic mean was applied to aggregate the indicators' normalized scores, allowing compensability of the individual indicators in each pillar. Because the indicators closely represent a specific issue in each pillar (e.g., all indicators in efficient and sustainable energy are related to energy issues), they can compensate for each other.

- Dimension level: Geometric mean was applied to aggregate the pillars' aggregated scores, allowing only partial compensability between pillars in each dimension. The pillars represent different issues

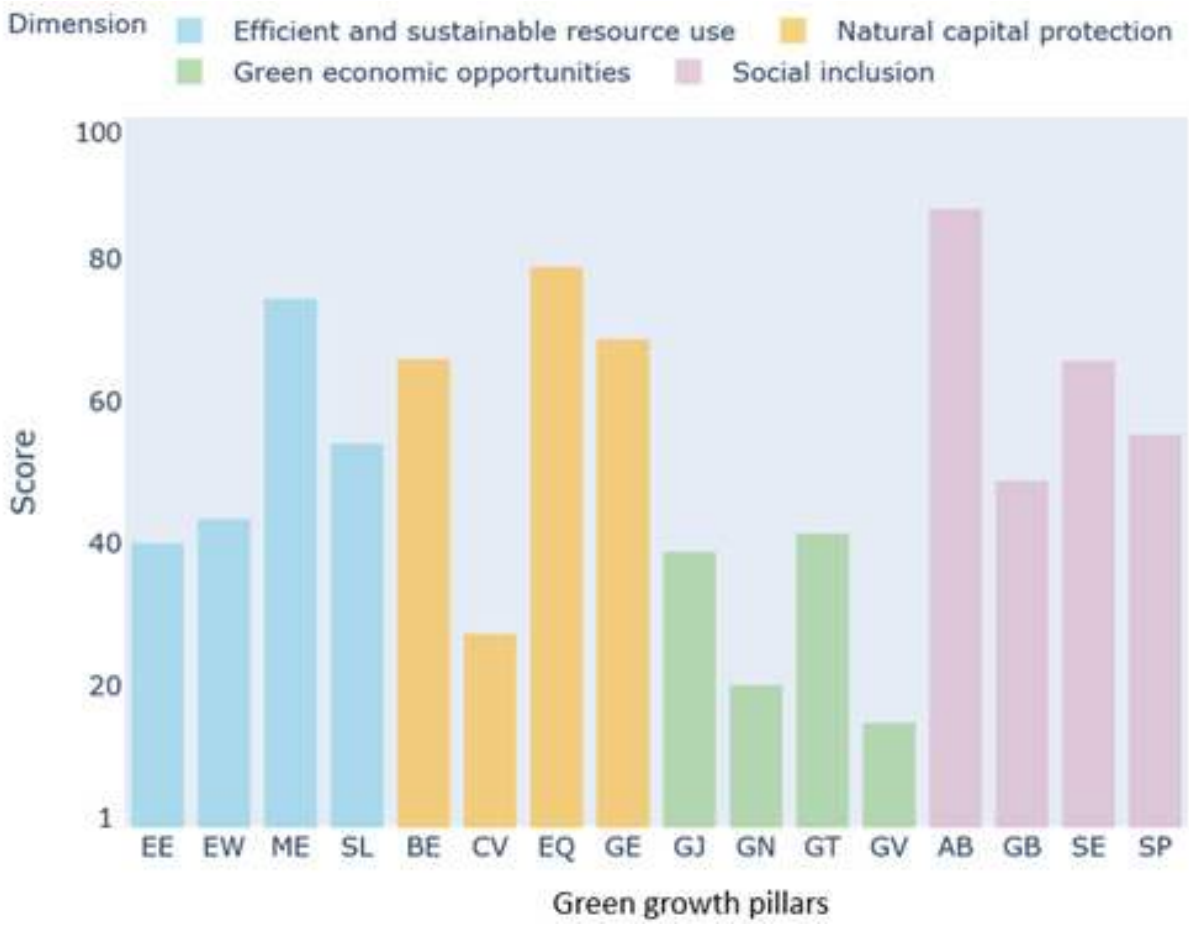
and cannot be permitted to compensate each other. For example, in the efficient and sustainable resource use dimension, energy efficiency cannot compensate for sustainable land use and vice versa.

The results of the aggregated scores at the pillar and dimension levels are briefly discussed below. A more detailed discussion is presented in Chapter 4, comparing Azerbaijan's performance with the CA countries.

a. Performance at the pillar level

Figure 13 presents the aggregated scores for the different green growth pillars. Overall, the scores for social inclusion pillars are the highest, followed by natural capital protection. With a score of 87.11, access to basic services and resources (AB) was the only pillar with a very high across the four dimensions in 2021. There are three pillars with high scores, i.e., between 60 and 80, in the natural capital protection dimension, including biodiversity and ecosystem protection (BE), environmental quality (EQ), and GHG emissions reduction (GE). Still, it has one pillar with a low score of 27.33 for cultural and social values. Social inclusion has only one pillar with a high score, i.e., social equity (SE) with 65.74, and the two remaining pillars have moderate scores. Improving performance in other pillars, particularly green economic opportunities, will further increase the scores for social inclusion pillars. Through development priorities of diversifying and greening the economy, Azerbaijan will have enormous opportunities to improve the scores in the four pillars of green economic opportunities, where performance was lowest in 2021. The biggest challenge to the green growth transition will be improving performance in green investment (GV) and green innovation (GN), which scores were very low at 14.88 and 20.17, respectively. Without green investment and innovation, there will be limited opportunity to increase efficient and sustainable resource use scores, where three pillars had only moderate scores.

Figure 13. Green growth performance in Azerbaijan at the pillar level, 2021



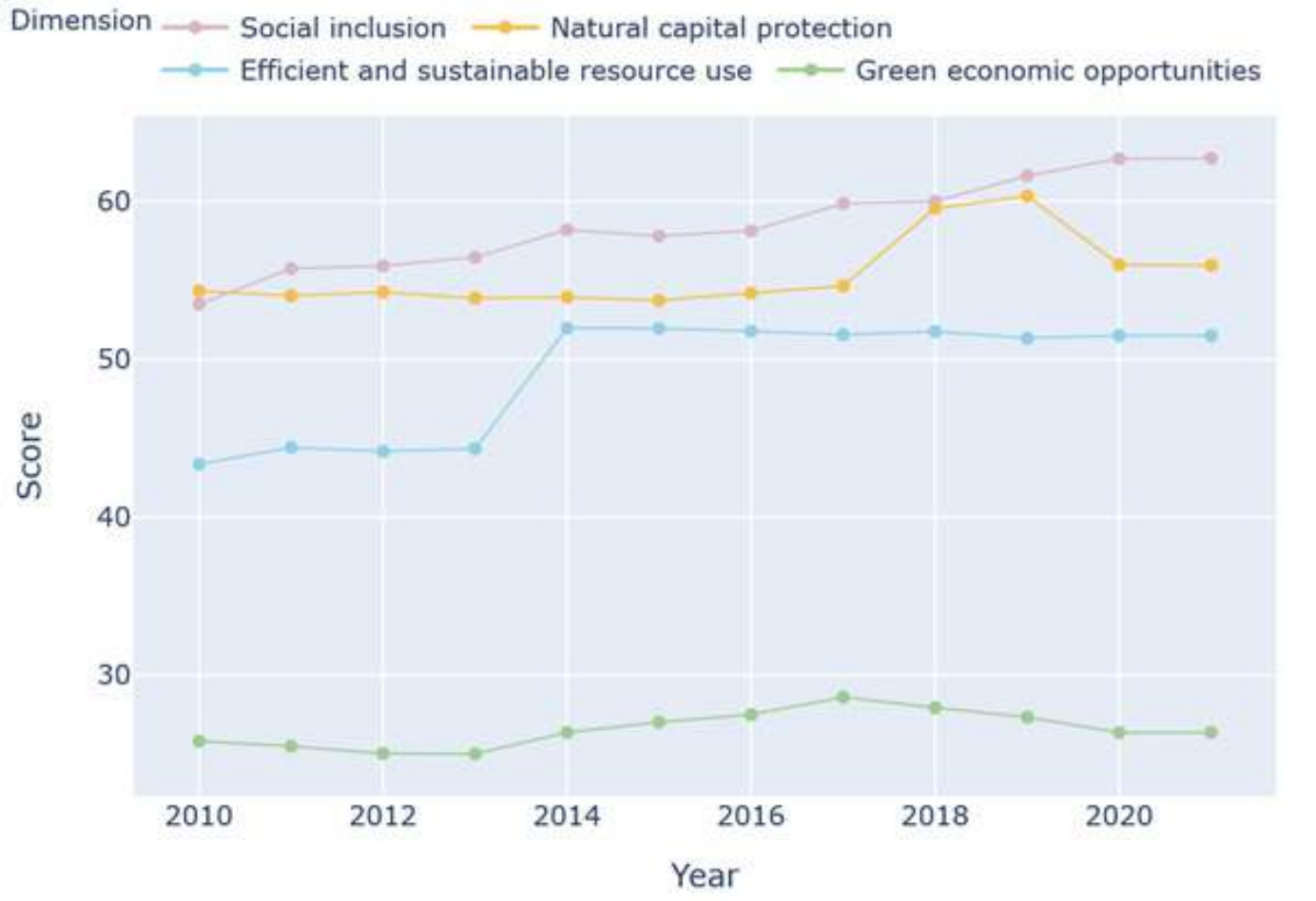
EE-efficient and sustainable resource use, EW - efficient and sustainable water use, ME - waste and material use efficiency, and SL-sustainable land use
BE - biodiversity and ecosystem protection, CV-cultural and social value, EQ - environmental quality, and GE- greenhouse gas emissions reduction
GJ-green employment, GN - green innovation, GT - green trade, and GV - green investment
AB-access to basic services and resources, GB-gender balance, - SE-social equity, and SP social protection

Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org

b. Performance at the dimension level

Figure 14 shows Azerbaijan's overall performance in the four green growth dimensions from 2000 to 2001. The aggregated scores for social inclusion show not only the highest level but also the highest incremental increase over time. The scores increased by 17 percent from 54 in 2010 to 63 in 2021. The steady increase from 2000 was halted in 2014/2015 due to the impact of the oil crisis. The effect of the pandemic was also visible, with scores almost stagnating in 2020 and 2021. After social inclusion, natural capital protection has the next highest score. The decreasing trend in the scores for this dimension was halted in 2012 and remained stable at 55 until 2017. From 2018, the performance showed an increasing trend, mainly attributed to the increase in the monitoring environment in tourism (CV3). But this went down again in 2020, most likely due to the impact of the pandemic. Azerbaijan's efficient and sustainable resource use performance remained relatively stable at a score of about 44 from 2000 to 2013. The big jump in the score in 2014 was due to the drastic decline in capture fisheries per unit of GDP (EW3) due to overfishing and pollution in the Caspian Sea. Reduced captured fish will allow marine resources to regenerate. The aggregated score for efficient and sustainable resource use remained at 52 from 2014 to 2021. Finally, the aggregated scores for green economic opportunities stayed between 25 and 30 from 2010 to 2021. It showed a declining trend from 2018 due mainly to the significant decline in financing for water resource management (GV4).

Figure 14. Green growth performance in Azerbaijan at the dimension level, 2000-2021



Source: Authors own. The figure is available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

3.3.3 Robustness check

Composite (or aggregated) indicators often face criticism because they can be misleading if poorly constructed and interpreted. Thus, the final important step in data analysis is evaluating the aggregated indicator scores' confidence level (i.e., robustness check). Two types of analyses were conducted to validate the robustness of the pillars and dimension scores. First, the sensitivity of the dimension scores to changes in the indicators' raw data was analyzed using Monte Carlo analysis. Second, the explanatory power of the indicators' normalized scores was analyzed to check their ability to explain the structure of the aggregated scores using regression analysis.

a. Monte Carlo analysis

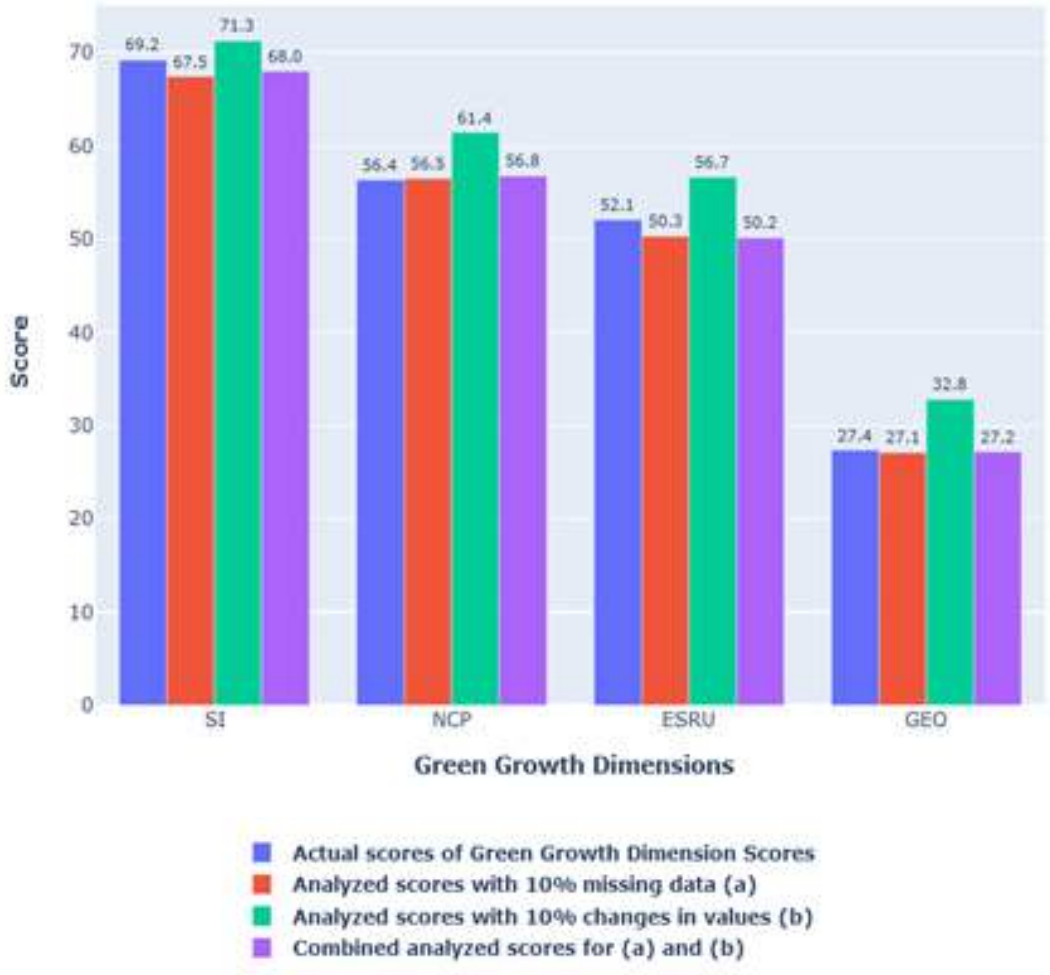
Monte Carlo methods are an easy and efficient class of algorithms often used for estimation purposes. The methods simulate a significant number of experiments to

obtain quantities of interest. They are based on random sampling, which allows for simulating complex systems and estimating probabilities and uncertainties. Monte Carlo analysis was applied in this report to validate the robustness of the aggregated scores as a reliable metric for comparative analysis and policy development. The objective is to ensure that the results accurately reflect the underlying dimensions of green growth, instead of being influenced by random fluctuations in the data. The analysis focuses on the impact of data uncertainty on the aggregated scores, as these are often caused by factors such as reporting methodologies, imputation techniques, and measurement uncertainties. To mitigate the impact of these issues, Monte Carlo simulations are employed to introduce noise and missing values into the data artificially. Two sources of data uncertainty were checked:

- Missing data – to check the impacts of imputation to address data gaps in several indicators.
- Changes in the values of the indicators – to check the impacts of using alternative databases, which have different values in some data points, and capping data to remove outliers.

Figure 15 presents the results from the Monte Carlo analysis for three sensitivity analyses – (a) 10 percent missing data, (b) 10 percent increment changes in indicator values, and (c) combined impacts from (a) and (b). The results are compared with the actual dimension scores, i.e., results presented in sections 3.3.1 and 3.3.2. Sensitivity to missing data shows minimal changes relative to the actual dimension scores. These results highlight the importance of ensuring data accuracy through effective data collection and imputation methods. Moreover, they inform that missing values will not impact the aggregated scores with handling of missing values through imputations techniques. Sensitivity to value changes shows more significant discrepancies from the actual dimension scores. These results emphasize the need for improved data collection and outliers' handling techniques to enhance confidence in the green growth dimension scores. On the combined analysis, the aggregation methods can tolerate additional missing values and changes in indicator values without compromising the robustness of the aggregated scores. Overall, the sensitivity analyses confirm that the green growth dimension scores can be interpreted with a degree of confidence.

Figure 15. Results of the Monte Carlo analysis to check the sensitivity of the dimension scores to data uncertainty



Source: Authors own.

b. Regression analysis

Two types of regression analysis were conducted to check the explanatory power and impacts of the indicators and pillars on the dimensions– panel data analysis and Random Forest regressor. The former was performed on the longitudinal data from 2010 to 2021 to examine the explanatory power of the indicators' normalized scores and pillar's aggregated scores in explaining the variation in green growth dimensions. The latter aims to determine the indicators with the most significant impact on the dimension scores.

Table 8 presents the results of the panel data analysis. The overall regression was statistically significant with an R-squared of at least 0.999, indicating a very good fitness of the dataset. The adjusted R-squared has no or only very minimal variation from the R-squared, meaning there is no overfitting, and the correlation is credible. The results show that 99 percent of the variance in the dependent variable (green growth dimensions) can be explained by the variance in the independent variables (green growth pillars). The P-value statistics from the regression analysis show that all green growth pillars are statistically significant. Overall, they have P-values less than 0.05, which implies a high statistical significance to the green growth dimension scores.

Table 8 Results of the panel data analysis to check the explanatory power of the pillars

Category code	Category names	Coefficient	Standard error	P-value
Efficient and sustainable resource use R^2 = 1.000 and Adj. R^2 = 1.000				
Constant	-	-2.7170	2.584	0.328
EE	Efficient and Sustainable Energy	0.2607	0.015	0.000
EW	Efficient and Sustainable Water Use	0.3590	0.003	0.000
ME	Material Use Efficiency	0.1926	0.038	0.001
SL	Sustainable Land Use	0.2566	0.039	0.000

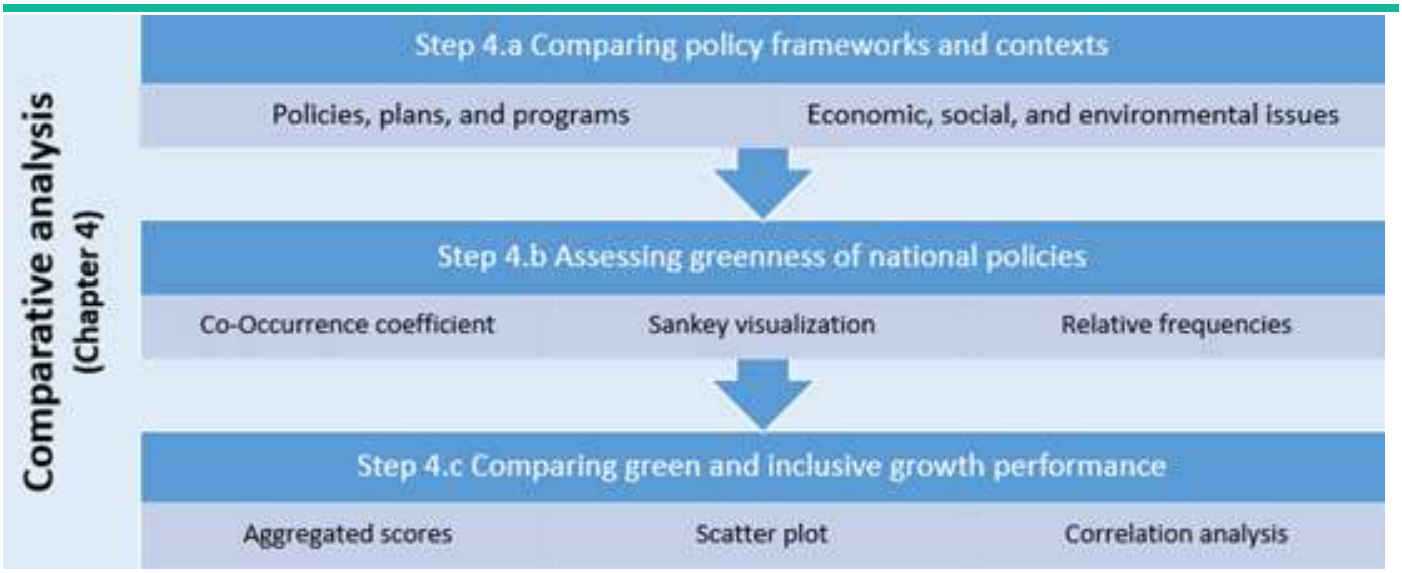
Table 8 Results of the panel data analysis to check the explanatory power of the pillars

Natural capital protection R2 = 1.000 and Adj. R2 = 1.000				
Constant	-	0.8666	0.862	0.348
GE	Greenhouse Gas Emissions Reduction	0.2153	0.002	0.000
EQ	Environmental Quality	0.1705	0.011	0.000
BE	Biodiversity and Ecosystem Protection	0.2197	0.005	0.000
CV	Cultural and Social Value	0.4517	0.001	0.000
Green economic opportunities R2 = 1.000 and Adj. R2 = 0.999				
Constant	-	-8.5927	4.550	0.101
GJ	Green Employment	0.2025	0.006	0.000
GN	Green Innovation	0.3738	0.008	0.000
GT	Green Trade	0.3391	0.112	0.019
GV	Green Investment	0.4092	0.007	0.000
Social inclusion R2 = 1.000 and Adj. R2 = 0.999				
Constant	-	-5.1882	10.073	0.622
AB	Access to Basic Services and Resources	0.2199	0.007	0.000
GB	Gender Balance	0.3835	0.032	0.000
SE	Social Equity	0.2051	0.108	0.042
SP	Social Protection	0.3021	0.017	0.000

04 COMPARATIVE ASSESSMENT WITH THE CENTRAL ASIAN COUNTRIES

This section corresponds to Step 4 of the analytical approach of this report (Figure 3). The comparative assessment of Azerbaijan's performance with Central Asian (CA) countries, including Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan, aims to analyze further policy gaps in Azerbaijan's green growth transition (Figure 16). Comparisons were conducted at the policy, indicator, and performance levels. At the policy level, Azerbaijan's economic and environmental policy frameworks and contexts are compared with those in the CA subregion to find similarities and divergences, which could explain differences in performance across countries (Step 4.a). It involved qualitative assessments of relevant literature and policy documents. The four main national policies, which were described in this step and used as data sources in Step 4.b, include national development plans, strategies, or Roadmaps, as well as Nationally Determined Contributions (NDCs) and National Biodiversity Strategies and Action Plans (NBSAPs). The results from Step 4.a are presented in section 4.1.

Figure 16 Comparative analysis of green growth and inclusive growth



Note: Complete diagram and description of analytical methods are in Annex 1.

At the indicator level, the relevance (i.e., frequency of occurrence) of the green and inclusive growth indicators in the four national policy documents in Azerbaijan and CA countries was assessed to determine the "greenness" of the economic and environmental policies (Step 4.b). The ATLAS.ti Scientific Software, a powerful workbench for the qualitative analysis of larger bodies of textual data, was applied for the assessment. It offers a systematic approach to analyzing unstructured data, i.e., data that statistical methods cannot meaningfully analyze. Using ATLAS.ti, the co-occurrence coefficient, Sankey visualization, and relative frequencies of the coded data that were identified from the text of the national policy documents were generated and presented in section 4.2. In this study, the coded data refers to the "reference" or "mention" of the green growth indicators, such that the more frequently the indicators were referred to or mentioned in the assessed documents, the "greener" the national policies were assumed to be. From a methodological perspective, the "codes capture meaning in the data" and "serve as handles for specific occurrences in the data that cannot be found by simple text-based search techniques". [196] From a technical perspective, the "codes are short pieces of text referencing other pieces of text … data" to classify data units. [197] The codes are synonymous with tags and keywords.

The co-occurrence coefficient (or c-coefficient), which values range between 0 and 1, indicates the strength of the relationship between the pair of codes. A value of 0 means codes do not co-occur, and 1 1 means these two codes co-occur wherever they are used. The equation for the c-coefficient is similar to quantitative content analysis as follows: [198]

$$c = n12 / (n1 + n2 - n12)$$

n12 = number of co-occurrences for code n1 and n2

The Sankey diagrams present data flows and connections, where data refer to the codes. Sankey applies a layout for its nodes and the edges connecting nodes to create an easily comprehensible data visualization. [199] In this study, the nodes refer to the coded data of the green growth indicators, and the edges refer to the policy documents in Azerbaijan and CA countries. The Sankey diagrams thus provide a useful visualization of the greenness of the national policies according to the thickness of the data flows or connecting lines between the nodes and edges.

The relative frequencies, presented in percentages, help compare code distributions across or within documents or document groups because they are easy to comprehend. [200] They are based on the counts of coded data. The counts were normalized because policy documents are not equal in length, such that absolute counts may distort results. [201]

At the performance level, the aggregated scores at the pillar, dimension, and composite index were compared to identify the top performer and reason for achieving the best green and inclusive growth performance (Step 4.c).

The aggregation approach for pillar and dimension scores was presented in section 3.3.2 of the previous chapter. The Green Growth Index refers to the aggregated scores of the four dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. Like in the dimension scores, the geometric mean was applied to generate Index scores. However, aggregation at the Green Growth Index level could only be done for countries with scores for all four dimensions. [vii] This ensures that comparing green growth performance across countries provides equal importance on all dimensions, completely precluding substitutability or compensability between the dimensions. The comparative assessments of current performance and changes in performance over time based on the aggregated pillar, dimension, and Green Growth Index scores are discussed in section 4.3. Scatter plots and correlation analyses were also conducted to provide additional substance to the comparative assessment of green growth performance in Azerbaijan and the CA countries.

4.1 Comparing policy frameworks and contexts

4.1.1 Economic, social, and environmental contexts

While the macroeconomic and financial situation is quite diverse, Azerbaijan and Central Asian countries have all registered significant economic growth in the last two decades. Azerbaijan had the third largest economy with 54.18 billion GDP and the second largest exports in goods and services at US$25.5 trillion in 2021 (Table 9). Overall, Kazakhstan had the largest economy in Central Asia and showed the most considerable improvement in total GDP and GDP per capita in the last two decades. High net trade of goods and services and foreign direct investment (FDI) inflows contribute to Kazakhstan's economy. FDI-led reconstruction of the energy sector has contributed to the solid economic performance in Kazakhstan and Azerbaijan. [202] These top oil exporting countries occupy the 10th and 16th ranks globally. Regarding GDP per capita, however, Turkmenistan occupies second after Kazakhstan. Turkmenistan has grown amazingly fast in recent years, with oil and natural gas as the primary drivers of economic growth, contributing over 60 percent to its GDP. [202] Unlike other Central Asian countries, economic growth in Kyrgyzstan and Tajikistan has not been driven by exports and investment in hydrocarbon energy. Remittances play a crucial role in these economies (Table 9). Kyrgyzstan and Tajikistan remained relatively closed economies, so foreign trade and investments have not been an essential source of economic growth. Demographically, Uzbekistan has the largest population in Central Asia. With a total land area of 2.7 million km2 and a total population of 19 million, Kazakhstan is the least densely populated country in the CA subregion. While at least half of the population in Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan live in urban areas, only a third live in urban areas in Kyrgyzstan and Tajikistan. The urban areas in Azerbaijan (27 percent in 2012) and Tajikistan (17 percent in 2020) have more people living in slums than in other CA countries. Unemployment is lowest in Kazakhstan and Turkmenistan at about 5 percent.

Table 9. Economic, social, and environmental contexts in Azerbaijan and the CA countries

Contexts	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Economy						
Income Group	Upper middle income	Upper middle income	Lower middle income	Lower middle income	Upper middle income	Lower middle income
GDP (constant 2015 US$) in billion, 2021	54	214	8	12	46	116
GDP per capita (current US$), 2021	5,384	10,042	1,276	897	7,612	1,983
GDP growth (annual %), 2021	5.6	4.3	3.6	9.2	6.3*	7.4
Foreign direct investment, net inflows (% GDP), 2020	1.2	4.2	-5.2	1.3	4.7	2.9
Personal remittances received (% of GDP), 2021	3.3	0.2	31.1	26.9	0	11.7
Exports of goods and services (current US$) in trillion, 2021	25.5	51.7	3.4	1.4	9.2	16.4
Trade openness (% GDP), 2021	77	56	108	56	35	64
Demographic						
Total population (Million), 2021	10.1	19.0	6.7	9.8	6.3	34.9
Population growth (% annual), 2021	0.4	1.3	1.7	2.1	1.5	2.0
Urban population (% total population), 2021	57	58	37	28	53	50
Population living in slums (% urban population), 2020	27**	1	2	17	9	n.d.
Total unemployment (% total labor force), 2021	6.6	4.9	9.1	7.8	5.1	7.2

Table 9. Economic, social, and environmental contexts in Azerbaijan and the CA countries (continued)

Contexts	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Environment						
Total land area (Thousand sq. km), 2020	83	2,700	192	139	470	441
Agricultural land (% total land area), 2020	57.8	79.3	54.1	35.4	72.0	58.3
Forest area (% total land area), 2020	13.7	1.3	6.9	3.1	8.8	8.4

*Notes: *2019, **2012, n.d. - no data*
Source: The World Bank. (2023). Data. The World Bank Group.

Except for Tajikistan, a significant share of the total land area in Azerbaijan and CA countries is used for agriculture (Table 9). Azerbaijan has the largest share of forest area to total land area at 13.7 percent. The natural resources available in the Caucasus and Central Asian countries influence economic structure and performance. Kazakhstan, with its 30 billion barrels (1.7 % global share), and Azerbaijan, with its 7 billion barrels (0.4% global share), hold one of the largest oil reserves globally (Table 10). Unlike Azerbaijan, economic growth in Kazakhstan depended on the amount of its hydrocarbon reserves and the modernization programs for its oil refineries. Turkmenistan, with 11.3 trillion cubic meters (7 percent global share), Kazakhstan, 2.4 trillion cubic meters (1.2 percent global share), and Azerbaijan, with about 2 trillion cubic meters (about 1 percent global share), are among the global top 20 holders of natural gas reserves.

Coal does not play a key role in Azerbaijan's economy. With its 25.6 billion tons of coal reserves, Kazakhstan is the only country in Central Asia with a substantial global share (2.4%). However, the role of coal in Kazakhstan's trade is not as significant as oil and natural gas. Like most countries in Central Asia, Azerbaijan depends on fossil fuels to generate electricity (Figure 17). Electricity use and access are strongly linked to economic growth . About 94 percent of Azerbaijan's economy and society depend on natural gas and oil for electricity generation. Azerbaijan and Turkmenistan are the only countries that use significant oil reserves to generate electricity. Oil emits more GHG emissions than natural gas. Compared to Turkmenistan, Azerbaijan is generating more per capita electricity from oil. In 2019, the largest sources of GHG emissions in Azerbaijan were electricity and heat generation. Like Uzbekistan and Turkmenistan, however, Azerbaijan is more heavily dependent on natural gas than other energy sources for electricity generation. Kazakhstan relies on coal to generate more than half of the electricity demand in the country. Electricity generation relies heavily on hydropower in countries with limited fossil energy reserves, like Kyrgyzstan and Tajikistan.

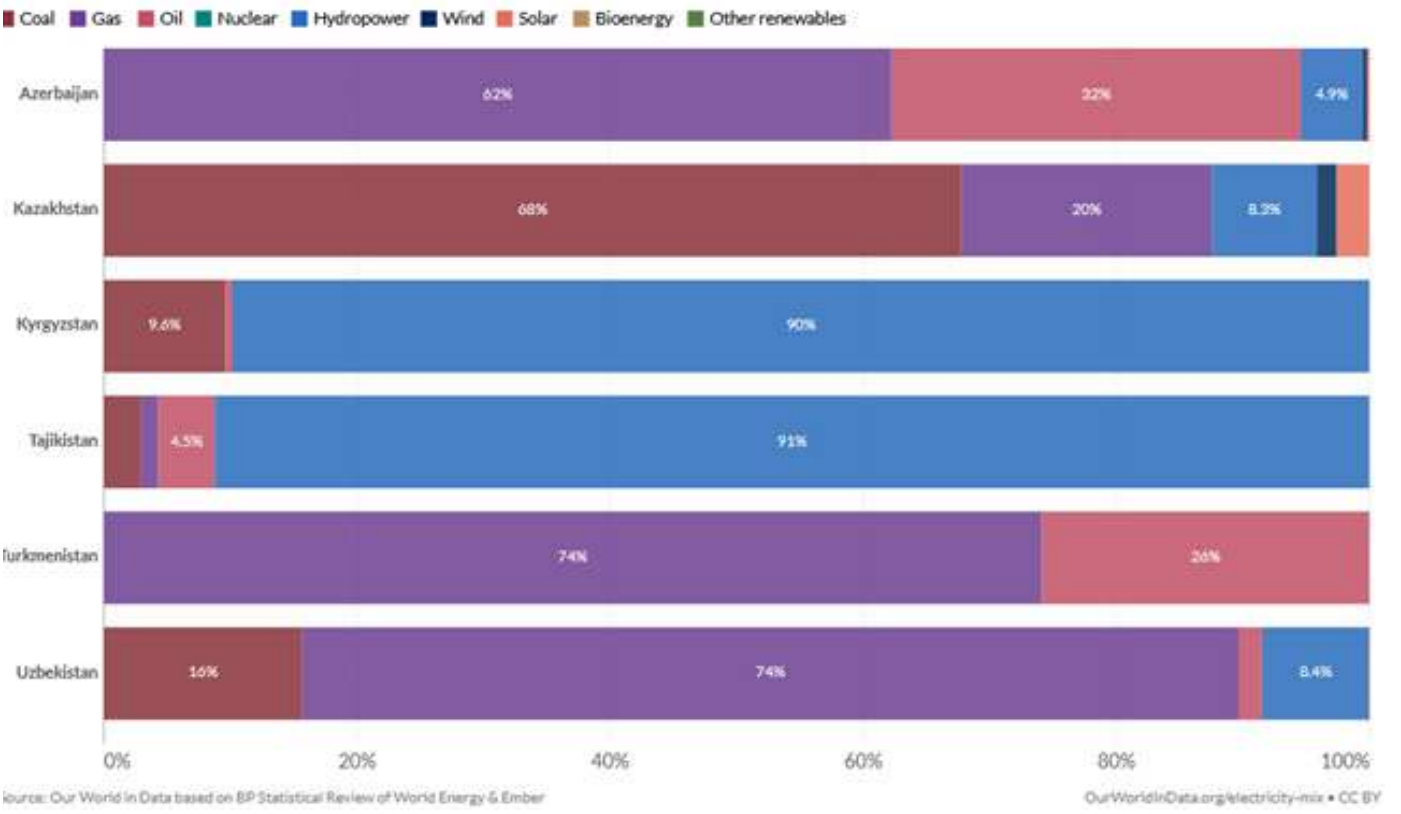
Table 10. Hydrocarbon reserves and potential renewable energy sources in Azerbaijan and Central Asia

Country	Oil reserves	Natural gas reserves	Coal reserves	Hydro potential (theoretical)	Solar potential	Wind potential
Azerbaijan	7 billion barrels (2019-2021) (BP 2020; Country economy.com, The World Factbook)	2.8 trillion cubic meters (2019) (BP 2020) 1.7 trillion cubic meters (2021) (The World Factbook)	4 metric tons (2019 est.) (The World Factbook)	TWh* (2020) (BP 2021) 520 MW (iea.org/reports/Azerbaijan; IRENA 2019)	23,000 MW (iea.org/reports/Azerbaijan; IRENA 2019)	3,000 MW (iea.org/reports/Azerbaijan; IRENA 2019)
Kazakhstan	30 billion barrels (2019-2021) (OSCE 2022, BP 2020, Country economy.com, The World Factbook)	2.7 trillion cubic meters (2019) (OSCE 2022) 4.1 trillion (2021) (The World Factbook)	25.6 billion tons (2019) (OSCE 2022, BP 2020, The World Factbook)	199 TWh/year (OSCE 2022; Aminjonov, F. 2020; Eshchanov et al. 2019a) 0.09 TWh* (2020) (BP 2021) 27 billion kWh/year (trade.gov/energy-kazakhstan)	3760 GW (OSCE 2022, Laldjebaev et al. 2021) 2.5 billion kWh per year (urasian-research.org; trade.gov/energy-kazakhstan)	354 GW (OSCE 2022, Laldjebaev et al., 2021) 1.8 trillion kWh per year (trade.gov/energy-kazakhstan) 11,388 TWh per year (Laldjebaev et al. 2021)

Table 10. Hydrocarbon reserves and potential renewable energy sources in Azerbaijan and Central Asia (continued)

Country	Oil reserves	Natural gas reserves	Coal reserves	Hydro potential (theoretical)	Solar potential	Wind potential
Kyrgyzstan	5 million barrels (2020) (OSCE 2022) 40.0 million barrels (2021) (Country economy.com, The World Factbook)	6 billion cubic meters (2020-2021) (OSCE 2022, The World Factbook)	1.3 billion tons (2020) (OSCE 2022) 971 million metric tons (2019 est.) (The World Factbook)	163 TWh/year (OSCE 2022, Aminjonov et al. 2020, Eshchanov et al. 2019a)	267 GW (OSCE 2022, Laldjebaev et al. 2021) 300 kWh/m2 (iea.org/reports/kyrgyzstan) 537 TWh per year (Laldjebaev et al. 2021)	1.5 GW (OSCE 2022, Laldjebaev et al. 2021) 255.663 GW** (Eshchanov et al. 2019) 256 TWh/year (Laldjebaev et al. 2021)
Tajikistan	12 million barrels (2019-2021) (OSCE 2022, Country economy.com, The World Factbook)	5.66 billion cubic meters (2018-2021) (OSCE 2022, The World Factbook)	4.5 billion tons (2019) (OSCE 2022) 375 million metric tons (2019) (The World Factbook)	527 TWh/year (OSCE 2022; Aminjonov, F. 2020, Eshchanov et al. 2019a) 18 billion kWh per year (CABAR)	195 GW (OSCE 2022, Laldjebaev et al., 2021) 3,103 billion kWh/year (CABAR) 410 TWh/year (Laldjebaev et al. 2021)	4 GW (OSCE 2022, Laldjebaev, et al. 2021) 146.135 GW** (Eshchanov et al., 2019) 146 TWh per year (Laldjebaev et al. 2021)

Figure 17. Per capita electricity generation by source, 2021



Note: Complete diagram and description of analytical methods are in Annex 1.

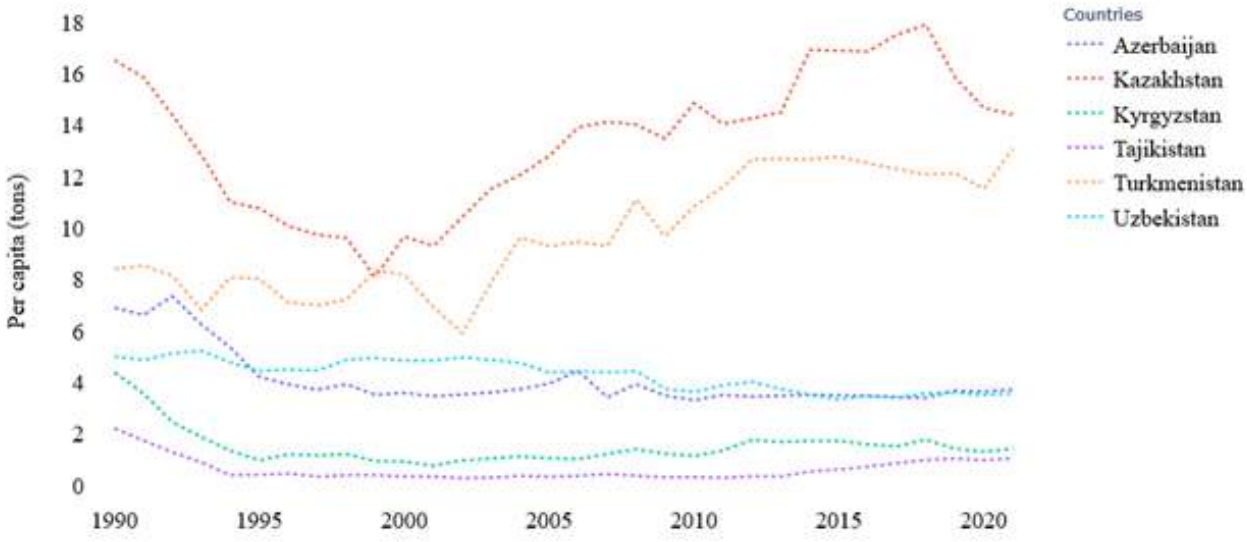
4.1.2 Progress and targets in climate actions

Figure 18a shows that, overall, Azerbaijan, the third largest economy compared with the CA countries Asia, is also the third largest per capita GHG emitter after Kazakhstan and Turkmenistan from 1900 to 2021. However, unlike Kazakhstan and Turkmenistan, Azerbaijan's per capita GHG emissions did not significantly increase from 2000. Progress in reducing per capita GHG emissions in Uzbekistan is slightly better than in Azerbaijan, with the former recording lower emissions in 2021. The rest of the CA countries, while having lower emissions than Azerbaijan, have followed a steadily increasing trend from 2000 to 2021.

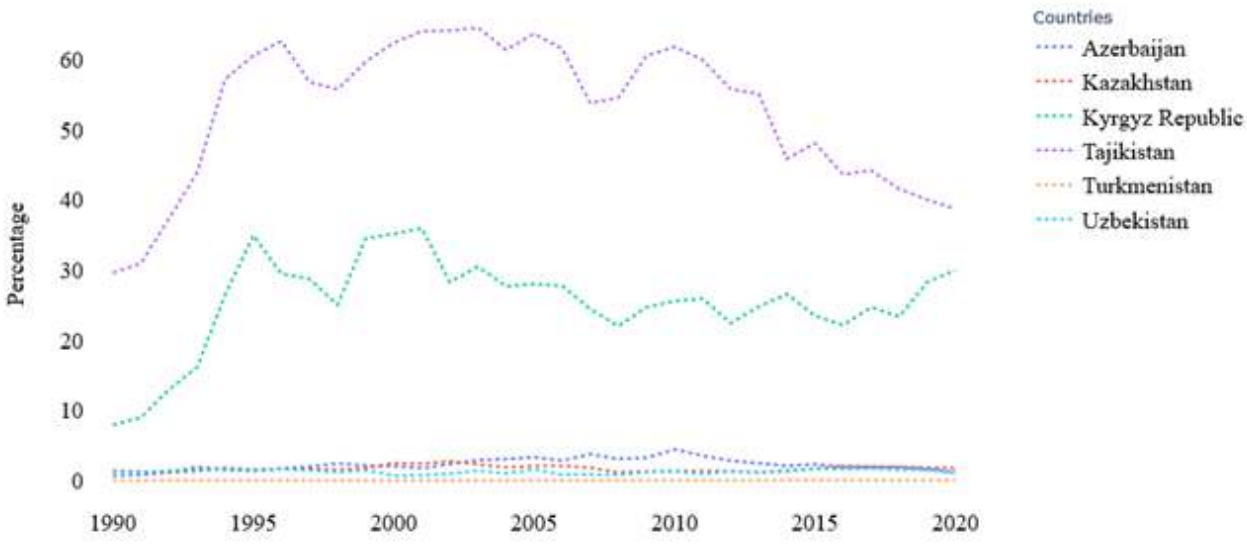
Azerbaijan and the CA governments are committed to reducing GHG emissions. They submitted their Nationally Determined Contributions (NDCs) specifying climate mitigation and adaptation actions, ranging from increasing renewables to protecting natural resources and covering different sectors. Reducing dependence on fossil fuels and increasing renewables in the energy mix will be vital to reducing emissions in Azerbaijan and Central Asia. The share of renewables to total energy consumption has not increased significantly in all countries since 1995. In Tajikistan and Kyrgyzstan, the share of renewables has been declining in recent years due to a reduction in hydropower capacities. Like Azerbaijan, the Central Asia countries will benefit from energy diversification and green innovation, including modernizing energy processing plants to improve energy efficiency. Both diversification and innovation will require human development and adapting human skills to modern technologies.

Figure 18. Per capita CO^2 emissions and share of renewables in Azerbaijan and the CA countries, 1990-2020

(a) Per capita CO_2 emissions*, 1950-2020



(b) Renewable energy consumption**, 1990-2020



Carbon dioxide (CO_2) emissions from fossil fuels and industry. Land use change is not included.
***Percent of total final energy consumption*
Data sources: (a) Our World in Data[209] and (b) World Bank Database [210]

Like Kazakhstan, one of the two largest GHG emitters in the CA subregion, Azerbaijan still needs to update its first NDC, submitted in 2017. Turkmenistan submitted its updated NDC on the 30th of January 2023, committing to reduce its emissions by 20 percent in 2030 relative to the country's 2010 emission level. Azerbaijan and Kazakhstan are committing to reduce GHG emissions by 35 percent by 2030 compared to 1990 (Table 11). Azerbaijan aims to achieve this target using its resources and capacities (i.e., unconditional), while Kazakhstan intends to achieve 25 out of the 35 percent with international support (i.e., conditional).[viii] In 2019, Kazakhstan recorded 279.67 million USD of international financial flows supporting its clean energy research and development and renewable energy production.[211] In contrast, Azerbaijan has received a very negligible amount since the publication of its first NDC in 2017. Like Azerbaijan, international financial flows for renewables have been insignificant in Turkmenistan. In its first NDC, Turkmenistan's target of zero GHG emission growth is conditional to economic and technological support to be provided by developed countries. According to its updated NDC, "implementation of the mitigation measures outlined in the NDC will require hundreds of millions of US dollars of international financial support".[212] In the updated NDCs for the Kyrgyz Republic and Tajikistan, more than 40 percent of the targets for emission reduction are categorized as conditional. Azerbaijan and all CA countries included energy, agriculture, and waste in the NDC's sectoral coverage. Only a few included land use, land-use change, and forestry (LULUCF), and industrial processes and product use (IPPU). Carbon dioxide (CO_2), methane (CH4), and nitrous oxide (N_2O) are considered in the GHG emissions reduction in all countries. In contrast, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and/or sulfur hexafluoride (SF6) are considered in a few of them, except for Tajikistan.

Table 11. Nationally Determined Contributions under the Paris Climate Agreement in Azerbaijan and the CA countries

Country	Submission dates		2021 Global share[13]	GHG targets, sectors, and gases
	First NDC	Updated NDC		
Azerbaijan	09/01/2017	-	0.10%	**Targets:** 35% unconditional reduction in GHG emissions by 2030 compared to 1990 **Sectors:** Energy, agriculture, waste, LULUCF **Gases:** CO2, CH4, N2O, HFCs, CF4
Kazakhstan	06/12/2016	-	0.75%	**Targets:** 15% unconditional and 25% conditional reduction in GHG emissions by 2030 compared to 1990 **Sectors:** Energy, Agriculture, Waste, LULUCF **Gases:** CO2, CH4, N2O, HFCs, PFCs, SF6
Kyrgyz Republic	29.09.2015	09/10/2021	0.03%	**Targets:** reduce emissions by 16.63% by 2025 and by 15.97% by 2030 compared to BAU (unconditional), and by 36.61% by 2025 and by 43.62% by 2030 compared to BAU (conditional) **Sectors:** Energy, IPPU, AFOLU, and Waste **Gases:** CO2, CH4, N2O, HFCs
Tajikistan	30.09.2015	12/10/2021	0.03%	**Targets:** not exceed 60-70% unconditional and 50-60% conditional reduction of 1990 emissions levels by 2030 **Sectors:** Energy, IPPU, AFOLU, and Waste **Gases:** CO2, CH4, N2O
Turkmenistan	21/10/2016	30/01/2023	0.22%	**Targets:** 20% reduction in its greenhouse gas emissions in 2030 under the BAU scenario, relative to 2010 emissions (Updated NDC 2023) if developed countries provide financial and technological support, Turkmenistan could achieve zero growth in emissions and even reduce them up to 2030 (INDC 2016) **Sectors:** Energy, Agriculture, IPPU, and Waste **Gases:** CO2, CH4, N2O, PFCs
Uzbekistan	19.04.2017	30/10/2021	0.33%	**Targets:** reduce specific emissions per unit of GDP by 35% by 2030 compared to 2010 levels partially conditional NDC (unspecified mix of domestic/international resources) **Sectors:** Energy, IPPU, AFOLU, and Waste **Gases:** CO2, CH4, N2O, HFCs

Sources: UNFCCC [214], Climate Watch [215]

Note: "In developing countries, the conditional component has often been linked to international support, including Article 6 carbon markets. However, the UNFCCC needs to provide clear guidance on NDC conditionality and its application. A lack of conceptual clarity opens space for different applications in NDCs, with potential consequences for access to Article 6 cooperative approaches." [216]

Acronyms: Land Use, Land-Use Change and Forestry (LULUCF), Industrial processes and product use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU), Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6)

[viii] "Unconditional" refers to reductions that are not dependent on any condition, while "conditional" provides conditions for achieving reductions on other countries' commitment or availability of support.

4.1.3 National socio-economic and environmental policies

Azerbaijan's national socioeconomic and environmental policies were discussed in detail in the previous chapter, including the National Priorities for Socio-Economic Development for the year 2030 (NPSD 2030), the Strategic Roadmap for the Perspective of the National Economy including the economic development strategy and action plan until 2020, the long-term vision for the period until 2025, and the target vision for the period after 2025 (Roadmap beyond 2025), the National Strategy on Conservation and Sustainable Use of Biodiversity for 2017-2020 that was published in 2016 (NBSAP 2016), and the Nationally Determined Contribution that was published in 2017 (NDC 2017). This section briefly introduced the most relevant policy documents for this study for the CA countries, except for Turkmenistan, which lack of data on green growth indicators limits the policy analysis.

Kazakhstan

The national policy documents considered for Kazakhstan include the Strategic Development Plan until 2025 (SDP 2025), the Vision for transition to a Green Economy to support the Strategy 2050 (Green Economy 2050), the Fifth National Report for the National Biodiversity Strategy and Action Plan that was published in 2014 (NBSAP 2014), and the Nationally Determined Contribution that was published in 2016 (NDC 2016). The SDP 2025 aimed to mitigate the impacts of the global financial crisis, with UN Sustainable Development Goals as a reference point through the transition to diversified, sustainable economic growth. Aligned with the NBSAP 2014, Kazakhstan adopted the Green Economy 2050, approved by the Decree of the President of the Republic of Kazakhstan □ 577, aiming to harmonize relations between people and nature. The top priorities for the transition to a "green economy" include 1) more effective resource use and management (including water, land, and biological resources), 2) modernization of current infrastructure, 3) improved welfare of the populace and environmental quality, and 4) strengthening of national security, including water security. By 2050, Kazakhstan aims to increase the share of alternative and renewable energy sources by at least half of the country's total energy consumption.

The NDC 2016 aims to achieve an economy-wide target of 15-25 percent reduction in GHG emissions by 2030 (See section 4.1.2 for more details). The NBSAP 2014 embodies the country's priorities for conservation and efficient management of ecosystems. To raise the importance and economic potential of natural ecosystems, integrated ecosystem management is aimed to be implemented by the principles of sustainable development. Sectoral and cross-sectoral programs and plans were formed, and efforts were made to ensure their coordination and joint reporting procedures in addition to directly integrating goals implemented under biodiversity-related treaties. Moreover, the modernization of technology, enhancement of the institutional environment, improvement of business and human capital competitiveness, and reduction of adverse human effects on the environment are considered cornerstones of qualitative economic growth. The SDGs guide the achievement of these efforts.

Kyrgyz Republic

Kyrgyz Republic's four national policy documents used in the analysis include the National Development Program until 2026 (NDP 2026), the National Development Strategy 2040 (Strategy 2040), the National Biodiversity Strategy and Action Plan published in 2016 (NBSAP 2016), and the Updated Nationally Determined Contribution published in 2021 (NDC 2021). The NDP 2026 was developed within Strategy 2040, focusing on the continuity principle based on the long-term strategic objectives of the country's sustainable development. Moreover, enhancing citizen welfare is one of the program's goals by fostering an environment supportive of socioeconomic growth, adopting crisis-resilience measures, and achieving long-term development goals. Strategy 2040 aims to develop a competitive economy centered on using innovation based on ecologically friendly technological advancements and creating a diversified, stable, and inclusive economy conducive to investments. With Strategy 2040, Kyrgyz Republic's vision is to form industrial, energy, financial, transport and logistics, information, and social ecosystems and build a new model of economy based on harmonious coexistence with nature. The country's economy aims to be well diversified, incorporated into the international division of labor system with high added value, clean energy, and organic agriculture.

Aligned with the NBSAP 2016 are basic principles of the government's environmental preservation program, judicious use of natural resources, biodiversity, and environmental protection. These are embodied in Kyrgyz Republic's Environmental Security Concept, endorsed by the President's Decree No. 506 as measures to ensure Environmental safety. Its main objective is the preservation and sustainable utilization of the country's biological variety for long-term socioeconomic growth. NDC 2021 presents Kyrgyz Republic's updated strategy to cut GHG emissions and shift to a low-carbon economy by 2030 (see section 4.1.2 for more details). It considers its national priorities, as envisioned in Strategy 2040 and the SDGs, and recognizes the importance of adopting the Low-Carbon Development Strategy and the National Adaptation Policy.

Tajikistan

The national policy documents used for Tajikistan include the Medium-term Development Program for 2021-2025 (MTDP 2025), the National Development Strategy for the period up to 2030 (Strategy 2030), the National Strategy and the Conservation Action Plan Biodiversity published in 2016 (NBSAP 2016) and the Updated Nationally Determined Contribution published in 2021 (NDC 2021). The MTDP 2025 was developed to ensure the implementation of the second stage of Strategy 2030. It aims to strengthen the public administration system, develop human potential, ensure the quality of national economic growth, financial stability, tax administration, rational use of natural resources, and accelerate industrialization in countries. Strategy 2030 emphasizes the country's vision of preserving national unity, ensuring national security, implementing the principles of social justice and economic efficiency, and improving human well-being. Tajikistan's long-term development goal is to improve the population's living standards based on

sustainable economic development, with a high level of scientific support for measures to preserve biodiversity and consistent state support in implementing the national strategy. Strategy 2030 suggests that coordinating institutions and accountability of state administration bodies, businesses, and civil society are essential in implementing its policy priorities.

Tajikistan sets ambitious goals and initiatives to achieve the shift to a low-carbon and climate-resilient development in a sustainable way. By incorporating Agenda 2030's priorities into the updated NDC 2021, Tajikistan aims to progress toward implementing the SDGs at the national level. By 2030, Tajikistan's NDC aims to achieve 60-70 percent unconditional and 50-60 percent conditional reduction of its GHG emissions (see section 4.1.2 for more details), with a focus on ensuring energy security and food security, efficient use of electricity, and people's access to good quality nutrition. The NBSAP 2016 aims to improve the population's living standards based on sustainable economic development with a high level of scientific support for measures to preserve biodiversity and consistent state support for implementing the National Strategy by the Committee for Environmental Protection of the Republic of Tajikistan.

Uzbekistan

Uzbekistan's four national policy documents include the Strategy for the Transition to A "Green" Economy for the Period 2019-2030 (Green Economy 2030), the Development Strategy of New Uzbekistan for 2022-2026 (Strategy 2026), the Fifth National Report on the Conservation of Biodiversity published in 2015 (NBSAP 2015), and the updated Nationally Determined Contribution published in 2021 (NDC 2021). The Green Economy 2030 aims to achieve sustainable economic progress that contributes to social development, reduction of greenhouse gas emissions, and climate and environmental sustainability by integrating the principles of the "green" economy into ongoing structural reforms. It focuses on modernizing and diversifying the foundational industries, promoting equitable socio-economic growth throughout the regions, strengthening the legal foundation for economic "green" policies, and promoting creative "green" investments through joint ventures between the public and private sectors. In the Strategy 2026 and NBSAP 2015, efforts are aimed to actively implement "green economy" technology across all sectors to raise energy efficiency by 20 percent and decrease GHG emissions by 20 percent in 2026. Strategy 2026 supports the improvement of energy efficiency and widespread use of renewable energy sources in buildings, the local economy, social infrastructure, and other areas to reduce the volume of harmful gases emitted by economic sectors into the air by 10 percent per unit of GDP. NBSAP 2015 emphasizes that the conservation and sustainable use of Uzbekistan's biological diversity is one of the priorities of the state environmental policy and is implemented through different mechanisms. In its updated NDC 2021, Uzbekistan increased its climate ambition by reducing specific GHG emissions per unit of GDP by 35 percent until 2030 (see section 4.1.2 for more details).

4.2 Assessing the "greenness" of national policies

The co-occurrence coefficients or c-coefficients were used to measure the greenness of the national policies. Table 12 presents the c-coefficients for the four green growth dimensions in Azerbaijan and the CA countries, except for Turkmenistan. Due to a lack of data for this country (see section 4.3 and Annex 3), no scores were computed for three dimensions, including efficient and sustainable resource use, green economic opportunities, and social inclusion. Among the four dimensions, Azerbaijan's c-coefficients for efficient and sustainable resource use (0.06) and natural capital protection (0.07) are much lower than those in the four CA countries. Uzbekistan's national policies, with c-coefficients of 0.22 for efficient and sustainable resource use and 0.23 for natural capital protection, are the greenest as far as these dimensions are concerned. For social inclusion, Azerbaijan has a higher c-coefficient than Uzbekistan and Kazakhstan, albeit the value is low at 0.09. Kyrgyz Republic has the highest coefficient of 0.22 for social inclusion. Azerbaijan performs best in green economic opportunities with a c-coefficient of 0.12, which is at par with Kazakhstan and slightly higher than Uzbekistan and Tajikistan. Kyrgyz Republic has the highest green economic opportunities c-coefficient among the CA countries, with a value of 0.14. ***Overall, the national policies across the countries are the least green (and inclusive) as far as green economic opportunities and social inclusion are concerned.***

Table 12 Co-occurrence coefficients of the national policies by dimension in Azerbaijan and the CA countries

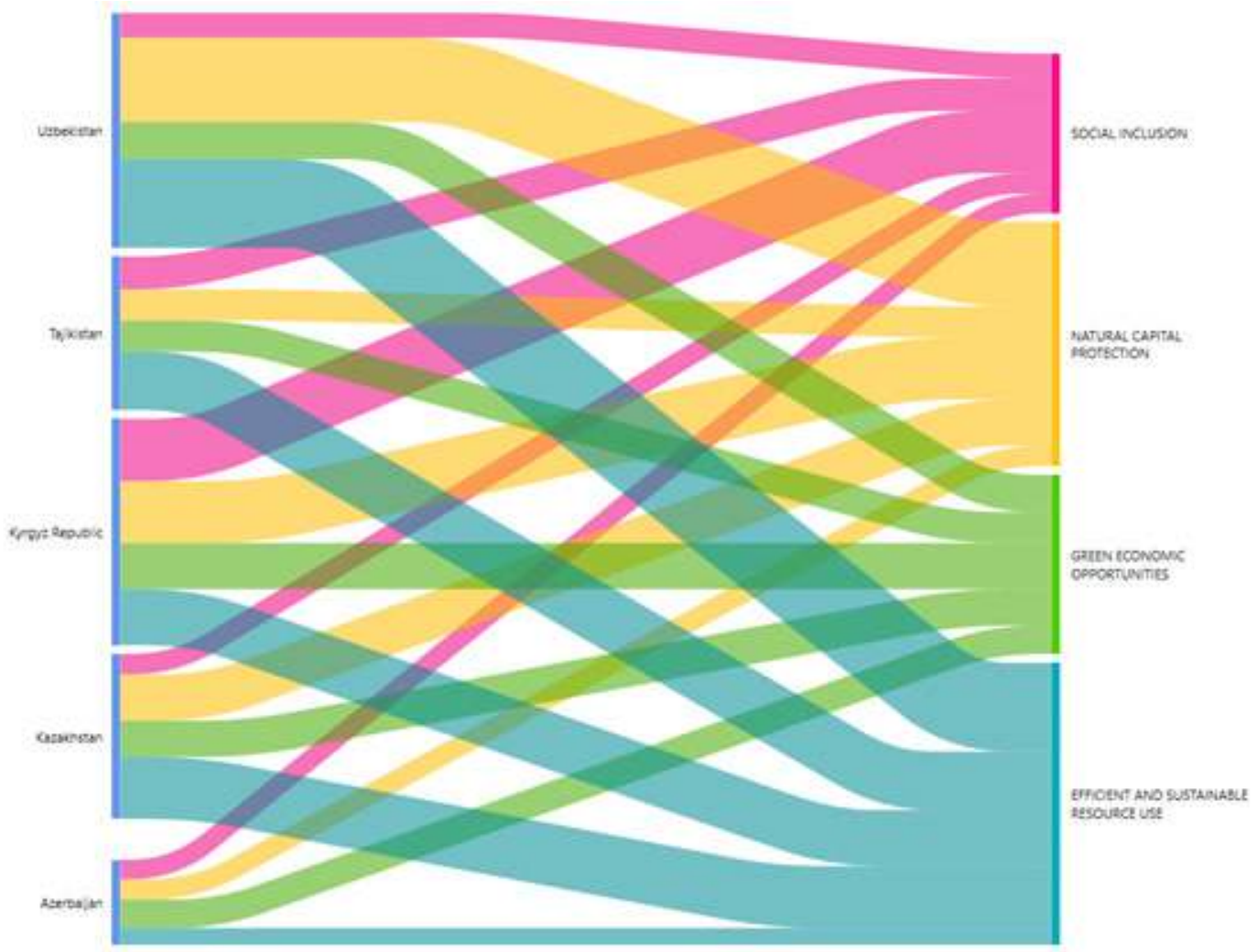
	Azerbaijan	Kazakhstan	Kyrgyz Republic	Tajikistan	Uzbekistan
EFFICIENT AND SUSTAINABLE RESOURCE USE	0.06	0.17	0.13	0.13	0.22
GREEN ECONOMIC OPPORTUNITIES	0.12	0.12	0.14	0.14	0.11
NATURAL CAPITAL PROTECTION	0.07	0.13	0.17	0.17	0.23
SOCIAL INCLUSION	0.09	0.07	0.22	0.11	0.07

Note: The coefficients measure the strength of the relationship between the codes, where a higher value indicates that more reference was made to green growth indicators in a particular dimension in the country's national policies. Turkmenistan was excluded from the assessment because it only has a dimension score only for natural capital protection.

Source: Authors own.

The Sankey diagram provides another perspective on the connections between the green growth dimensions and the countries' national policies (Figure 19). **Azerbaijan's national policies show the least connection to the four green growth dimensions, indicating they are the least green.** Although their priorities vary, Uzbekistan and Kyrgyz Republic have the longest edges and the greenest national policies. Uzbekistan's policies are heavily oriented toward natural capital protection and efficient and sustainable resource use. In contrast, the Kyrgyz Republic provides almost equal importance to all four green growth dimensions. Kazakhstan and Tajikistan emphasize efficient and sustainable resource use in their national policies. The degree of connections of this dimension to the national policies is almost equal to that of the Kyrgyz Republic. The Sankey diagram further confirms the less important attention to green economic opportunities and social inclusion in national policies. The contributions of each policy document to greening national policies in each country are discussed below.

Figure 19. Sankey visualization of connections between national policies and green growth dimension in Azerbaijan and the CA countries



Source: Authors own.

4.2.1 Azerbaijan

Table 13 presents the relative frequencies of the green growth indicators in Azerbaijan's four national policies. [ix] Among these four policy documents, the Roadmap beyond 2025 is the greenest with 114 coded data (Table) and thus the most prominent Sankey edge (Figure 20).

With a relative frequency of 53.17 percent, the emphasis of this document is on green economic opportunities. The Sankey in Figure 20 shows that issues relating to green innovation and employment indicators are emphasized most in Azerbaijan's Roadmap beyond 2025. In particular, the Sankey edge for green innovation is the largest in the Roadmap beyond 2025 compared to the other three policy

documents. An example of codes for green innovation in the Roadmap beyond 2025 is as follows:

"To better meet the needs of present and future generations, environmentally friendly green technologies must proliferate."

"…it is crucial that we deepen the development of the manufacturing industry to ensure the development of highly profitable science-intensive medium- and high-tech industries."

"AREAS OF MODERN INNOVATIONS … Within the context of the revolutionary, technological transformations observed in the world economy … A promising life will be characterized by deep digitalization, the active introduction of new technologies, and the rapid development of the most modern areas without the use of human labor."

The lack of importance of natural capital protection indicators in Azerbaijan's Roadmap 2025, with relative frequencies of only 2.38 percent, is somehow compensated by focusing on them in the NBSAP 2016 (Table 13). The relative frequencies of natural capital protection in this policy document are as high as 82.69 percent, albeit out of the total coded data counts of only 47. Like the NBSAP 2016, the NDC 2017 also gives importance to national capital protection indicators with relative frequencies of 52.49 percent. As a result, the national capital protection garnered the highest average relative frequencies of 35.69 percent vis-à-vis other dimensions. GHG emissions reduction, which is the focus of NDCs, is one of the indicators in this dimension. But the NDC 2017 also has a few codes related to biodiversity and ecosystem protection, as exemplified in the following:

"The Armenia-Azerbaijan conflict … inflicted heavy damage on the environment of Azerbaijan. 1.7 million hectares of land …, including 13197.5 hectares of rare and valuable forests, …"

"Land Use, Land-Use Change, and Forestry (LULUCF) sector… Plant new forest areas, water and land protecting forest strips (windbreaks), urban and roadside greenery…"

The NBSAP 2016 focuses mainly on biodiversity and ecosystem protection, and cultural and social values, as shown in Sankey (Figure 20). Environmental quality is not given importance in the NBSAP 2016 and other national policy documents, making its indicators the least important in the natural capital protection dimension. Other green growth indicators least referred to in Azerbaijan's national policy documents include material use efficiency and efficient and sustainable water use in the efficient and sustainable resource use dimension, green investment in the green economic opportunities dimension, and gender balance in the social inclusion dimension.

Table 13. Relative frequencies of the green growth indicators in national policies by dimension, Azerbaijan

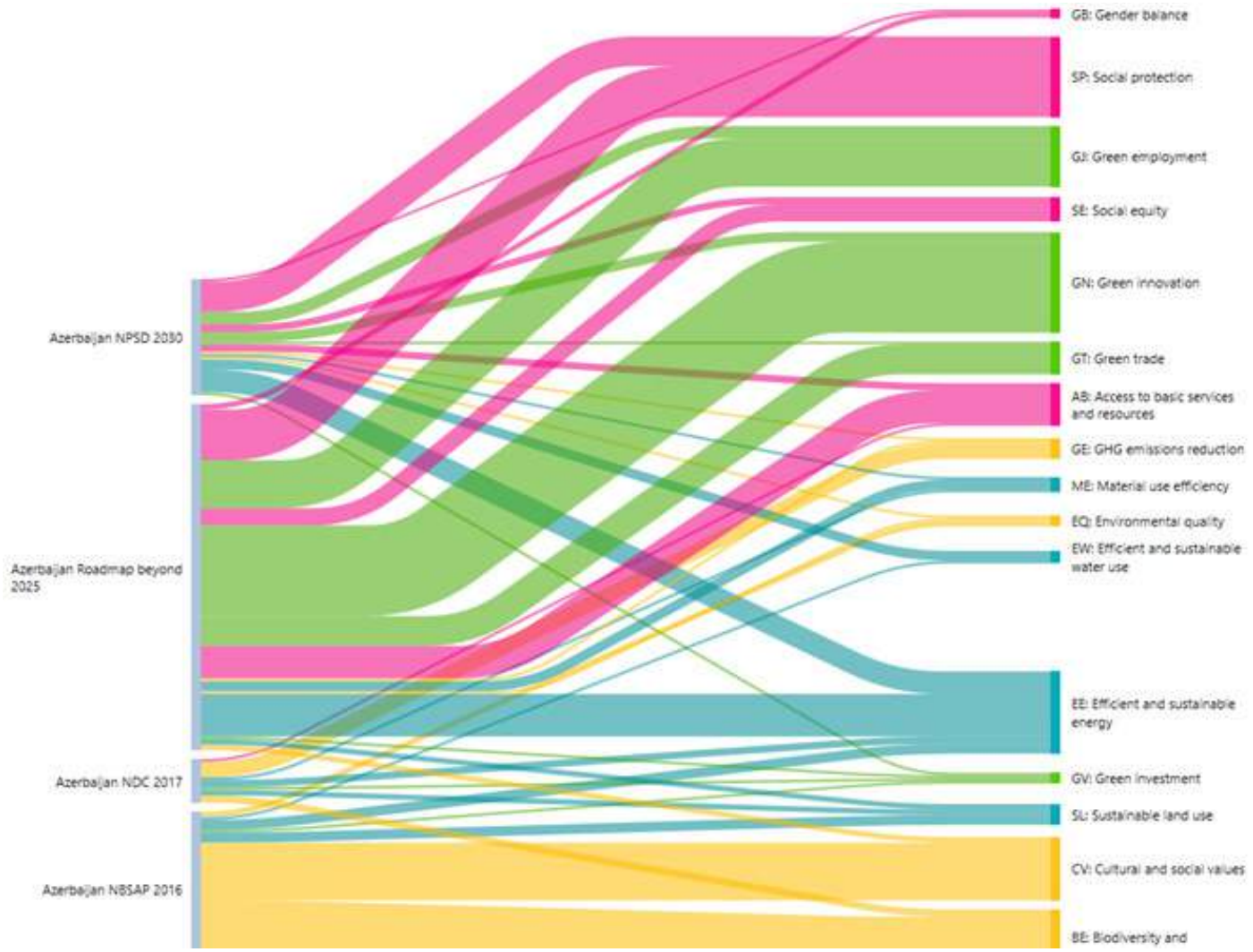
	1: Azerbaijan NPSD 2030 (39)	4: Azerbaijan NBSAP 2016 (47)	13: Azerbaijan Roadmap beyond 2025 (114)	44: Azerbaijan NDC 2017 (14)	Totals
EFFICIENT AND SUSTAINABLE RESOURCE USE (781)	28.57%	15.38%	15.87%	35.29%	23.78%
GREEN ECONOMIC OPPORTUNITIES (495)	23.81%	1.92%	53.17%	52.94%	21.20%
NATURAL CAPITAL PROTECTION (676)	4.76%	82.69%	2.38%	52.94%	35.63%
SOCIAL INCLUSION (441)	42.86%		28.57%	5.88%	19.33%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

Notes: NPSD refers to National Priorities for Socio-Economic Development for the year 2030; NBSAP refers to the National Strategy on Conservation and Sustainable Use of Biodiversity for 2017-2020 that was published in 2016; Roadmap refers to the Strategic Roadmap for the Perspective of the National Economy including the economic development strategy and action plan until 2020, the long-term vision for the period until 2025, and the target vision for the period after 2025; and NDC refers to the Nationally Determined Contribution that was published in 2017.

Legend: (") refers to the counts of the coded data, where those on the first column are the total counts for all countries for each dimension, and on the first row are the counts for each national policy document for Azerbaijan. For example, out of the 781 coded data for efficient and sustainable resources for all countries, 39 are found in Azerbaijan's NPSD 2030. The Totals on the columns refer to the sum of the counts' relative frequencies for each national policy document for Azerbaijan, and rows refer to the average of the counts' relative frequencies for Azerbaijan's national policies for each dimension.

Source: Authors own.

Figure 20. Sankey visualization of connections between national policies and green growth pillars, Azerbaijan



Source: Authors own.

4.2.2 Kazakhstan

Table 14 presents the relative frequencies of the green growth indicators in Kazakhstan's four national policies.[x] The NBSAP 2014 is the greenest among them, with 165 coded data. Unlike Azerbaijan's NBSAP emphasizing natural capital protection, Kazakhstan's NBSAP provides relative frequencies of only 50.52 percent for this dimension. The other dimension with high relative frequencies is efficient and sustainable resource use. The Sankey in Figure 21 shows that the NBSAP's connections to natural capital protection are mainly through the indicators of biodiversity and ecosystem services and cultural and social values, while connections to efficient and sustainable resource use are through efficient and sustainable water and land use. The 14.95 percent relative frequencies for green economic opportunities in the NBSAP 2014 connect mainly to green investment. Comparing Kazakhstan with Azerbaijan, the NBSAP of the former has a more significant connection to green investment than the latter (Figure 20 and Figure 21). Below are examples of green investment codes for Kazakhstan:

> *" The development of the private forest fund should be considered as the implicit achievement."*

> *"The positive changes occurred in the forest fund of the country during the reporting period from 1 January 2008 to 1 January 2013. The total area of the State Forest Fund increased by 10,4 thousand ha (3,5%)."*

> *"Established Kazakhstan's Fund for Conservation of Biodiversity (including all its statutory and regulatory documents), which is the first specialized non-governmental environmental Fund not only for Kazakhstan but also for the CIS countries. It must create a mechanism of additional financing for projects aimed at biodiversity conservation through providing grants to legal entities."*

[x] These are: the Strategic Development Plan until 2025 (SDP 2025), the Vision for transition to Green Economy to support the Strategy Kazakhstan 2050 (Green Economy 2050), Fifth National Report for the National Biodiversity Strategy and Action Plan published in 2014 (NBSAP 2014), and the Nationally Determined Contribution that was published in 2016 (NDC 2016)

"At the national level, in accordance with existing state programs, there has been a steady increase of the funds spent on the conservation and sustainable use of biodiversity in recent years. … Investments in the Concept of transition to a "green economy" will be made to an average of 1% of GDP until 2050."

Among the CA countries, Kazakhstan has the most comprehensive NBSAP, emphasizing many pillars and covering all dimensions, including social inclusion. However, only a minimal connection to access to basic services and resources and social protection is in Kazakhstan's NBSAP, focusing mainly on food security and health safety. Among Kazakhstan's four policy documents, SDP 2025 emphasizes social inclusion with relative frequencies of 32.80 percent, particularly access to basic services and resources and social protection. Like in Azerbaijan, policy documents in Kazakhstan have a minimal connection to gender balance. Nonetheless, in the SDP 2025, Kazakhstan provides general but clear goals for gender balance, such as follows:

"The gender policy of Kazakhstan will be focused on achieving parity rights, benefits, duties and opportunities for men and women in all spheres of society, as well as on overcoming all forms and manifestations of gender discrimination."

"Initiative 6.13 Improvement of legislation in the sphere of family and gender policy… legislation will be improved in ensuring equal rights and opportunities for men and women in the field of family relations ... and combating all forms of gender-based discrimination and violence."

"Initiative 6.14 Strengthening the institution of gender equality through state regulation and the introduction of gender impact assessment into the system of state and budget planning. An authorized body will be identified to manage intersectoral coordination in gender policy. …"

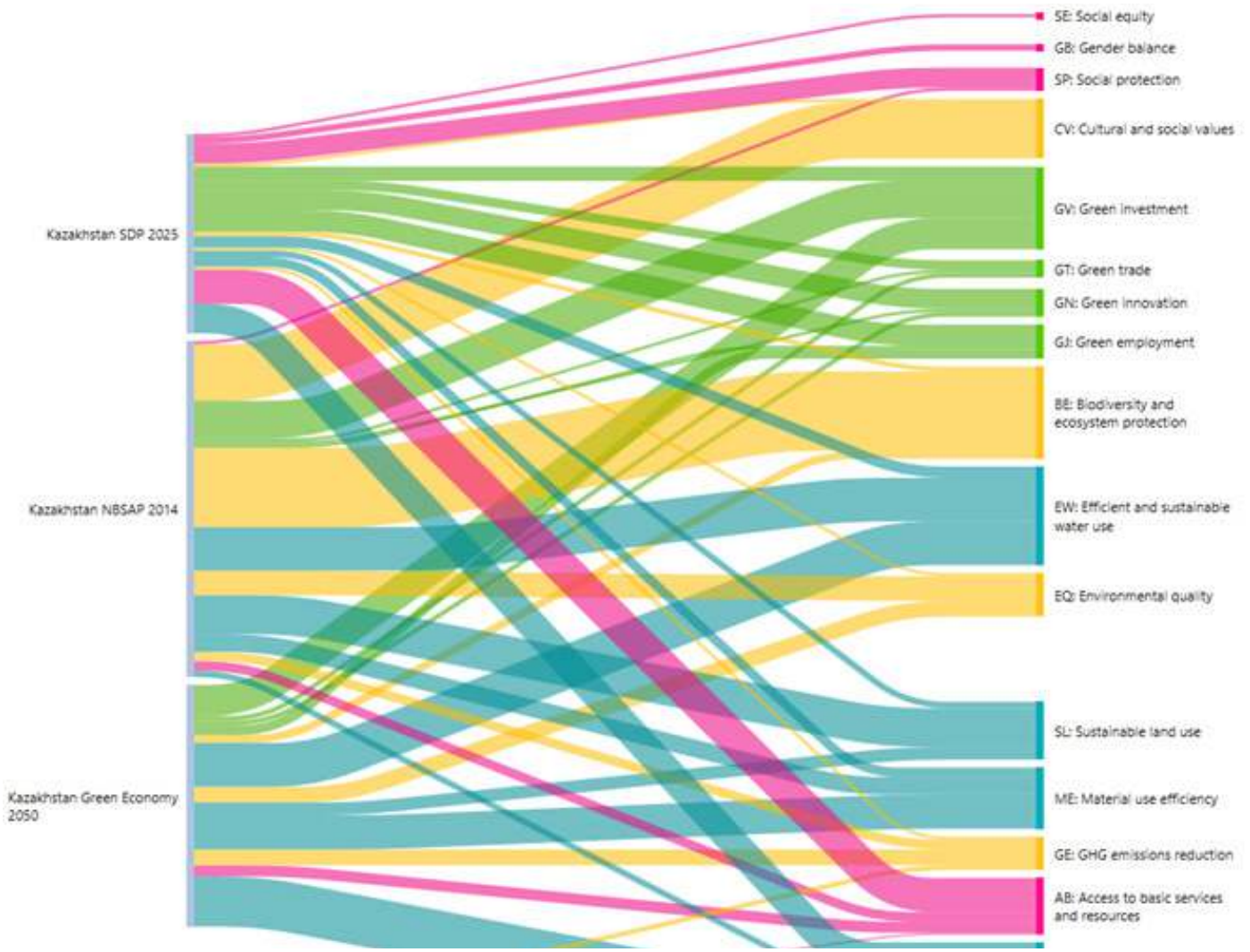
With 123 coded data, Kazakhstan's Green Economy 2050 is also very green. In contrast to Azerbaijan, which considers green growth as one of its five national priorities for socio-economic development in its Strategic Roadmap for the Perspective of the National Economy (section 3.1.1 Policy contexts), Kazakhstan has a dedicated policy document to describe its green economy vision. Moreover, there is an apparent contrast between these two policy documents: Kazakhstan's Green Economy 2050 provides emphasis on efficient and sustainable resource use with relative frequencies of 57.78 percent (Table 14), while Azerbaijan's Roadmap beyond 2025 focuses on green economic opportunities with relative frequencies of 53.17 percent (Table 13). The Green Economy 2050 has the most significant connections to the efficient and sustainable use of water and energy and the least connections to sustainable land use (Figure 21). The NDC 2016 also refers to the importance of efficient and sustainable energy. However, this policy document is the least green among the four, with only five coded data and thus limited connections to the green growth indicators.

Table 14. Relative frequencies of the green growth indicators in national policies by dimension, Kazakhstan

	30: Kazakhstan NBSAP 2014 (165)	31: Kazakhstan NDC 2016 (5)	32: Kazakhstan SDP 2025 (139)	33: Kazakhstan Green Economy 2050 (123)	Totals
EFFICIENT AND SUSTAINABLE RESOURCE USE (781)	30.41%	20.00%	28.00%	57.78%	34.05%
GREEN ECONOMIC OPPORTUNITIES (495)	19.95%		32.80%	22.22%	17.49%
NATURAL CAPITAL PROTECTION (676)	50.52%	60.00%	6.40%	14.81%	32.93%
SOCIAL INCLUSION (441)	4.12%	20.00%	32.80%	5.19%	15.53%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors own.

Figure 21. Sankey visualization of connections between national policies and green growth pillars, Kazakhstan



Source: Authors own.

4.2.3 Kyrgyz Republic

Table 15 presents the relative frequencies of the green growth indicators in Kyrgyz Republic's four national policies. [xi] With 263 coded data, Strategy 2040 accounts for the most significant counts of codes relating to green growth indicators. Across the four dimensions, relative frequencies show that no dimension is heavily emphasized, with counts greater than 50 percent. At the pillar level, the Sankey diagram reveals that Strategy 2040 is connected to all pillars, with efficient and sustainable energy and access to basic services and resources showing the most significant connections (Figure 22). Gender balance received the least attention in Strategy 2040. However, because gender balance has connections to the NDP 2026 and NDC 2021, albeit only insignificant, this pillar did not obtain the least number of codes. In contrast to Azerbaijan's NDC published in 2017, the updates on Kyrgyz Republic's NDC 2021 cover more issues related to green growth, including social inclusion. This aligns with other updated NDCs in Tajikistan and Uzbekistan. In the case of gender balance, the following information was coded from the Kyrgyz Republic's NDC 2021:

> *"The updated NDC will include integrated provisions facilitating the achievement of gender equality, … The Implementation Plan for the Updated NDC and the suggested adaptation and mitigation actions carry dual benefits and contribute to achieving the Sustainable Development Goals."*

> *"During the development of the NDC, the following issues were identified that need to be addressed: … the gender imbalance in the decision-making system on access to natural resources such as water, land, etc. at the level of local self-government structures."*

[xi] These are: the National Development Program until 2026 (NDP 2026), the National Development Strategy 2040 (Strategy 2040), the National Biodiversity Strategy and Action Plan that was published in 2016 (NBSAP 2016), and the Updated Nationally Determined Contribution that was published in 2021 (NDC 2021)

Although the NDP 2026 emphasizes social inclusion with relative frequencies of 41.78 percent, it also covers all green growth dimension pillars. Most pillars with a negligible emphasis in the NDP 2026 belong to natural capital protection, including GHG emissions reduction, biodiversity and ecosystem protection, and environmental quality. However, they receive emphasis either in the NDC 2021 or the NBSAP 2016. The latter heavily emphasizes natural capital protection, with a relative frequency of 71.43 percent. The Sankey shows that biodiversity and ecosystem protection, and cultural and social values are the pillars with the most considerable connections to the NBSAP 2016. Green investment is also considered a relevant issue in this policy document, notably to support biodiversity and ecosystem protection, as demonstrated in the following coded data:

"Objective 2.4. Mobilize financial resources: The current functioning of the control system in the field of biodiversity conservation is mainly funded by the budget. Funding for biodiversity conservation is carried out on leftovers. Allocated funds from the national and local budgets are insufficient."

"Key actions: make an inventory and assessment and expenditures for the conservation of biodiversity; ensure proper use of funds aimed at biodiversity and ecosystem conservation; develop new funding mechanisms for the conservation of biodiversity and establish a trust fund; develop mechanisms for the generation of funds from the use of biodiversity and ecosystem services."

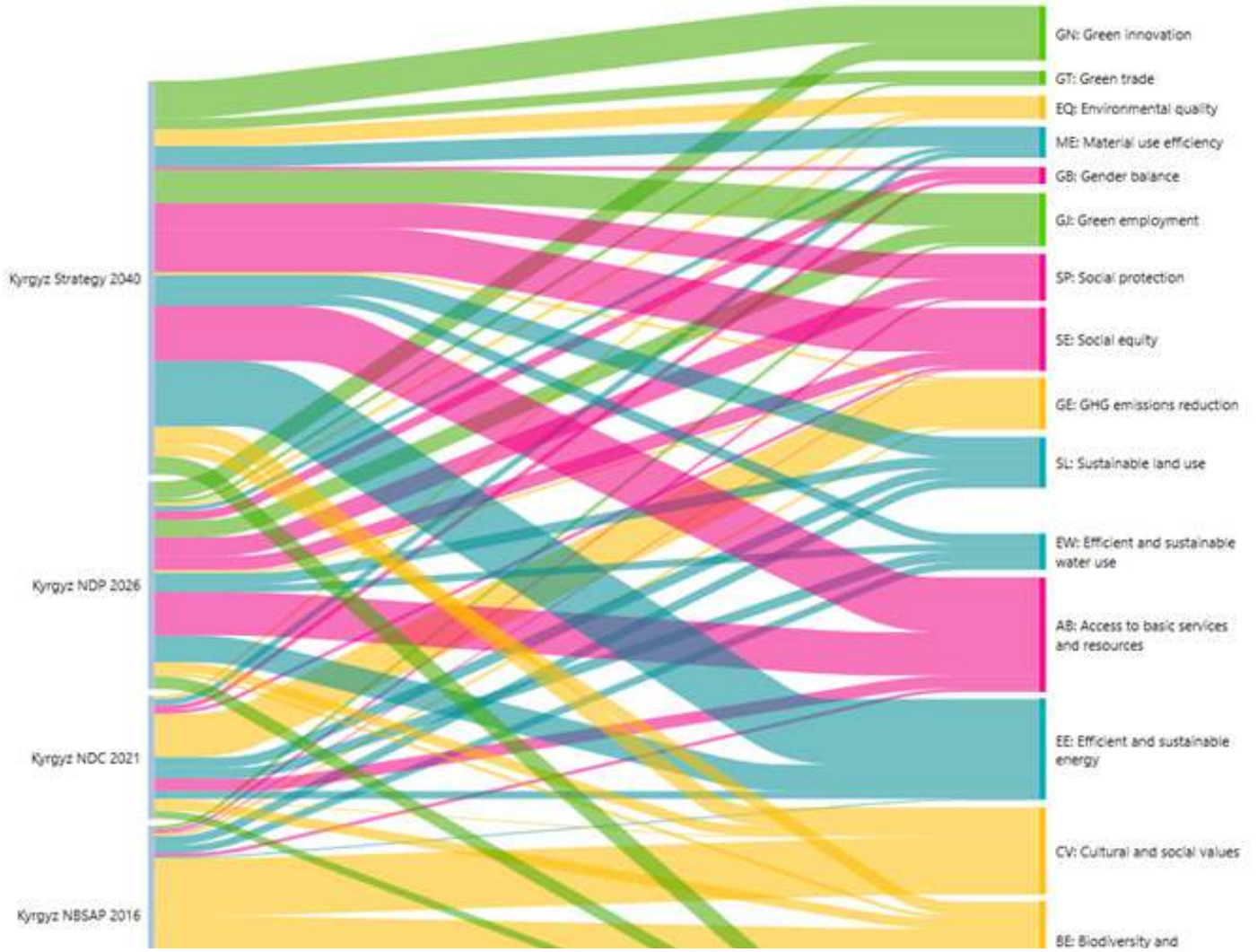
The relative frequencies of Kyrgyz Republic's national policies are relatively spread over the four green growth dimensions, except for the NBSAP 2016. As a result, the pillars are given sufficient emphasis across the different policy documents with very few exceptions, including gender balance and green trade.

Table 15. Relative frequencies of the green growth indicators in national policies by dimension, Kyrgyz Republic

	26: Kyrgyz Strategy 2040 (263)	27: Kyrgyz NBSAP 2016 (92)	28: Kyrgyz NDC 2021 (72)	29: Kyrgyz NDP 2050 (126)	Totals
EFFICIENT AND SUSTAINABLE RESOURCE USE (781)	30.47%	9.82%	27.91%	23.29%	22.87%
GREEN ECONOMIC OPPORTUNITIES (495)	24.37%	14.29%	6.98%	25.34%	17.74%
NATURAL CAPITAL PROTECTION (676)	12.90%	71.43%	47.67%	9.59%	35.40%
SOCIAL INCLUSION (441)	32.26%	4.46%	17.44%	41.78%	23.99%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors own.

Figure 22. Sankey visualization of connections between national policies and green growth pillars, Kyrgyz Republic



Source: Authors own.

4.2.4 Tajikistan

Table 16 presents the relative frequencies of the green growth indicators in Tajikistan's four national policies.[xii] The MTDP 2025 is the greenest of the four policy documents in Tajikistan, with 198 coded data related to the green growth indicators. Among the four dimensions, efficient and sustainable resource use and green economic opportunities, with relative frequencies aof 39.89 percent and 31.15 percent, are provided the highest emphasis in the MTDP 2025. The Sankey shows that efficient and sustainable energy, material use efficiency, and green employment are most connected to this policy document (Figure 23). Tajikistan provides more emphasis on material use efficiency as compared to Azerbaijan and other CA countries.

"Measures have been successfully implemented to modernize the infrastructure for water supply, sewerage, and solid waste disposal, and the country is installing and rehabilitating the energy supply and outdoor lighting infrastructure."

"New sources of strengthening the country's export potential are industries in which the country has a relative advantage and possibility of producing competitive end products based on local raw materials and resources."

"Main activities (lines of activity) to achieve … development of the building materials industry and the construction of high-rise buildings in urban and rural areas to reduce the cost of housing, use energy-saving technologies in the production of building materials, improve the efficiency of building technologies that meet modern urban and environmental requirements; …"

[xii] These are: the Medium-term Development Program for 2021-2025 (MTDP 2025), the National Development Strategy for the period up to 2030 (Strategy 2030), the National Strategy and the Conservation Action Plan Biodiversity that was published in 2016 (NBSAP 2016), and the Updated Nationally Determined Contribution that was published in 2021 (NDC 2021)

While social inclusion is only the third most important dimension in the MTDP 2025, it is the first in the Strategy 2030 with relative frequencies of 45.24 percent. Strategy 2030 covers all four social inclusion pillars but with slightly larger connections to access to basic services and resources. It also gives significant importance to efficient and sustainable resource use with relative frequencies of 30.95 percent, with a particular focus on efficient and sustainable energy. This green growth pillar has the most considerable Sankey edge because all four policy documents, including the NBSAP 2016, show connections to it. Among the efficient and sustainable resource use pillars, sustainable land use has the most significant connections to the NBSAP 2016. As a result, after efficient and sustainable energy, issues related to sustainable land use indicators are the most coded data in Tajikistan's policy documents. Examples of coded data for sustainable land use in the NBSAP 2016 are as follows:

"Other factors affecting biodiversity degradation are various types of land degradation (soil erosion, salinization, pollution, loss of soil organic matter, etc.) that contribute to further degradation of biodiversity by causing landslides (destroying villages, roads and land, as well as watering and irrigation systems)."

"Based on current experience, new farmers and land users are generally unaware of environmentally sustainable approaches and agricultural practices or environmental safety for biodiversity conservation. The population may not anticipate the possible negative effects (e.g., on the soil) associated with the agricultural practices used …. This poses some risk to the environment and can cause adverse changes in land quality, including soil erosion, reduced soil organic matter, land degradation and biodiversity."

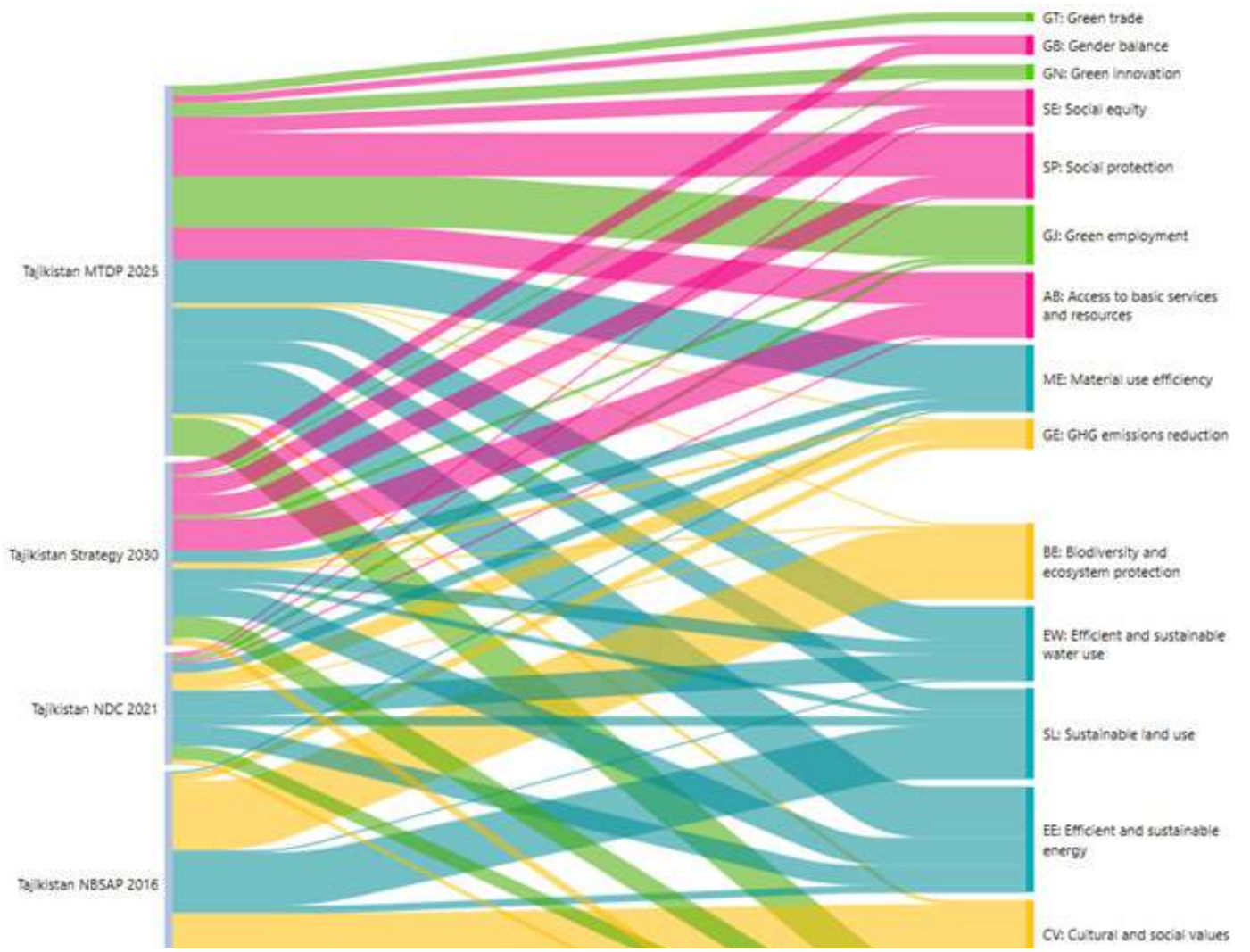
The NBSAP 2016 links sustainable land use with biodiversity conservation so that natural capital protection remains its focus, with relative frequencies of 62.50 percent for this dimension. The relative frequencies of efficient and sustainable resource use in the NDC 2021 are high for efficient and sustainable resource use at 56.60 percent but with only limited connections to sustainable land use. Efficient and sustainable energy and water use are the focus of the NDC 2021. This updated NDC covers all green growth dimensions, including social inclusion. Overall, Tajikistan's policy documents have good coverage of the green growth pillars, except for NBSAP 2016, which excludes social inclusion. Social inclusion tends to be neglected in NBSAPs, not only in Tajikistan but also in Azerbaijan and Uzbekistan.

Table 16. Relative frequencies of the green growth indicators in national policies by dimension, Tajikistan

	34: Tajikistan MTDP 2025 198	34: Tajikistan NBSAP 2016 108	36: Tajikistan Strategy 2030 93	37: Tajikistan NDC 2021 50	Totals
EFFICIENT AND SUSTAINABLE RESOURCE USE 781	39.89%	31.73%	30.95%	56.60%	39.79%
GREEN ECONOMIC OPPORTUNITIES 495	31.15%	5.77%	16.67%	16.98%	17.64%
NATURAL CAPITAL PROTECTION 676	2.19%	62.50%	7.14%	20.75%	23.15%
SOCIAL INCLUSION 441	26.78%		45.24%	5.66%	19.42%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors own.

Figure 23. Sankey visualization of connections between national policies and green growth pillars, Tajikistan



Source: Authors own.

4.2.5 Uzbekistan

Table 17 presents the relative frequencies of the green growth indicators in Uzbekistan's four national policies.[xiii] Strategy 2026 is the greenest of the four national policy documents, with 468 coded data relating to the green growth indicators. At the dimension level, efficient and sustainable resource use receives the most significant attention in Strategy 2026, with a relative frequency of 41.25 percent. At the pillar level, efficient and sustainable energy is most connected to this policy document (Figure 24). Only Strategy 2026 covers all the green growth pillars. The development of Strategy 2026, which was published in 2022, appeared to have been guided by the Green Economy 2030, published in 2019. In the coded data for efficient and sustainable energy, for example, the issue of energy efficiency is linked to the green economy context:

"Goal 24: Uninterrupted electricity supply to the economy and active introduction of "Green Economy" technologies to all sectors, increasing the economy's energy efficiency by 20%."

"Taking into account the increase in the share of the private sector in the energy sector: By 2022, increase the power generation capacity to 16,400 megawatts… Decommissioning of old power units with a total capacity of 590 megawatts in 2022; introduction of modern "green" and energy-efficient technologies for the rapid development of electricity production capacities."

"… transition to a "green economy" to reduce losses in industrial sectors and increase the efficiency of resource use, a decision on the creation of a program to ensure … energy efficiency and a system of encouraging the production and use of electric cars."

[xiii] These are: the Strategy for the Transition to A "Green" Economy for the Period 2019-2030 (Green Economy 2030), the Development Strategy of New Uzbekistan for 2022-2026 (Strategy 2026), Fifth National Report on the Conservation of Biodiversity that was published in 2015 (NBSAP 2015), and the updated Nationally Determined Contribution that was published in 2021 (NDC 2021)

The Green Economy 2030 has the most minor counts of coded data among the four policy documents considered in this study. Like Strategy 2026, the Green Economy 2030 provides the most significant emphasis on efficient and sustainable resource use with relative frequencies of 51.92 percent, particularly efficient and sustainable energy. Several green growth pillars are not covered in the Green Economy 2030, including cultural and social values and environmental quality, gender balance, green trade, and social protection. Among the different pillars, social protection has the least connections to the policy documents in Uzbekistan. Uzbekistan places the least emphasis on this pillar compared to Azerbaijan and other CA countries. In Uzbekistan, social protection was only mentioned in one of the four policy documents, specifically the Strategy 2026. Examples of coded for social protection in this policy document are as follows:

"Expanding access to mandatory social guarantees, including types of social protection, due to the digitization of the sector, introducing the principles of openness and transparency into this process."

"… increasing the role of the public in reducing the shadow economy; carrying out propaganda work on ensuring social protection among the population employed in the informal sector; …"

"Development and approval of the national strategy for social protection of the population. In doing so, keep the following in mind: designation of a state body for conducting a unified state policy in the field of social protection; creation of a social insurance system, including the establishment of a social insurance fund; provision of social assistance and services to low-income families based on a social contract; Creation of a separate database on women, young people and persons with disabilities in need of assistance in the information system of the "Social Protection Single Register", …"

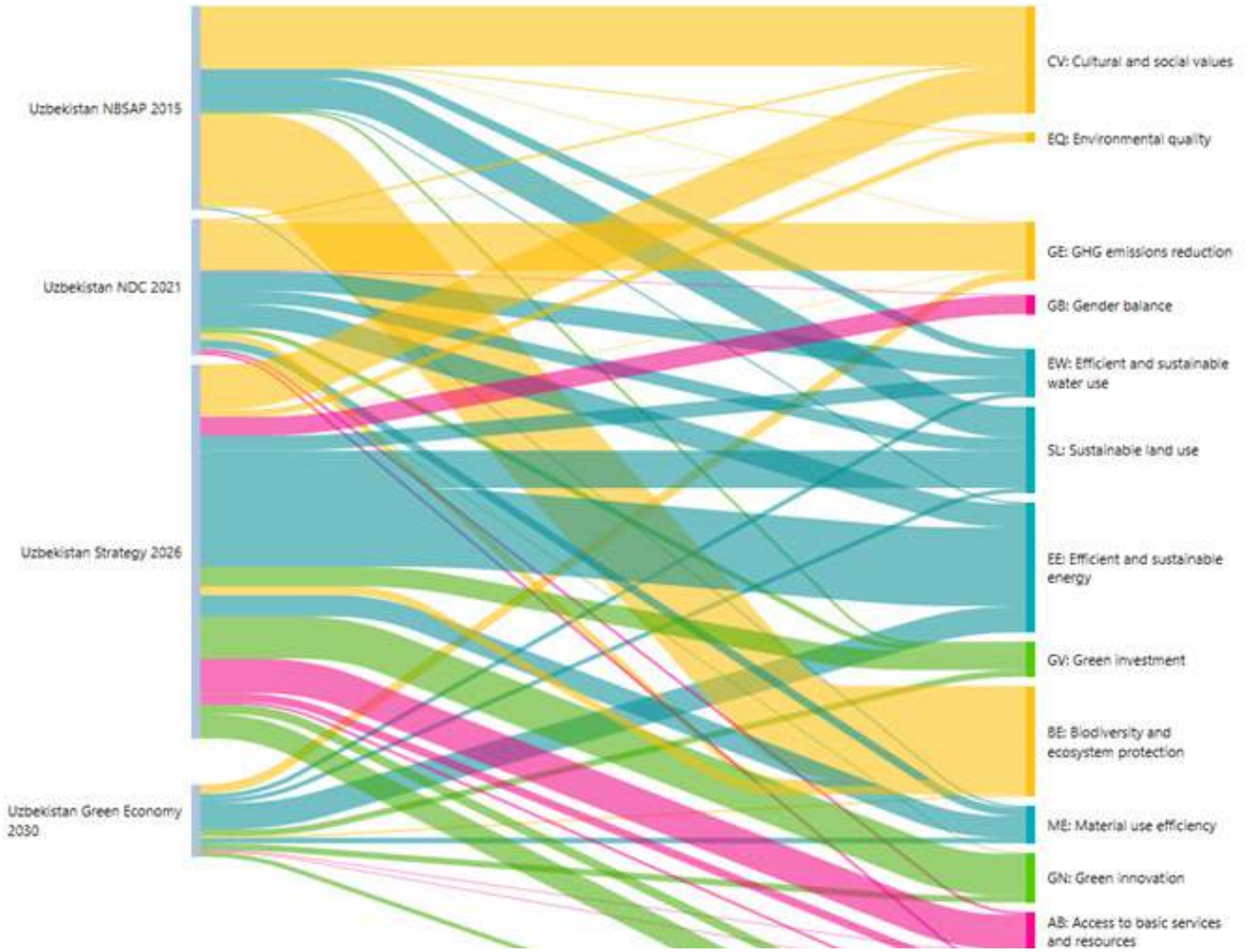
Like Azerbaijan and Tajikistan, Uzbekistan's NBSAP has no coded data on social inclusion. The NBSAP 2015 focuses mainly on natural capital protection with relative frequencies of 72.96 percent, connecting primarily to biodiversity and ecosystem protection and cultural and social values. Its links to efficient and sustainable resource use, with relative frequencies of 25.16 percent, are mainly through sustainable land use. While significantly emphasizing natural capital protection and efficient and sustainable resource use, the updated NDC 2021 does not entirely exclude the other pillars. It has some connections, albeit only minimal, to access to basic services, gender balance, and social equity in the social inclusion dimension, and green innovation and green investment in the green economic opportunities dimension.

Table 17. Relative frequencies of the green growth indicators in national policies by dimension, Uzbekistan

	1: Uzbekistan Green Economy2030 (33)	4: Uzbekistan NBSAP 2015 (154)	13: Uzbekistan NDC 2021 (93)	44: Uzbekistan Strategy 2026 (50)	Totals
EFFICIENT AND SUSTAINABLE RESOURCE USE (781)	51.92%	25.16%	39.22%	41.25%	39.39%
GREEN ECONOMIC OPPORTUNITIES (495)	23.08%	1.89%	5.88%	24.33%	13.79%
NATURAL CAPITAL PROTECTION (676)	21.15%	72.96%	48.04%	16.9%	39.77%
SOCIAL INCLUSION (441)	3.85%		6.86%	17.5%	7.05%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Authors own.

Figure 24. Sankey visualization of connections between national policies and green growth pillars, Uzbekistan



Source: Authors own.

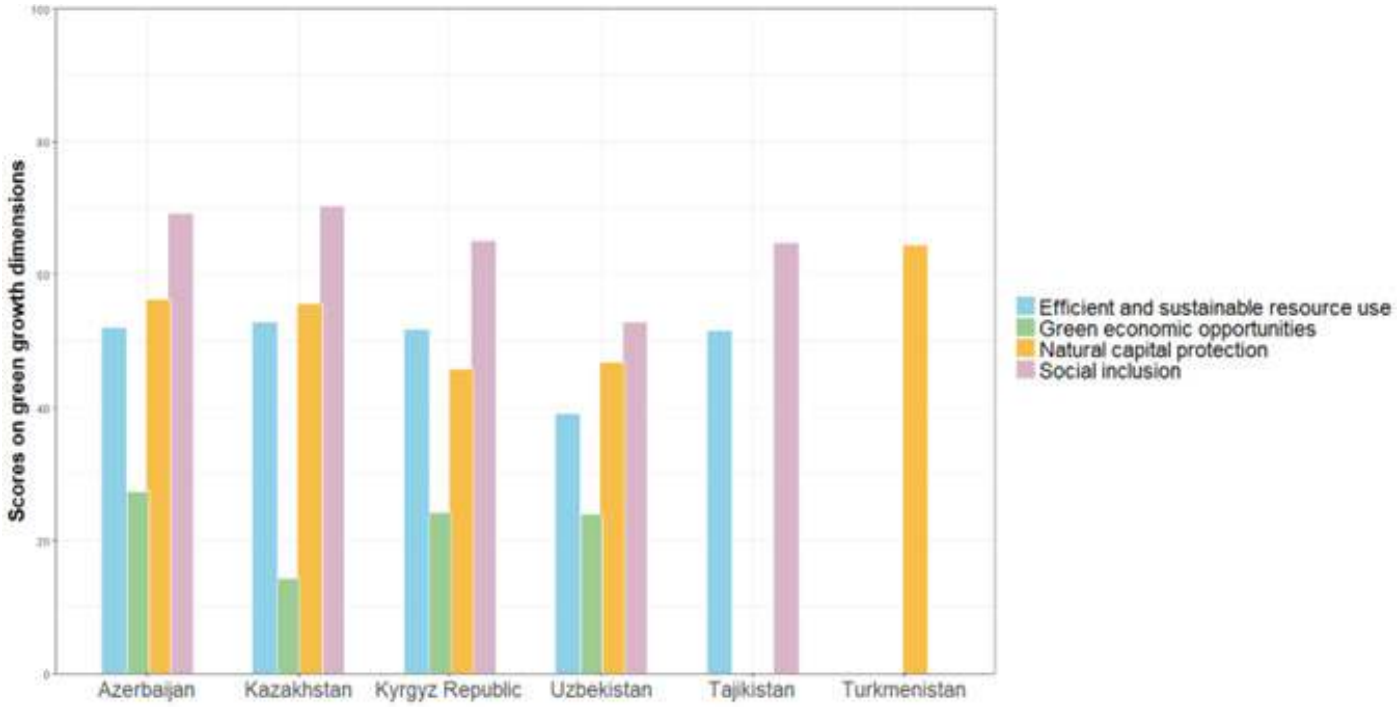
4.3 Comparing green and inclusive growth performance

4.3.1 Green growth dimensions

Azerbaijan's dimension scores (section 3.3.2 Performance in green and inclusive growth) are compared with the CA countries. Performance is comparable to Kazakhstan's, except for green economic opportunities, where the former performs better (Figure 25). Due to a lack of data, Tajikistan has available scores only for efficient and sustainable resource use and social inclusion, and Turkmenistan only for natural capital protection. Social inclusion scores are highest among the four dimensions for all countries, with Kazakhstan and Azerbaijan performing best while Uzbekistan performing lowest in this dimension in 2021. Comparing the social inclusion indicators for which Turkmenistan has available data (Annex 4), this country appears to have better scores than Uzbekistan overall.

In contrast to the Kyrgyz Republic, the scores in natural capital protection are higher than efficient and sustainable resource use in Azerbaijan, Kazakhstan, and Uzbekistan. Turkmenistan shows, however, the highest scores in natural capital protection. Among the four dimensions, performance in green economic opportunities is lowest for countries with scores for this dimension, including Azerbaijan, Kazakhstan, Kyrgyz Republic, and Uzbekistan. Looking at the indicators with available data for green economic opportunities, the same pattern could be expected for Tajikistan and Turkmenistan. ***The results show that, like Azerbaijan, the most significant prospects to improve green growth performance in the CA countries are in creating green economic opportunities, including green investment, innovation, employment, and trade.*** This situation can be observed in these countries and the rest of the world, where green economic opportunities scores are lowest from 2010 to 2022. [217]

Figure 25. Comparison of green growth performance of Azerbaijan and CA countries at the dimension and Index levels, 2021

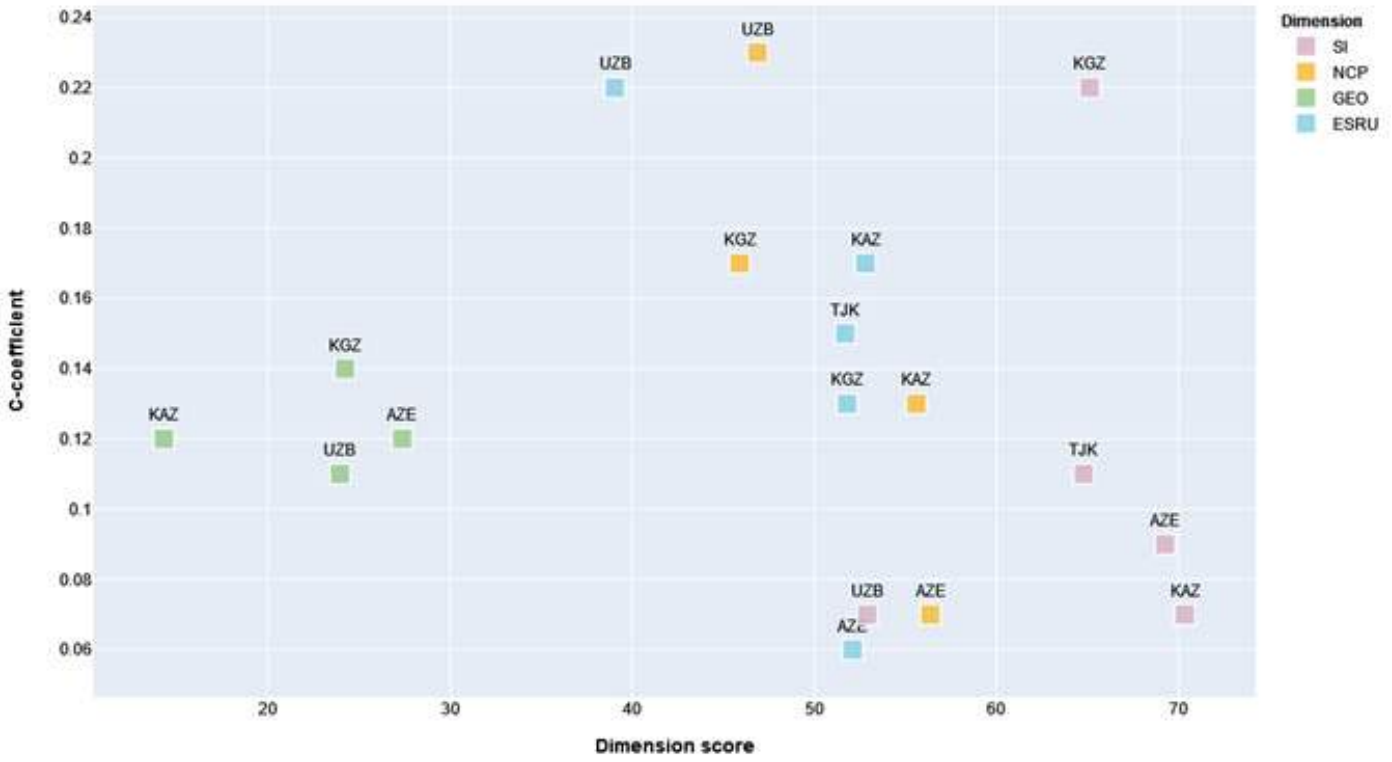


Source: Authors own.

Figure 26 presents the scatter plot between the c-coefficients (Table 12) and dimension scores (Figure 25) for Azerbaijan and the CA countries. A unique structure can be observed from the distribution of the coefficients and scores of the dimensions. First, for green economic opportunities, they gather at the lower part, indicating that more insufficient emphasis in the policy documents tends to result in lower dimension scores for Azerbaijan and CA countries, including Kazakhstan, Kyrgyz Republic, and Uzbekistan. Providing an additional focus on green economic opportunities in policy documents and tracking changes in indicators' scores when implementing policies could help improve performance in this dimension, for which Azerbaijan and the CA countries have the lowest scores. Second, for social inclusion, they tend to show inverse relationships so that the dimension scores are high, although the c-coefficients are low. This implies that the countries show high performance in social inclusion, although its green growth indicators are not emphasized in the policy documents, except for the Kyrgyz Republic. The latter country shows high values for both c-coefficients and dimension scores. Overall, the social inclusion scatter plot indicates that most countries' policy documents are shifting focus from socio-economic to environmental issues such as resource protection and sustainability. The shift could be explained by global commitments to environmental sustainability and improvement in social conditions in Azerbaijan and most CA countries. For example, income inequality in the Kyrgyz Republic, Tajikistan, and Kazakhstan has become at par with the EU economies.

Uzbekistan has the lowest c-coefficient and score for social inclusion, which indicates the need to continue emphasizing social inclusion indicators in its policies to improve performance in this dimension. And third, no specific structure can be discerned for efficient and sustainable resource use and natural capital protection, with the c-coefficients and scores showing somewhat random relationships for the different countries. For example, Azerbaijan's dimension scores are relatively high, between 50 and 60, although its coefficients are below 0.08. In contrast, Uzbekistan's scores for these dimensions are only moderate at around 40, although its c-coefficients are highest with at least 0.22. For the remaining countries, the c-coefficients and scores tend to gather in the middle of the scatter plot. Regardless of the emphasis on efficient and sustainable resource use and natural capital protection in policy documents, including the NBSAPs and NDCs, the dimension scores tend to be comparable across countries between 45 and 56. Although an exception from this trend is Uzbekistan's efficient and sustainable resources use score below 40. ***With governments updating their NBSAPs and NDCs to enhance environmental coverage and targets as well as re-orienting national development plans and strategies to green economy to meet their commitments to the SDG, Paris Climate, and Biodiversity Targets, the dimension scores for efficient and sustainable resource use and natural capital protection are expected to improve in the future.***

Figure 26. Scatter plot of the c-coefficients and dimension scores of Azerbaijan and CA countries, 2021



Notes: AZE – Azerbaijan, KAZ – Kazakhstan, KGZ – Kyrgyz Republic, TJK – Tajikistan, and UZB - Uzbekistan
ESRU – efficient and sustainable resource use, GEO – green economic opportunities, NCP – natural capital protection, SI – social inclusion
Source: Authors own.

4.3.2 Sustainability pillars

The circular diagrams in Figure 27, showing the distance of the pillars to the top-performing countries, provide further details on the green growth performances of Azerbaijan and the CA countries in 2021. A score of 100 implies that the performance is aligned with the average score of the five top-performing countries (section 3.2 Indicators for green and inclusive growth). In the center of the diagrams are the Green Growth Index scores. No score was computed for Tajikistan and Turkmenistan due to a lack of aggregated scores for at least one of the dimensions (Figure 25). With a score of 48.58, Azerbaijan performs better than any of the CA countries. However, this score is only half the score of global top-performing countries. Social equity and access to basic services and resources are the two pillars contributing most to this moderate green growth performance in Azerbaijan. The CA countries, except for Uzbekistan, also have a very high score of above 90 in social equity. All CA countries have lower scores in access to basic services and resources than Azerbaijan. However, the former performs relatively better than the latter regarding gender balance. ***Opportunities for Azerbaijan and CA countries to further improve performance in social inclusion will be in gender balance and social protection. Among the social inclusion pillars, however, gender balance is the least emphasized in the policy documents in all countries*** (Figure 19-Figure 24).

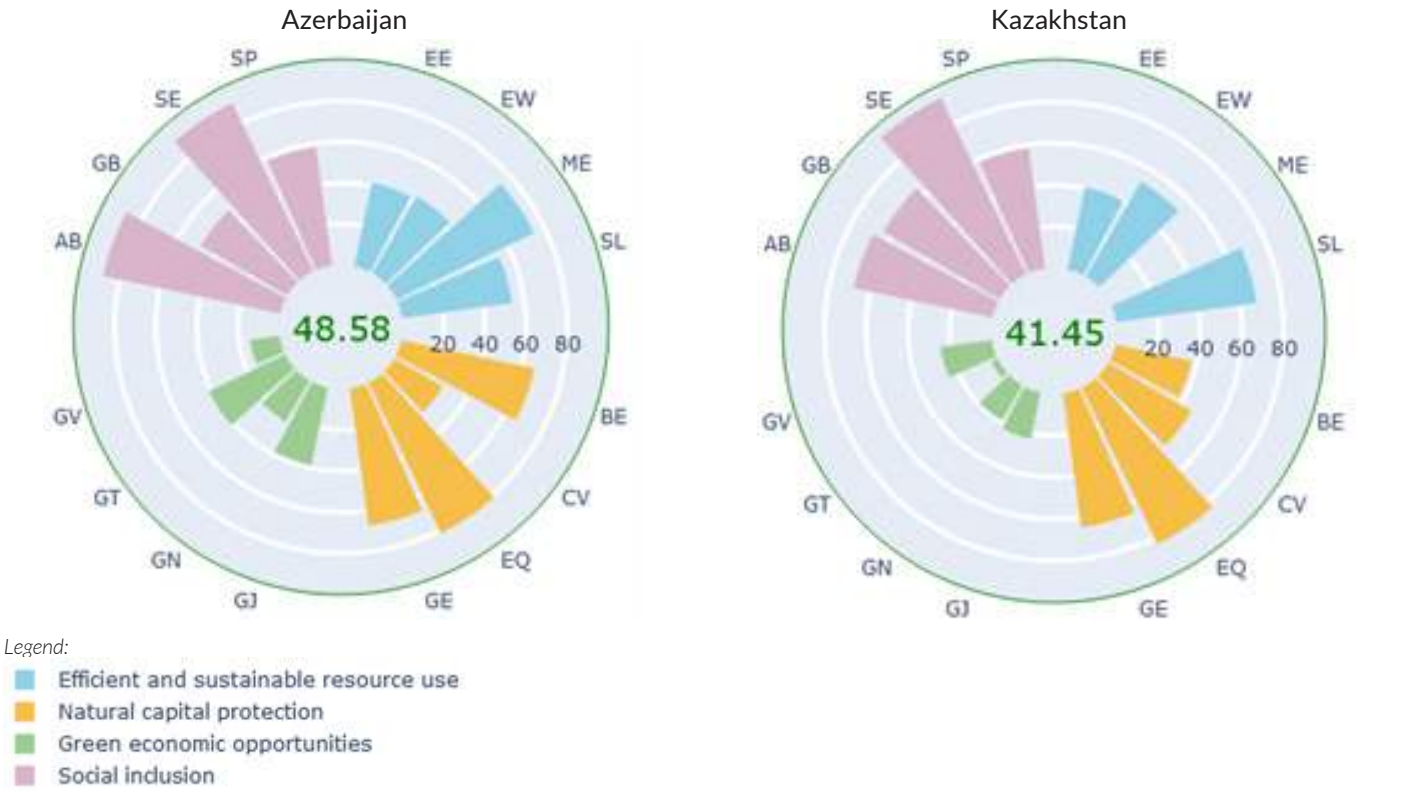
In natural capital protection, Azerbaijan performs better in environmental quality and biodiversity and ecosystem protection than the CA countries. However, regarding GHG emissions reduction, the opposite is the case. Kyrgyz Republic and Tajikistan are the CA countries performing best in GHG emissions reduction, with scores of over 90. At least 90 percent of the electricity supply in these two CA countries comes from renewable energy (Figure 17), and their two tons of CO$_2$ emissions per capita per year are the lowest in the CA subregion in 2021 (Figure 18). Kyrgyz Republic emphasizes GHG emissions reduction in its policy documents more than Tajikistan (Figure 22 and Figure 23). Improving efficient and sustainable resource use is closely linked to reducing GHG emissions. Azerbaijan's efficient and sustainable resource use performance is at par with Kazakhstan, Kyrgyz Republic, and Tajikistan (Figure 25), with a material use efficiency score of 75 contributing most to this (Figure 27). For the CA countries, Kazakhstan scores highest in sustainable land use, Kyrgyz Republic in efficient and sustainable energy, and Tajikistan in both efficient and sustainable energy and material use efficiency. Performance in efficient and sustainable energy varies across Azerbaijan and the CA countries, although all emphasized it in their policy documents (Figure 19-Figure 24). I***ncreasing the share of renewable energy in total energy consumption is a common challenge across these countries, which can be overcome through green investment in their vast renewable resources*** (Annex 4).

Foreign capital investments needed for sustainable energy transition remained low in these traditionally closed economies. The net foreign investment inflows in Azerbaijan and CA countries were below five percent of

the GDP in 2020 (Table 1). The recent UNECE Renewable Energy Status Report 2022 suggested that the CA countries have enormous potential to increase renewable power capacity, particularly solar photovoltaic (PV) and wind power additions, which remained largely untapped. The same is true for Azerbaijan, which has untapped renewable energy potential not only from solar and wind energy but also from hydro, biomass, and geothermal resources.

Azerbaijan performs slightly better than the Kyrgyz Republic and Uzbekistan in green economic opportunities due to a higher green trade score than the former and a higher green employment score than the latter (Figure 27). Kyrgyz Republic's trade openness is 108 percent of its GDP, higher than Azerbaijan (77 percent) and Uzbekistan (64 percent) in 2021 (Table 9). The lower green trade score in Kyrgyz Republic compared with Azerbaijan and Uzbekistan implies that the former has a low share of environmentally sustainable export products. Azerbaijan places more emphasis on green trade in its policy documents than the CA countries (Figure 20). As part of its economic diversification strategy, Azerbaijan is creating opportunities in foreign trade and investment in line with the clean environment and green growth priority of its Strategic Roadmap for the Perspective of the National Economy. This will open more opportunities in Azerbaijan to create green employment and thus further improve its performance in this pillar. Azerbaijan significantly emphasizes green employment in its policy documents, particularly its Roadmap beyond 2025. ***Among the four green economic opportunities pillars, Azerbaijan emphasizes green innovation more than any CA country. Because innovation is critical to stimulating investment, enhancing trade, and creating employment, the focus given to green innovation will be expected to contribute to improving Azerbaijan's performance in green economic opportunities.***

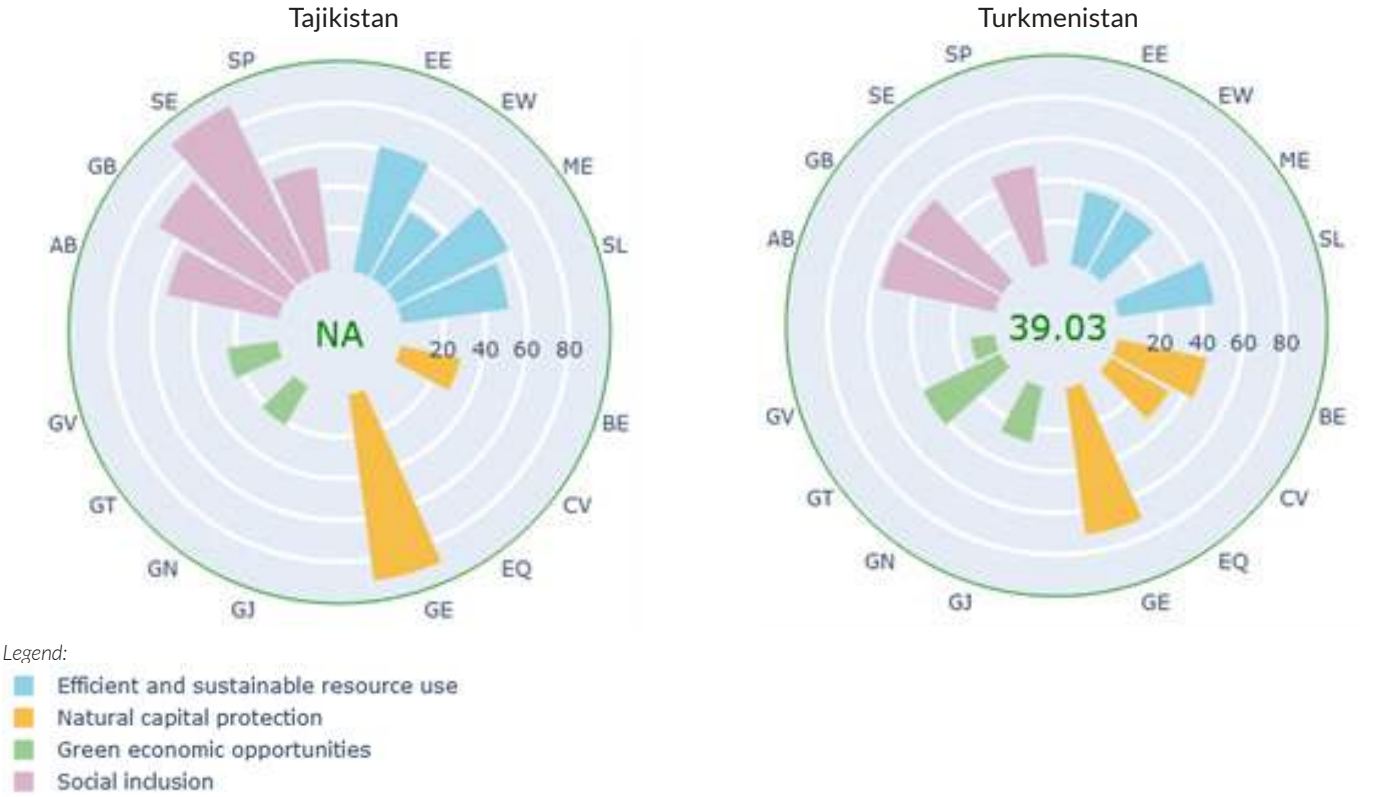
Figure 27. Performance at the pillar and Green Growth Index levels in Azerbaijan and CA countries, 2021



Green growth pillars:
EE – efficient and sustainable energy, EW – efficient and sustainable water use, ME – waste and material use efficiency, and SL – sustainable land use
BE – biodiversity and ecosystem protection, CV – cultural and social value, EQ – environmental quality, and GE – greenhouse gas emissions reduction
GJ – green employment, GN – green innovation, GT – green trade, and GV – green investment
AB – access to basic services and resources, GB – gender balance, - SE – social equity, and SP social protection
Source: Authors own. The figures are available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org

Source: Authors own.

Figure 27. Performance at the pillar and Green Growth Index levels in Azerbaijan and CA countries, 2021 (continued)



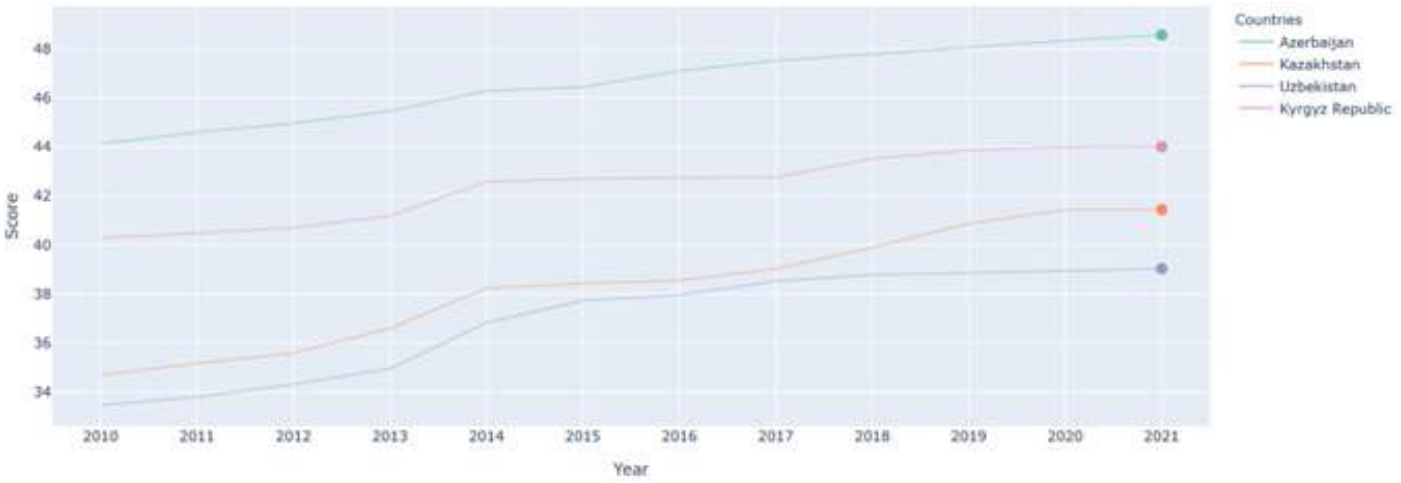
Green growth pillars:
EE – efficient and sustainable energy, EW – efficient and sustainable water use, ME – waste and material use efficiency, and SL – sustainable land use
BE – biodiversity and ecosystem protection, CV – cultural and social value, EQ – environmental quality, and GE – greenhouse gas emissions reduction
GJ – green employment, GN – green innovation, GT – green trade, and GV – green investment
AB – access to basic services and resources, GB – gender balance, - SE – social equity, and SP social protection
Source: Authors own. The figures are available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org

Source: Authors own.

4.3.3 Trend in performance

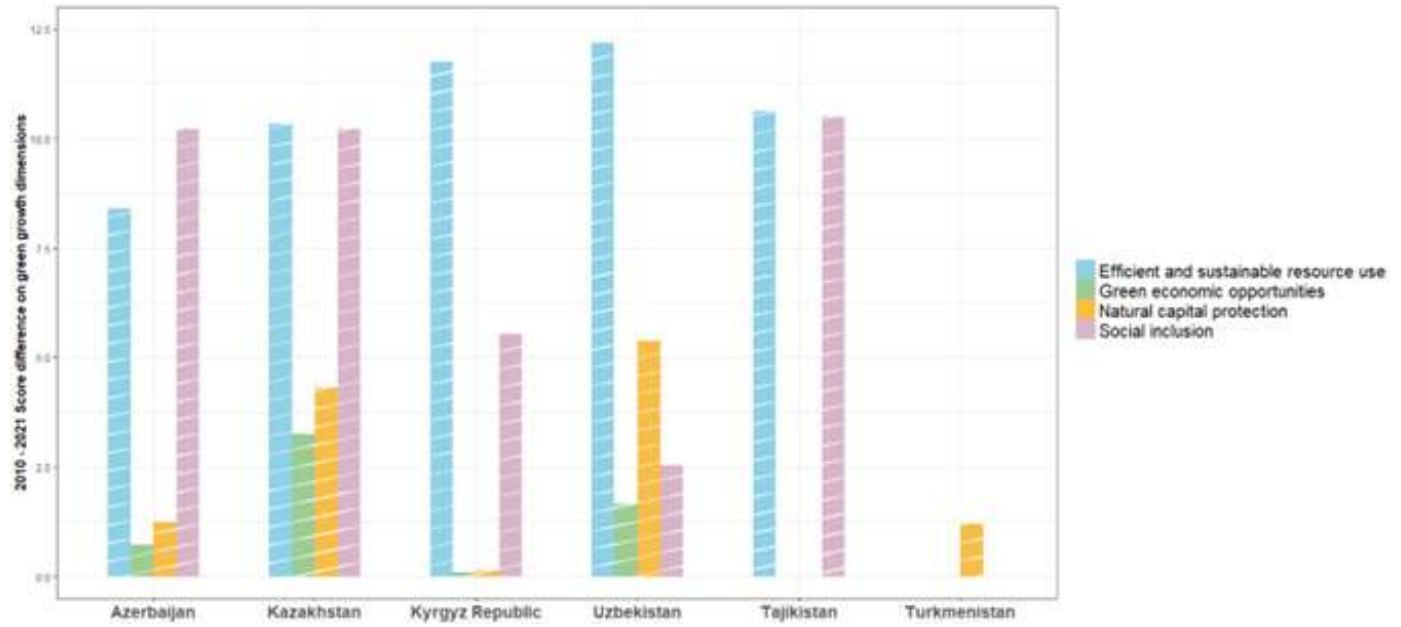
The overall green growth performance has increased in Azerbaijan and the CA countries, including Kazakhstan, Kyrgyz Republic, and Uzbekistan, from 2010 to 2021 (Figure 28). Although Azerbaijan constantly showed the highest Green Growth Index scores during this period, Kazakhstan and Uzbekistan experienced the most significant increase of 20 percent and 17 percent between 2020 and 2021. Azerbaijan's percentage increase in the Green Growth Index score is at par with the Kyrgyz Republic by around 10 percent. , Figure 29 provides information on the contributions of the green growth dimensions to these score changes. In the case of Azerbaijan, social inclusion contributed most to the increase in the Green Growth Index score, followed by efficient and sustainable resource use. In contrast, efficient and sustainable resource use was mainly responsible for increased scores in the Kyrgyz Republic and Uzbekistan. Both pillars equally contributed to improving the Green Growth scores in Kazakhstan. Although no Green Growth score could be computed for Tajikistan, Figure 29 also reveals that, like Kazakhstan, efficient and sustainable resource and social inclusion increased by almost the same level between 2010 and 2021. Improvements in natural capital protection and green economic opportunities are less significant than the other dimensions. Kyrgyz Republic and Azerbaijan had the lowest increase in natural capital protection and green economic opportunities scores. Uzbekistan experienced the most significant increase in natural capital protection score but the lowest increase in social inclusion.

Figure 28. Trend in Green Growth Index score in Azerbaijan and CA countries, 2010-2021



Source: Authors own. The figures are available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

Figure 29. Difference in the green growth scores in Azerbaijan and CA countries by dimension between 2010 and 2021



Source: Authors own.

Table 18 presents the correlation between the c-coefficients (Table 12) and score difference (Figure 29) for each dimension in Azerbaijan and CA countries. The correlation shows whether there are statistical relationships between the policy emphasis given on the green growth indicators belonging to each dimension and the improvement in dimension scores between 2010 and 2021. More than half of the correlations have values of at least 50, implying a strong relationship between them. Moreover, more than half of the correlations have negative signs, indicating that the increase in the scores between 2010 and 2021 is associated with a lower emphasis on the dimensions in the policy documents or vice versa. Three dimensions show a strong correlation for Azerbaijan, with values ranging from 61 to 91, including social inclusion, natural capital protection, and green economic opportunities.

Azerbaijan's score difference of about 10 in social inclusion has a positive relationship with the c-coefficient, indicating that the emphasis given in policy documents could have contributed to the increase in social inclusion score in 2021. The same can be observed in Kazakhstan, Kyrgyz Republic, and Uzbekistan, with the latter CA country showing the strongest correlation of 0.94. The score difference of 2.5 in Uzbekistan from 2010 to 2021 could be traced back to the level of emphasis provided to the social inclusion indicators. This implies an excellent opportunity for Uzbekistan to improve its social inclusion performance if greater policy emphasis is given to access to basic services and resources, gender balance, and social protection (Figure 27). [xiv] Tajikistan is the only country

showing a negative correlation in social inclusion, with the highest score difference for social inclusion at 10.62. The negative correlation indicates that an increase in social inclusion score between 2010 and 2021 has been achieved, although the policy documents give a relatively lower emphasis. ***Overall, the results for social inclusion indicate that policies in Azerbaijan and CA countries should not shift policy emphasis away from social inclusion indicators but address them together with economic and environmental issues to ensure a green and inclusive growth transition. Gender balance, social equity, and social protection continue to be challenging in these countries, including upper middle-income countries like Azerbaijan and Kazakhstan.***

Table 18 Correlation between the c-coefficients and score difference by dimension and country

Dimension	Azerbaijan	Kazakhstan	Kyrgyz Republic	Tajikistan	Uzbekistan
ESRU	-0.28*	0.25	0.90	-0.75*	-0.94**
GEO	-0.59**	0.25	0.13	-	-0.63**
NCP	-0.91**	-0.63**	-0.63**	-	-0.15**
SI	0.61	0.83	0.57	-0.50*	0.94

Notes: ESRU – efficient and sustainable resource use, GEO – green economic opportunities, NCP – natural capital protection, and SI – social inclusion. No correlations are available for Turkmenistan due to a lack of scores for three dimensions.

*Correlation levels: 1 = perfect; between 0.50 and 0.99 = strong; 0.30 and 0.49 = moderate; below 0.29 = low; and 0 = no correlation. For negative correlations, *c-coefficient is lower than the score difference, and **score difference is lower than the c-coefficient.*

The correlation between the c-coefficients and the score differences is negative for Azerbaijan's natural capital protection and green economic opportunities. Kazakhstan and the Kyrgyz Republic also show strong negative correlations in natural capital protection. For these three countries, the policy emphasis on the green growth indicators in this dimension did not contribute to a significant score change in natural capital protection. For example, Kyrgyz Republic's c-coefficient is high at 0.17, and the score difference is as low as 0.14. Like Azerbaijan, Uzbekistan's green economic opportunities dimension has a strong negative correlation. The c-coefficients for green economic opportunities in these countries are between 0.1 and 0.14, indicating that higher policy emphasis would be needed to increase the dimension scores significantly. GHG emissions reduction and environmental quality have contributed to improved performance in natural capital protection, but biodiversity and ecosystem protection, as well as cultural and social values, have yet to contribute. There is a vast potential in Azerbaijan and the CA countries to create green economic opportunities from biodiversity and ecosystem resources because of their rich cultural and social values. Policies will need to apply a holistic approach to natural capital protection and green economic opportunities to improve performance in these dimensions.

Only a low correlation is found between the 8.4 score increase and the 0.06 c-coefficient for efficient and sustainable resource use in Azerbaijan. Except for Kazakhstan, the CA countries showed a strong correlation, albeit with different directions of relationship between the c-coefficient and dimension score. There is a strong positive correlation between them in the Kyrgyz Republic, indicating that the 11.76 increase in score from 2010 to 2021 is highly linked to the emphasis given to efficient and sustainable resource use in this country. The correlations are both negative for Tajikistan and Uzbekistan. However, while the high increase in score in the former is associated with a lower policy emphasis (i.e., 0.15 c-coefficient), the higher policy emphasis (i.e., 0.22 c-coefficient) in the latter is not associated with a very high score in efficient and sustainable resource use. ***Overall, Azerbaijan and the CA Countries have achieved a higher score in efficient and sustainable resource use than natural capital protection. This could be explained by the challenge they face and, thus, the policy emphasis they give in diversifying their fossil-based economies, which are vulnerable to changes in the global market, affected by green policies in trading partner countries, and obligated to reduce GHG emissions. Azerbaijan's improvement in performance over time is slower than that of the CA countries, which can be enhanced by putting similar policy emphasis given to efficient and sustainable resource use in the CA countries.***

[xiv] No data is available for social equity.

05 CONCLUSIONS AND RECOMMENDATIONS

5.1 Azerbaijan's policy options

Azerbaijan's development priorities for green growth transition include economic diversification, green innovation, human skills and development, and land-water-food nexus. Failure to achieve them will challenge the country's ability to meet global sustainability commitments, including the SDGs, Paris Climate Agreement, and Aichi Biodiversity Targets, which support green and inclusive growth. Based on the assessments in this study, below are some options for Azerbaijan's transition to green and inclusive growth.

- **The most significant opportunity for Azerbaijan to improve its performance will be in green economic opportunities.** This green growth dimension directly supports its three development priorities: economic diversification, green innovation, and human skills and development. Hence, strong policies that will steer foreign investment and trade away from fossil products will promote green innovation and employment. Progress in green innovation is closely intertwined with the rate of investments in developing human skills and technology, and enabling SMEs to establish businesses and absorb innovations to support economic diversification. ICT is driving economic diversification in Azerbaijan because, after oil and gas, it is the most profitable sector and the largest foreign direct investment (FDI) recipient. Strategic policies to shift FDIs from the fossil to the ICT sector will help build a digital knowledge-based economy, which is an important driver of economic diversification. Moreover, policies will need to address the low participation of SMEs in providing formal training to employees, poor collaboration between universities and industries in developing innovative skills and technology, and lack of investment in environmental resource management in critical sectors. They could slow down the development of a knowledge-based economy, which is needed to support economic diversification in renewable, agriculture, and tourism, the sectors with the most considerable potential to create green employment in Azerbaijan.

- **Additional focus on efficient and sustainable water use to reduce environmental degradation, address challenges in the land-water-food nexus, and support agricultural productivity and food security is imperative.** Barriers to green growth transition due to efficient and sustainable water use issues could be reduced by improving performance in other pillars, including waste and material use efficiency and sustainable land use. Green innovation and investments in municipal wastewater treatment and modern irrigation systems will help enhance efficient and sustainable water use. Moreover, due to the transboundary nature of Azerbaijan's water resources, including major rivers providing freshwater drinking sources and coastal areas important for biodiversity, efficient and sustainable water use is closely linked to protecting environmental quality. Putting in place appropriate conservation measures and an effective biodiversity monitoring system, the biodiversity and ecosystem resources could be tapped to create opportunities for green financing to support green growth transition in the country. For example, the Law on Accession to Protocol on Biodiversity Conservation for protecting the Caspian Sea's marine environment on biodiversity conservation in the Caspian Sea opened the opportunities to expand Azerbaijan's marine protected areas. Coastal and marine areas offer an essential income source from eco-tourism; hence, their protection is critical to creating local livelihood and promoting green and inclusive growth. Key biodiversity areas' role in creating local tourism livelihood and mobilizing green finance will be ensured under a protected area regime that effectively monitors the implementation and achievement of biodiversity targets.

- **Azerbaijan's untapped renewable resources, including solar, wind, biomass, and geothermal, offer enormous potential to reduce electricity generation from fossil sources, create green employment, and shift to a low-carbon economy.** A low-carbon economy can be promoted through economic diversification in agriculture value-added, food processing, and other manufacturing industries, supported by an energy mix of natural gas and renewables. Although GHG emissions per unit of energy produced are the lowest from natural gas among the different fossil energy sources, green innovation will be needed to further reduce methane emissions from natural gas. Reducing methane is the condition for the Commission to more than double its natural gas imports from Azerbaijan over the coming years. Green innovation will be needed to move into high-technology renewable energy industries and expand other connected industries and services. Azerbaijan's innovation outputs (e.g., knowledge and technology creation, impact, diffusion) will need to be comparable to its innovation investments, which is currently not the case. Increasing the share of R&D expenditure will increase the ability of universities and research institutions to develop much-needed skills and innovation for economic diversification, particularly in the energy sector.

- **Protecting property rights creates an enabling environment for economic diversification and green innovation, attracting foreign investment and new SMEs where private ownership of capital**

and assets are secured. Azerbaijan will need to overcome the challenges of empowering the youth with innovative skills, enabling them to find employment in high-income sectors (thus reducing income inequality and youth unemployment). Enhancing the role of women in urban and rural areas in creating green opportunities in high-value-added sectors requires improving access to loans, digital skills, and appropriate education, among others. The green growth transition will need to reach the rural-based sectors through agricultural diversification, clean energy innovation, and forest protection to improve the socio-economic condition of the poor population and vulnerable women. Poverty will also be reduced by ensuring the delivery of health and welfare services in the rural areas, home to many self-employed or informal workers who depend on subsistence agriculture.

5.2 Azerbaijan and Central Asia's green growth transition

Azerbaijan's green growth performance saw a slow but steady improvement in the last decade. Although its performance is better than any of the CA countries, its Green Growth Index score of 48.58 was only half the score of global top-performing countries in 2021. Azerbaijan shares common challenges and opportunities for green growth transition with the CA countries.

- Like Azerbaijan, the most considerable prospects to improve green growth performance in the CA countries are in creating green economic opportunities, for which they have the lowest scores. The national policies lack emphasis on green economic opportunities. Providing additional focus on this dimension in policy documents and tracking changes in indicators' scores when implementing policies could help improve performance in this dimension.

- Reducing dependence on fossil fuels and increasing renewables in the energy mix will be vital to reducing emissions in Azerbaijan and Central Asia. The share of renewables to total energy consumption has not increased significantly in all countries since 1995. This is a common challenge in Azerbaijan and the CA countries, which can be overcome through green investment in their vast renewable resources. Foreign capital investments needed for sustainable energy transition remained low in these traditionally closed economies.[xv] Investments will be needed to tap the enormous potential to increase renewable power capacity, particularly solar photovoltaic (PV) and wind power additions.

- GHG emissions reduction and environmental quality have contributed to improved performance in natural capital protection, but biodiversity and ecosystem protection, as well as cultural and social values, have yet to contribute. There is considerable potential in Azerbaijan and the CA countries to create green economic opportunities from biodiversity and ecosystem resources because of their rich cultural and social values. Policies will need to apply a holistic approach to natural capital protection and green economic opportunities to improve performance in these dimensions.

[xv] Net foreign investment inflows were below five percent of the GDP in 2020.

- Although social inclusion scores are the highest among the four dimensions for Azerbaijan and the CA countries, there are opportunities to further improve performance in social inclusion in gender balance and social protection. Overall, the results for social inclusion indicate that policies should not shift policy emphasis away from social inclusion indicators but address them simultaneously with economic and environmental issues to ensure a green and inclusive growth transition. Among the social inclusion pillars, gender balance received the most minor emphasis in the policy documents.

Azerbaijan has a few lessons to learn from the CA countries' strategy for green growth transition. When updating its NBSAPs and NDCs, emphasis will need to be given to sustainability pillars with very low scores, including efficient and sustainable energy and water use, natural capital's cultural and social values, and green investment. Azerbaijan can learn from the Kyrgyz Republic and Tajikistan's updated NDCs, giving more emphasis on green investment. Moreover, the Kyrgyz Republic considers facilitating the achievement of gender equality and gender balance in the decision-making system on access to natural resources. Similarly, it can learn from the Kyrgyz Republic and Kazakhstan's NBSAPs, which consider issues across different dimensions. Although Azerbaijan includes "green growth" as one of its priorities in the Strategic Roadmap for the Perspective of the National Economy, developing a policy or strategy primarily dedicated to green growth will be valuable for identifying targets and tracking achievements in the green growth transition. This is the case for Kazakhstan and Uzbekistan, which have Presidential Decrees for the vision or strategy for the transition to a green economy.

5.3 Next steps forward

Using the Green Growth Index to assess green growth performance, this report highlighted the significant challenges that Azerbaijan and the CA countries face in transitioning to green and inclusive growth. It demonstrated that there are some levels of correlations between policy emphasis and green growth performance. Countries are developing national strategies and plans for green growth to guide the transition and track performance. Non-government and international organizations, including the GGGI, are supporting countries to develop green growth strategies and plans. Green Growth Index can provide the basis for identifying policy priorities based on the pillar and dimension scores and relevant green growth indicators for tracking performance based on sustainability targets. GGGI supports its member countries to develop a national Green Growth Index using a participative approach, with national experts from various ministries and line agencies selecting the green growth indicators for the Index through a series of seminars, webinars, workshops, and consultations. [xvi] The participative approach is important to capacitate the national experts in understanding green growth, facilitate the inclusion of government-selected indicators into the green growth strategies and plans, establish a monitoring platform for collecting data for the green growth indicators and updating the Green Growth Index, and encourage the use of the Green Growth Index to track green growth performance systematically. The green growth indicators identified and green growth performance assessed in this study provide the knowledge and materials for conducting a participative approach to develop the National Green Growth Index, which in turn will be valuable for developing or updating National Green Growth (or Green Economy) Strategy, not only for Azerbaijan but also the CA countries.

[xvi] For example, Zambia Green Growth Index, https://zambia-greengrowthindex.gggi.org/

APPENDICES

Appendix 1 Concept and methods

The methods applied in the report have three components – conceptualization, data preparation, and data analysis (Figure A.1), each consisting of three steps described below.

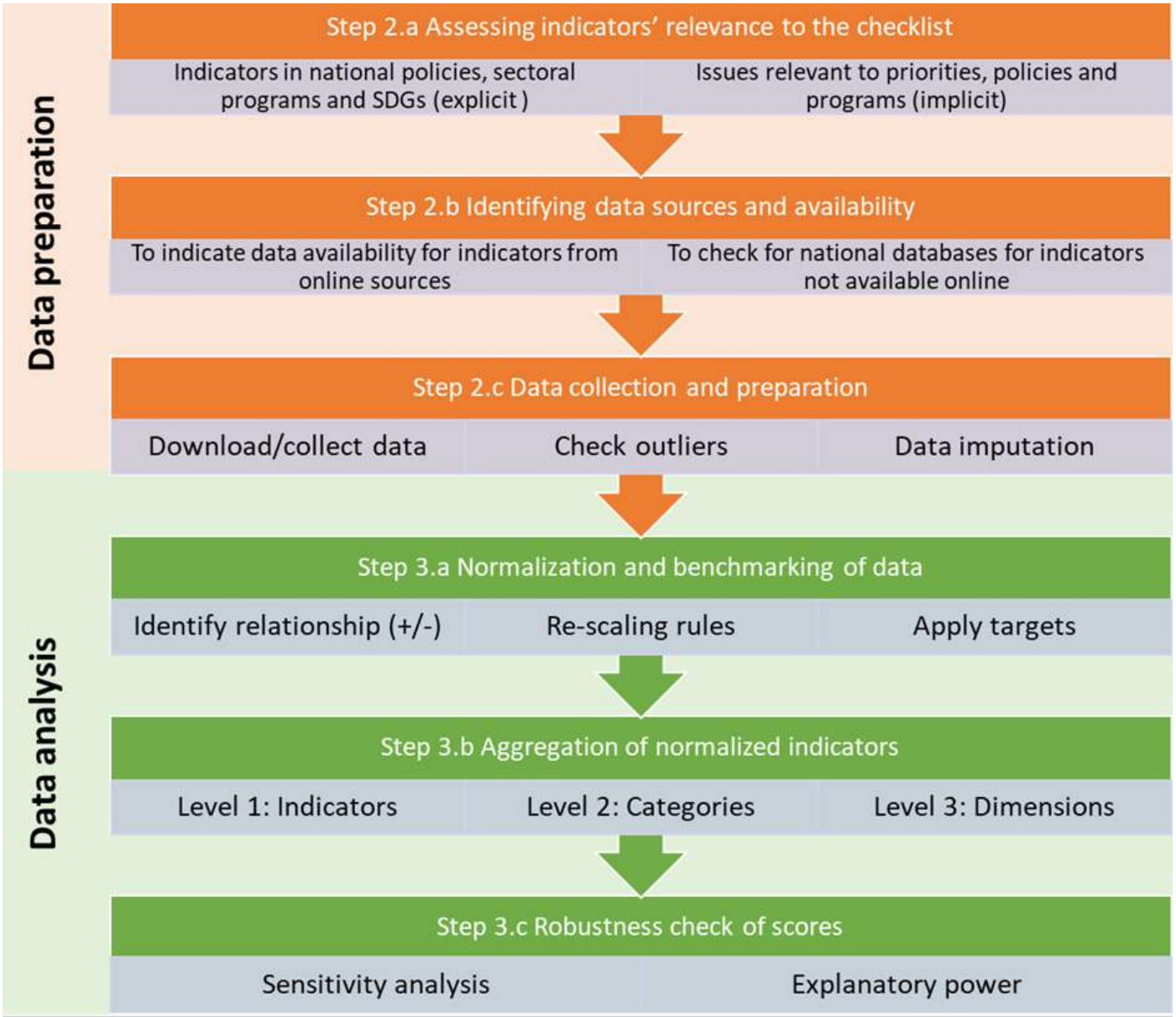
The steps for the conceptualization include applying a green growth framework (step 1.a), assessing policy frameworks and priorities (step 1. b), and setting up checklist criteria for the indicators (step 1.c). In **step 1.a, a** green growth framework was applied to guide the selection of the indicators. The Green Growth Index framework, validated by a hundred experts from different fields of expertise and countries in 2019, was chosen to organize the indicator selection systematically. In **step 1.b,** policy frameworks and priorities in Azerbaijan were identified by assessing policy documents, sectoral programs, and relevant literature. The assessment methods are described in section 1.b below. The assessment results, which provided useful knowledge to form the criteria for the next step, are presented in Chapter 2 of the report. In **step 1.c,** the checklist criteria described in section 1.c below were set up to guide the selection of the green growth indicators.

The steps for the data preparation include assessing indicators' relevance to the checklist (step 2.a), identifying data sources and availability (step 2.b), and data collection and preparation (step 2.c). **Step 2.a** dealt with assessing the green growth indicators, whether directly or indirectly linked to the checklist criteria. The assessment method is described in section 2.a below. **Step 2.b** focused on finding data for the green growth indicators previously identified in step 4. The results on the inventory of data sources and availability are presented in section Annex 2. **Step 2.c** is important before the data analysis because checking for outliers ensures that data is accurate, and imputing data corrects for data gaps. Inaccuracy and gaps in data will affect the aggregated scores of the indicators.

The steps for the data analysis include normalization and benchmarking of data (step 3.a), aggregation of normalized indicators (step 3.b), and robustness check of the scores (step 3.c). In **Step 3.a**, data were normalized to transform the units of the indicators into the same numerical scale, i.e., 1-100. Benchmarking integrates sustainability targets in the normalized scores, allowing interpretation of distance to targets, i.e., a score of 100 implies the targets have been achieved for the indicators. **Step 3.b** follows the aggregation of normalized indicators at distinct levels to facilitate the interpretability of results, e.g., at the category, dimension, and overall scores. **Step 3.c** is crucial to check the robustness of the selected indicators and the relevance of the results to green growth.

Figure A.1 Methods for the assessment of green and inclusive growth in Azerbaijan

Figure A.1 Methods for the assessment of green and inclusive growth in Azerbaijan (continued)



1. Concept

1.a Green growth framework

The objective in step 1.a is to use a framework to support the selection of green growth indicators. Without a framework, the indicators may not be aligned with the challenges and opportunities for green growth transition. The framework for the Green Growth Index consists of four dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion (Figure A.2). These dimensions are closely interlinked based on the concepts of the low carbon economy, resilient society, ecosystem health, and inclusive growth. The details of these interlinkages are described in the technical reports on the Green Growth Index (Acosta et al., 2019, 2020). The framework emphasizes that efficient and sustainable use of natural resources will produce more goods and services with fewer resources. This will, in turn, protect natural capital, including water, energy, land, and materials, as well as the ecosystem services they provide. A healthy ecosystem characterized by, for example, fertile soil, multifunctional forests, productive land and seas, excellent quality freshwater and clean air, and pollination increases economic productivity and creates new economic opportunities. The green growth framework also highlights the importance of protecting natural capital, which provides sources of economic growth such as green jobs, trade, and investment. Finally, social inclusion is considered a key mechanism to both the achievement and distribution of gains from green growth, where people are not only beneficiaries of economic growth but also contributors to creating economic opportunities.

Each dimension in the green growth framework is represented by four indicator categories (Figure 1). These indicator categories are essential to transitioning to green growth pathways. Efficient and sustainable resource use covers energy, water, land use, and waste and material use. The natural capital protection dimension includes improving environmental quality, reducing GHG emissions, protecting biodiversity and ecosystem, and preserving cultural and social value. Green economic opportunities

are created through investment, trade, innovation, and employment. Social inclusion includes access to basic services and resources, gender balance, social equity, and social protection.

1.b Policy frameworks and priorities

The objective in step 1.b is to identify green growth indicators emphasized in documents published by the government and issues that indicate priorities as well as challenges and opportunities for sustainable development in Azerbaijan. In the latter case, policy documents such as the Strategic Roadmap, 2030 National Priorities, Nationally Determined Contribution (NDC), ... have been reviewed. Various documents on Sectoral Roadmaps were also reviewed, including agriculture, heavy industry and engineering, logistics and trade, financial services, telecommunication and information technology, affordable housing, and education and training. Development priorities can also provide knowledge on the green growth indicators that should be considered when assessing green growth transition. In addition to the policy documents, relevant literature was reviewed to understand the social, economic, and environmental contexts that underpin challenges and opportunities for sustainable development in Azerbaijan.

1.c Checklist criteria

The objective in step 1.c is to set up checklist criteria based on the knowledge generated from assessing policy frameworks and development priorities. Five checklists were identified and provided the rationale for selecting the green growth indicators.

Checklist 1: National issues considered priorities for sustainable development in Azerbaijan, including economic diversification, green innovation, food self-sufficiency, and energy-water-food nexus.

Checklist 2: Policies relevant to economic development and climate actions provide information on the goals and targets of the government to overcome challenges and maximize opportunities, including those mentioned in the national policy documents (i.e., Strategic Roadmap, 2030 National Priorities, NDC, ...).

Checklist 3: Programs and strategies implemented for different sectors to support the achievement of national goals and targets, including agriculture, heavy industry and engineering, logistics and trade, financial services, telecommunication and information technology, affordable housing, and education and training.

Checklist 4: Climate actions can be aimed at reducing GHG emissions through mitigation or increasing the resilience of the society and ecosystem through adaptation.

Checklist 5: Global issues that UN Member Countries commit to addressing, particularly those in the Sustainable Development Goals (SDGs). Due to the lack of indicators for green economic opportunities in the SDGs, the Global Green Growth Index was also considered in the list of criteria to address this gap in green growth indicators.

2. Data preparation

2.a Relevance to the checklist

The objective in step 2.a is to create a table checklist informing about the relevance of the green growth indicators to the criteria. The two categories of relevance are direct and indirect. Direct relevance, represented by the icon ☑ in the table checklist, indicates that the indicators directly correspond to the criteria, i.e., with the same names and measurement units as mentioned in the documents. Indirect relevance, represented by the icon ☑, indicates that indicators were not directly mentioned in the documents, i.e., names and measurement units were not mentioned. In the case of indirect relevance, the selected indicators were based on expert judgment. Table 1 below provides an example of the checklist table for the five indicators for efficient and sustainable water use. It summarizes the indicators' presence and level of relevance to the five criteria described in step 1.c.

Table 1. Checklist for the green growth indicators in efficient and sustainable energy

Indicator code and short name	Development priorities (Checklist 1)				National policies (Checklist 2)					Sectoral roadmaps* (Checklist 3)	Climate action (Checklist 4)		Global issues (Checklist 5)	
	ECON	INNO	HUMA	NEXU	Azerbaijan 2030	Strategic Roadmap	Energy laws	NDC	NBSAP		MITI	ADAP	GG Index	SDGs
EE1 – primary energy supply per GDP					☑	☑	☑	☑		☑	☑		☑	☑
EE2 – share of renewables					☑	☑	☑	☑	☑	☑	☑		☑	☑
EE3 – logistics performance					☑	☑		☑		☑	☑	☑	☑	☑
EE4 – share renewable electricity					☑		☑	☑		☑	☑	☑		☑
EE5 – electric transmission losses								☑		☑	☑	☑		

Legend: ☑ *direct relevance,* ☑ *indirect relevance*
Notes: ECON – economic diversification, INNO – green innovation, FOOD – food self-sufficiency, and NEXU – energy-water-food nexus

2.b Data sources and availability

The objective in step 2.b is to identify data sources for the green growth indicators and make an inventory of the availability of time-series data. The data from the SDG database was prioritized before checking other online databases published by international organizations. Online databases are preferred to increase transparency and allow replicability of the results applied in the report. Information on data sources and availability is presented in Annex 2.

2.c Collected and validated database

The objective in step 2.c is to prepare and validate the data collected from various sources. Scaling and imputation are the most important methods to prepare the data and improve the comparability of the indicators. Scaling the data by an appropriate denominator (e.g., population, GDP, land area, etc.) allows an objective comparison across countries. Although the assessment focused on Azerbaijan, normalization and benchmarking required global data. Data imputation using available time-series databases helps improve the country coverage of the indicators. To minimize the effects of imputation on data uncertainty, the simple method of imputing data from the closest years was applied. The most important methods to validate the data's statistical appropriateness are checking for outliers and correlation. Since outliers can distort the indicators' statistical properties and normalized values, they were capped using lower or upper fences based on the interquartile range (IQR) from the 75th and 25th percentiles. The correlation analysis aims to identify redundant indicators with very high correlations to improve the explanatory power of the indicators and verify whether indicators have acceptable levels of association in their respective dimensions.

3. Data analysis

3.a Normalization and benchmarking

The objective in step 3.a is to transform the data so that the indicators have the same units of measurement and facilitate the interpretation of the results. It is necessary to apply a normalization method to translate the indicators with different units into a common scale. Normalization allows the indicator values measured in different units to be adjusted to a single scale to make the data comparable across the indicators. The re-scaling method (min-max transformation) for normalization was applied for the following reasons: it is the simplest and most widely used method that will facilitate ease of comprehensibility and replication; using upper and lower bounds will reduce issues related to outliers; and integrating targets will allow benchmarking against sustainability targets. Through benchmarking, the indicators are assigned values between 1 and 100, where a score of 100 implies that the target for a given indicator has been achieved. For the SDG indicators, sustainability targets are based on explicit or implicit SDG targets. For non-SDG indicators, sustainability targets are represented by the average values of the top five performing countries.

3.b Aggregation of normalized indicators

The objective in step 3.b is to aggregate the scores of the indicators to provide an overall score for the four green growth dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. The two most common and straightforward aggregation methods include linear aggregation using arithmetic mean and geometric aggregation using geometric mean. These two methods have different underlying assumptions. Linear aggregation allows full and constant compensability, i.e., low values in one indicator can be traded off (substituted) by high values in another. On the other hand, geometric aggregation allows only partial compensability, limiting the ability of the indicators with very high scores to fully compensate for indicators with low scores. The two methods were applied in the different aggregation models so that, as the level of aggregation increases, the level of substitutability decreases:

Level 1: Arithmetic mean was applied to linearly aggregate the normalized indicators, allowing compensability of the individual indicators in each indicator category.

Level 2: Geometric aggregation was applied to the indicator categories to allow only partial compensability between indicators in each dimension.

3.c Robustness check

The objective in step 3.b is to evaluate the confidence level of the scores. Two methods were applied: First, regression models were used to check the indicators' explanatory power in explaining the dimension scores' structure. Second, Monte Carlo analysis was applied to check the sensitivity of the aggregated scores to changes in the input variables of the aggregation models.

Details of the methods in step 3 are provided by Acosta et al., 2019, GGGI Technical Report Number 5, Green Growth Index: Concepts, Methods, Applications.

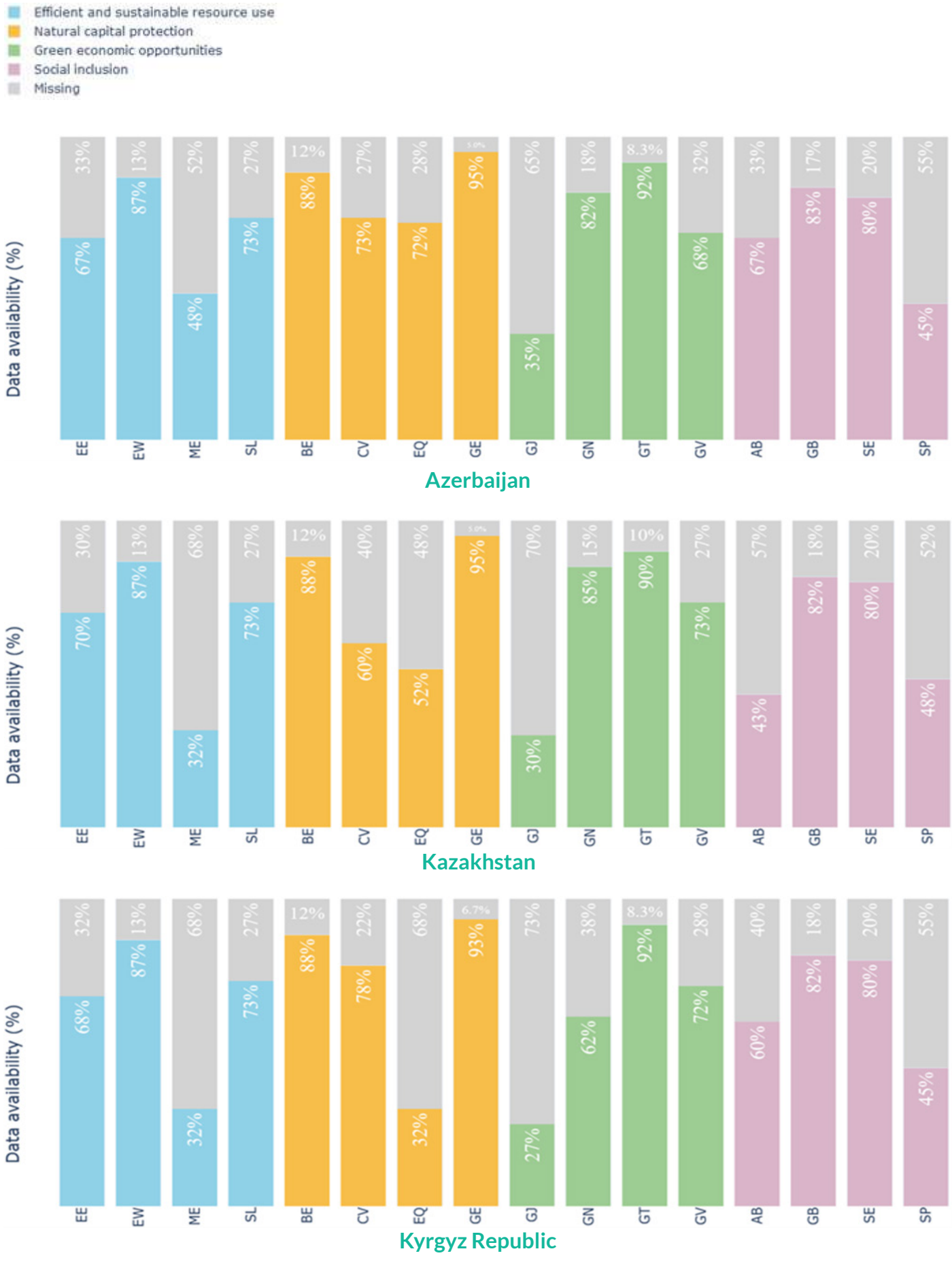
Appendix 2 Details on the green growth indicators

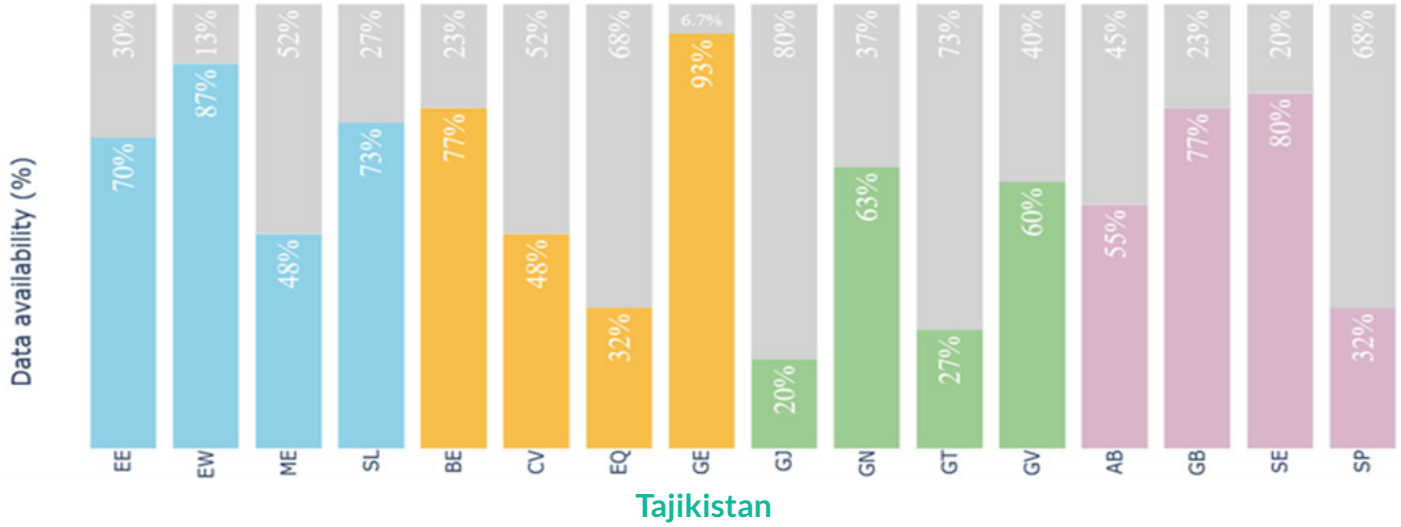
Indicator code and short name	Available years	Imputed years	Source of downloaded data
Efficient and sustainable resources use			
EE1 – primary energy supply per GDP	2000 - 2019	2020 - 2021	UNSTATS database
EE2 – share of renewables	2000 - 2019	2020 - 2021	UNSTATS database
EE3 – logistics performance	2007, 2010, 2012, 2014	2000 - 2006, 2008, 2009, 2011,2015 - 2021	WB Open Data
EE4 – share renewable electricity	1990 - 2021	-	Our World in Data
EE5 – electric transmission losses	1990 - 2014	2015 - 2021	WB Open Data
EW1 – water use efficiency	2000 - 2019	2020 - 2021	UNSTATS database
EW2 – level of water stress	2000 - 2019	2020 - 2021	UNSTATS database
EW3 – sustainable fisheries	1983 - 2021	-	Our World in Data
EW4 – share of surface irrigation	1995 - 2019	2020 - 2021	FAO Aquastat
EW5 – renewable water per capita	1992 - 2019	2020 - 2021	FAO Aquastat
SL1 – nutrient balance per hectare	1992 - 2018	2019 - 2021	FAOSTAT
SL2 – share organic agriculture	2005 - 2020	2021	FAOSTAT
SL3 – share ruminant livestock	1992 - 2020	2021	FAOSTAT
SL4 – agriculture production per hectare	2000 - 2020	2021	FAOSTAT
SL5 – forest area change rate	2010 , 2020	2011 - 2019, 2021	UNSTATS database
ME1 – material consumption per GDP	1992 - 2017	2018 - 2021	UNEP
ME2 – material footprint per capita	1992 - 2015	2016 - 2021	UNEP Global Material Flows Database
ME3 – average food loss and waste	2014 - 2018	2010 - 2013, 2019 - 2021	FAOSTAT
ME4 – share of solid waste recycled	No data	-	-
ME5 – ratio treated wastewater	1996 - 2019	2020 - 2021	FAOSTAT
Natural capital protection			
EQ1 – air pollution PM2.5	1990 - 2010(5 Year range), 2011-2017	2018-2021	WB Open Data
EQ2 – DALY rate due to unsafe water	1990 - 2019	2020-2021	Institute for Health Metrics and Evaluation GHDx database
EQ3 – waste generation per capita	2000-2021	-	The State Statistical Committee of the Republic of Azerbaijan
EQ4 – coastal pollution, chlorophyll-a deviations	2005 - 2021	-	UNSTATS database
EQ5 – DALY rate due to air pollution	2019	2012 - 2018, 2020 - 2021	World Health Organization
GE1 – CO2 emissions per capita	1990 - 2021	-	Climate Watch Data and WB Open Data
GE2 – Non-CO2 emissions per capita, excluding AFOLU	1990 - 2021	-	Climate Watch Data and WB Open Data
GE3 – Non-CO2 emissions per capita for AFOLU	1990 - 2021	-	Climate Watch Data and WB Open Data
GE4 – carbon intensity of energy production	1985 - 2020	2021	Our World in Data
GE5 – CO2 emissions per added value in manufacturing	2000 - 2019	2020 - 2021	UNSTATS database
BE1 – share key biodiversity areas in PAs	2000 - 2021	-	UNSTATS database
BE2 – share of forest area	1992 - 2020	2021	WB Open Data
BE3 – share naturally generating forest	1992 - 2020	2021	FAOSTAT
BE4 – share of forest in legally PAs	2000 - 2015(5 Year range), 2015 - 2020	2011 - 2014, 2021	UNSTATS database
BE5 – change in water-related ecosystem	2000 - 2021	-	UNSTATS database

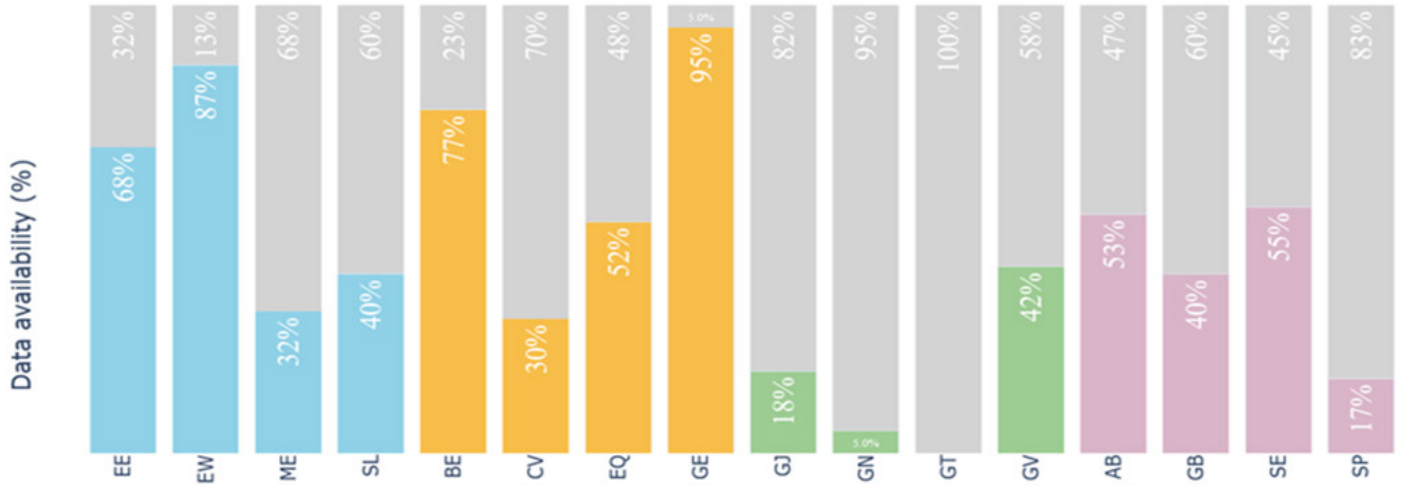
Indicator code and short name	Available years	Imputed years	Source of downloaded data
CV1 – red list index	1993 - 2021	-	UNSTATS database
CV2 – share of terrestrial and marine PAs	2016 - 2021	2010 - 2015	WB Open Data
CV3 – monitoring environment in tourism	2008 - 2020	2021	UNSTATS database
CV4 – share plant genetic resources	1995 - 2020	2021	UNSTATS database
CV5 – share of cultural goods in exports	2014 - 2017	2010 - 2013, 2018 - 2021	UNESCO UIS Data
	Green economic opportunities		
GV1 – financial flows for renewables	2000, 2005, 2006,2009 - 2011, 2014 - 2017	2012,2013,2018-2021	UNSTATS database
GV2 – installed renewable electricity	2000 - 2020	2021	UNSTATS database
GV3 – ODA for biodiversity, recipient	2002 - 2020	2021	UNSTATS database
GV4 – water resource mgt, financing	2017, 2020	2010 - 2016, 2018 - 2021	UNSTATS database
GV5 – agriculture government expenditure	2008 - 2020	2021	UNSTATS database
GT1 – share export environmental goods	2000 - 2019	2020, 2021	COMTRADE DATA
GT2 – share export environmental technologies	2003 - 2020	2021	UNSTATS database
GT3 – share hazardous waste exports	2000 - 2020	2021	UNSTATS database
GT4 – share high technology exports	2007 - 2020	2021	WB Open Data
GT5 – CO2 emissions embedded in trade	2000 - 2020	2021	Our World in Data
GJ1 – share green employment manufacturing	2010 - 2018	2019 - 2021	Based on methods by de Alba &Todorov (2018)
GJ2 – renewable energy employment	2021	2014 - 2020	IRENA and ILO
GJ3 – share youth and adults with ICT skills	2017 - 2020	2010 - 2016, 2021	International Telecommunication Union (ITU)
GJ4 – firms offering formal training	2002, 2005, 2009, 2013, 2019	2010-2012,2014-2018,2020,2021	WB Open Data
GJ5 – schools with access to internet	2016 - 2020	2010 - 2015, 2021	UNESCO UIS Data
GN1 – share patents env technology	1991,1992,1995-1997,1999 - 2002, 2004 - 2013, 2015 - 2019	2014, 2020, 2021	OECD database
GN2 – new business density	2008 - 2020	2021	WB Open Data

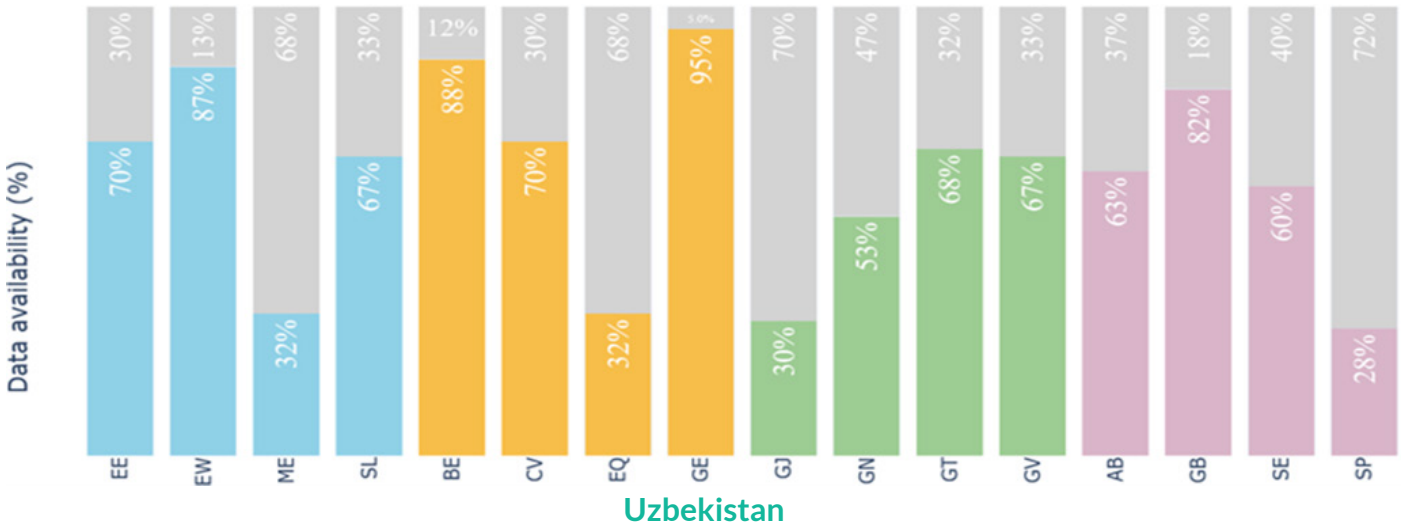
Indicator code and short name	Available years	Imputed years	Source of downloaded data
GN3 – share medium/high-tech manufacturing value added	2000 - 2019	2020 , 2021	UNSTATS database
GN4 – collaboration in R&D	2007 - 2017	2018 - 2021	World Economic Forum Global Competitiveness Index
GN5 – share R&D expenditure	2000 - 2020	2021	UNESCO UIS Data
Social inclusion			
AB1 – access to safely manage water and sanitation	2000 - 2021	-	UNSTATS database
AB2 – moderate/severe food insecurity	2015 - 2020	2010 - 2014, 2021	UNSTATS database
AB3 – convenient access to public transport	2020	2010 - 2019, 2021	UNSTATS database
AB4 – population covered by 4G mobile network	2012 - 2020	2010 - 2011 , 2021	UNSTATS database
AB5 – property rights	1996 - 2021	-	WB TCdata360
GB1 – women in national parliaments	2000 - 2021	-	UNSTATS database
GB2 – female with financial accounts	2000 - 2021	-	UNSTATS database
GB3 – equal gender pay	1971 - 2021	-	WB Open Data
GB4 – maternity cash benefits	2016, 2020	2010 - 2015, 2017 - 2019, 2021	UNSTATS database
GB5 – tertiary enrolment gender parity	1991 - 2020	2021	WB Open Data
SE1 – inequality in income	1988 - 2012	2013 - 2019	WB Open Data
SE2 – rural/urban access to clean fuels	2000 - 2020	2021	WB Open Data
SE3 – youth unemployment disparity	2000 - 2021	-	UNSTATS database
SE4 – old people dependency ratio	1960 - 2021	-	WB Open Data
SE5 – discrimination against disability	No data	-	-
SP1 – population-given social assistance	2015	2010 - 2014, 2016 - 2021	UNSTATS database
SP2 – universal health coverage	2000 - 2015(5 Year range), 2017, 2019	2011-2014, 2016, 2018, 2020, 2021	UNSTATS database
SP3 – Proportion of unemployed persons receiving unemployment cash benefit, by sex (%)	2000, 2005, 2007, 2011, 2016, 2020	2010,2012 -2015,2017 - 2019, 2021	UNSTATS database
SP4 – victims of intentional homicide	1990 - 2002, 2007, 2008, 2010-2020	2021	WB Open Data
SP5 – health regulation capacity	2010, 2011, 2013, 2014, 2018-2021	2012,2015-2017	UNSTATS database

Appendix 3 Data availability of the green growth indicators





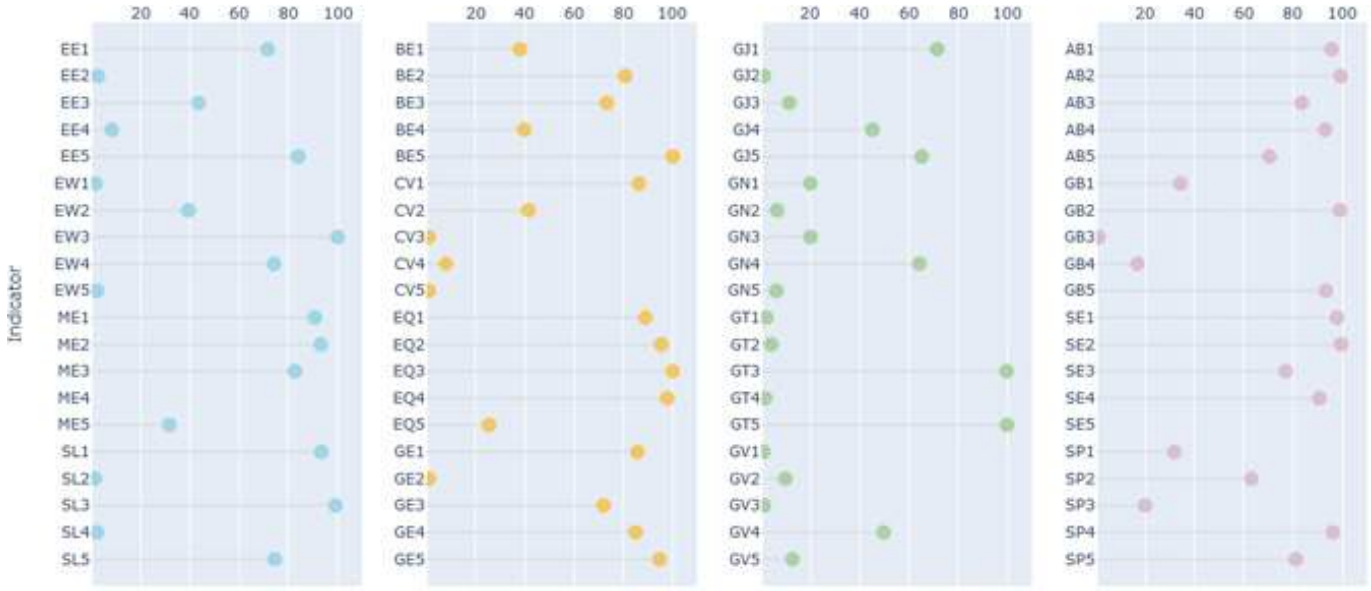




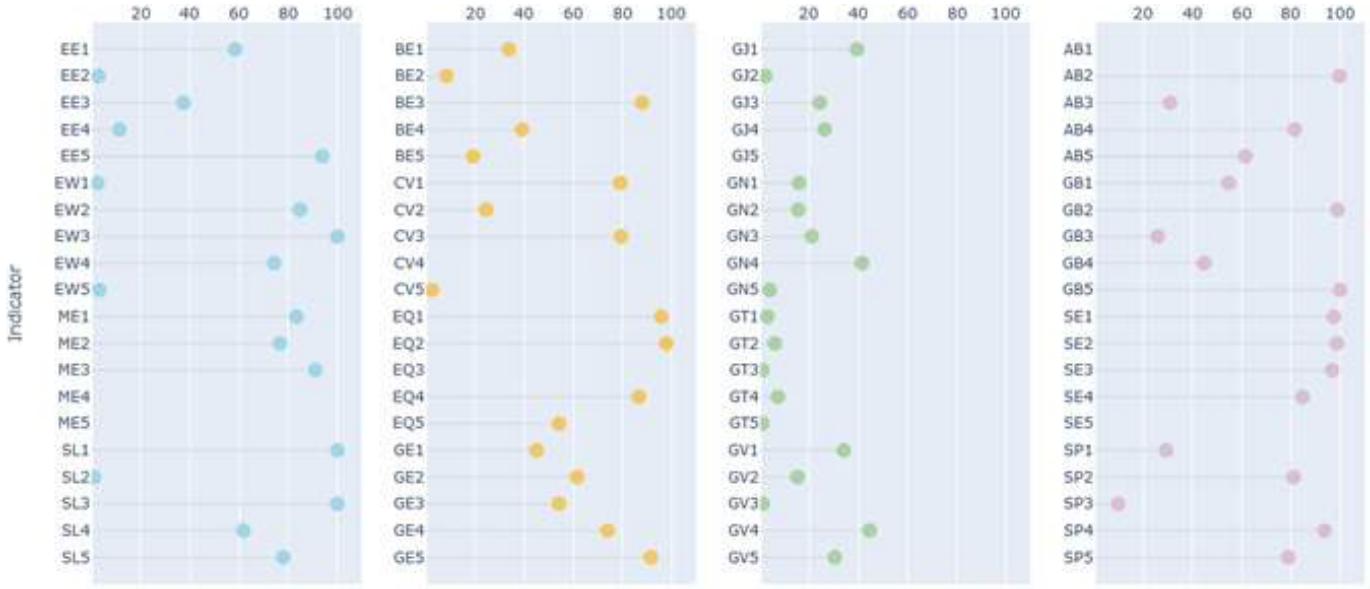
Source: Authors own. The figures are available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

Appendix 4 Benchmarked scores of the green growth indicators

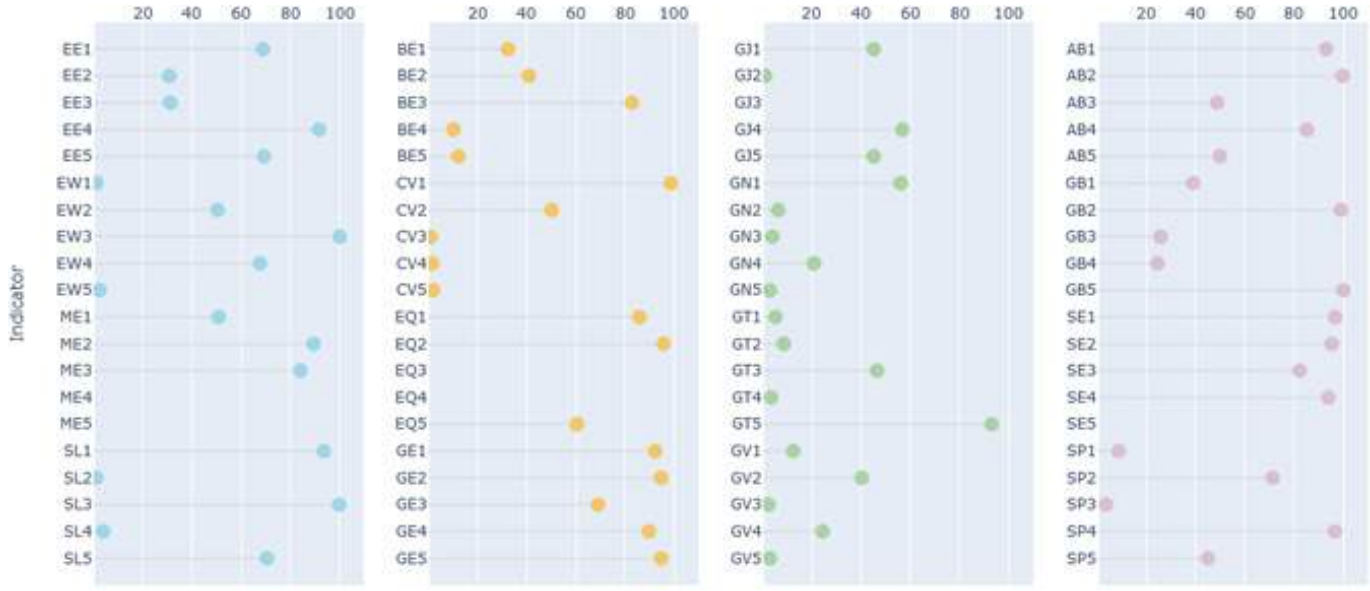
Azerbaijan



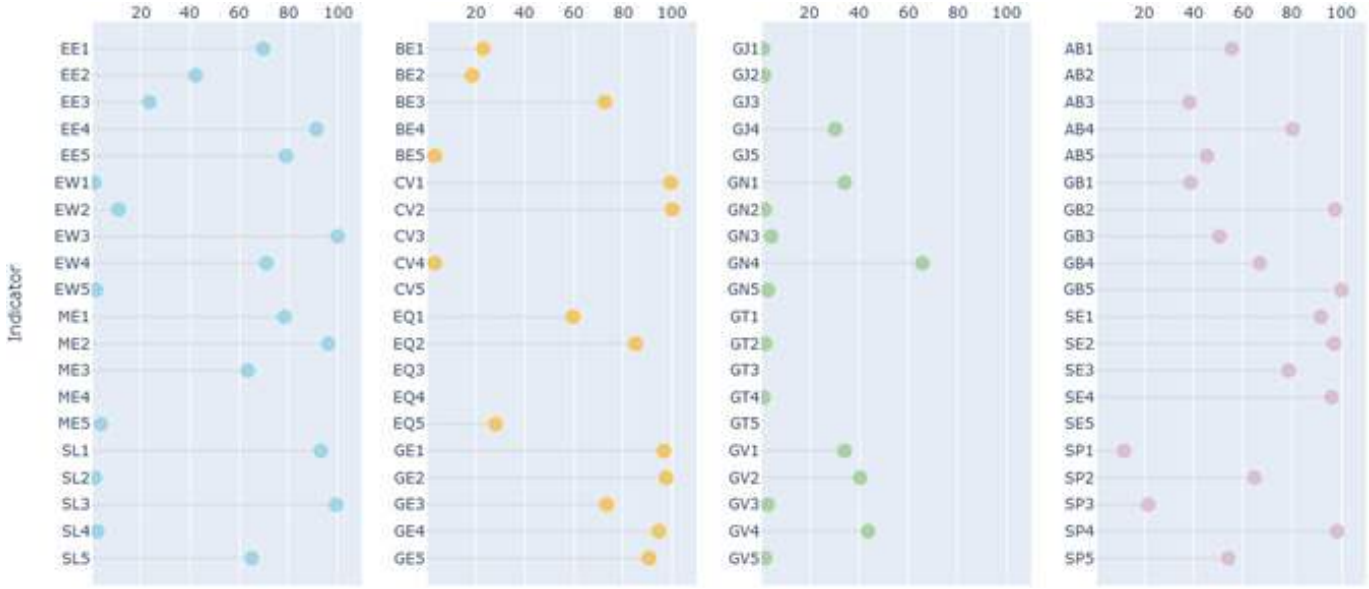
Kazakhstan



Kyrgyz Republic



Tajikistan



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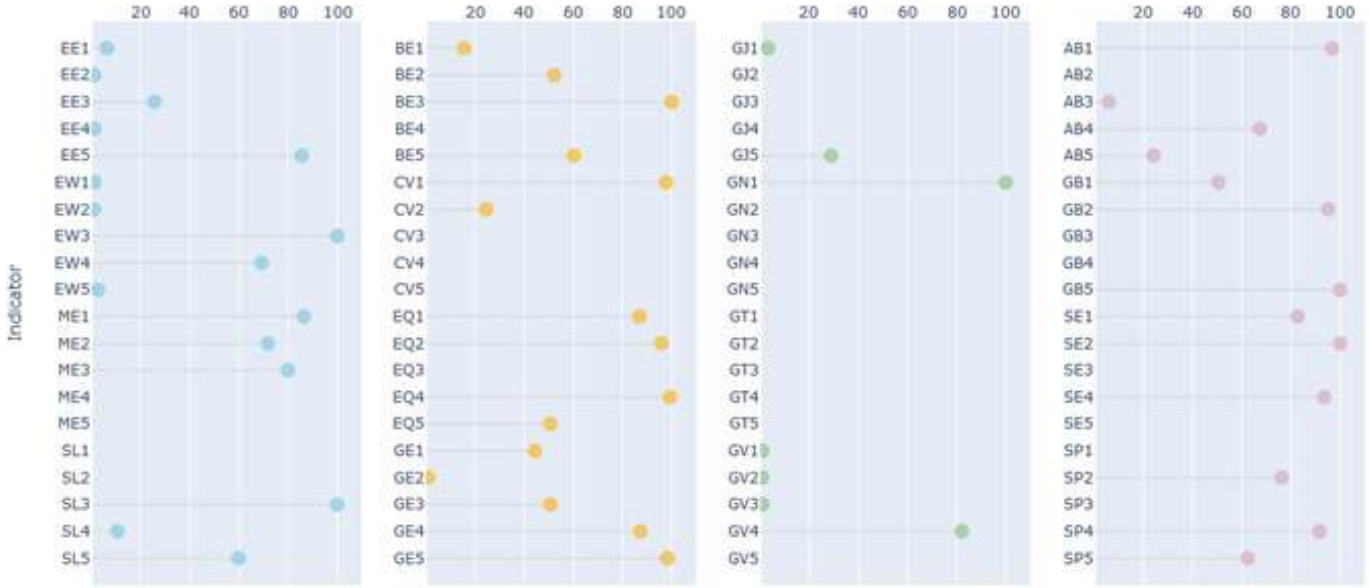
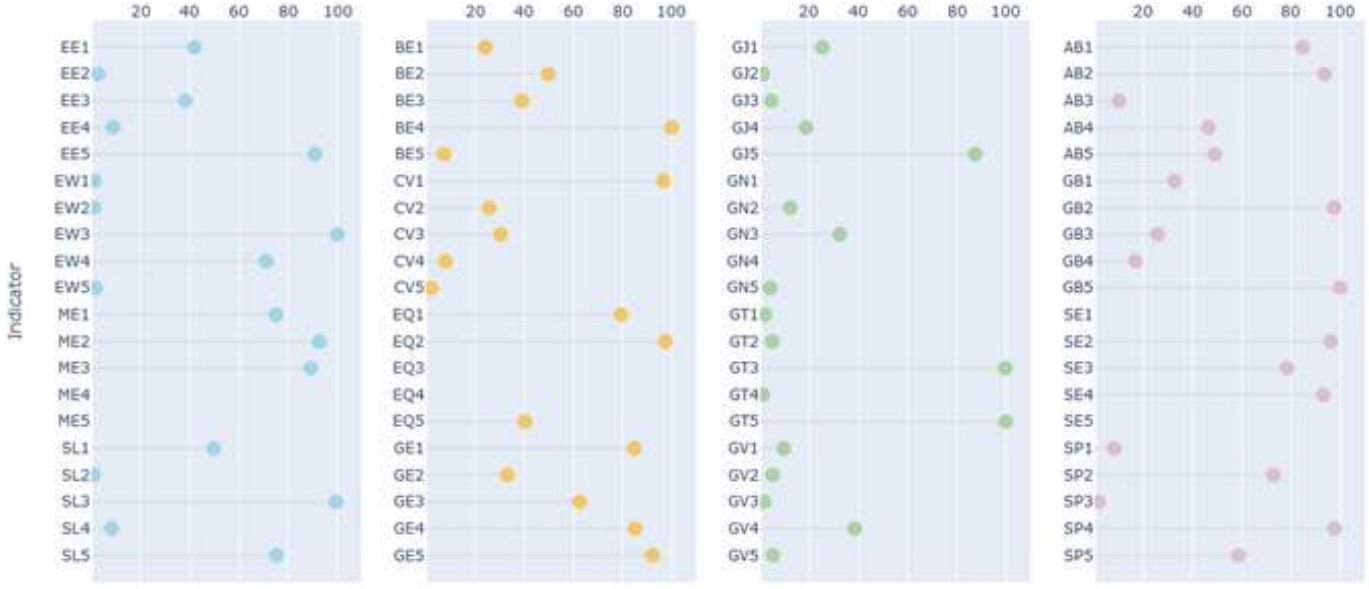


Uzbekistan



Source: Authors own. The figures are available on the interactive webpage at this link: https://azerbaijan-centralasia-ggindex.gggi.org/

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