



Uzbekistan: *Choosing an Innovative and Green Future*

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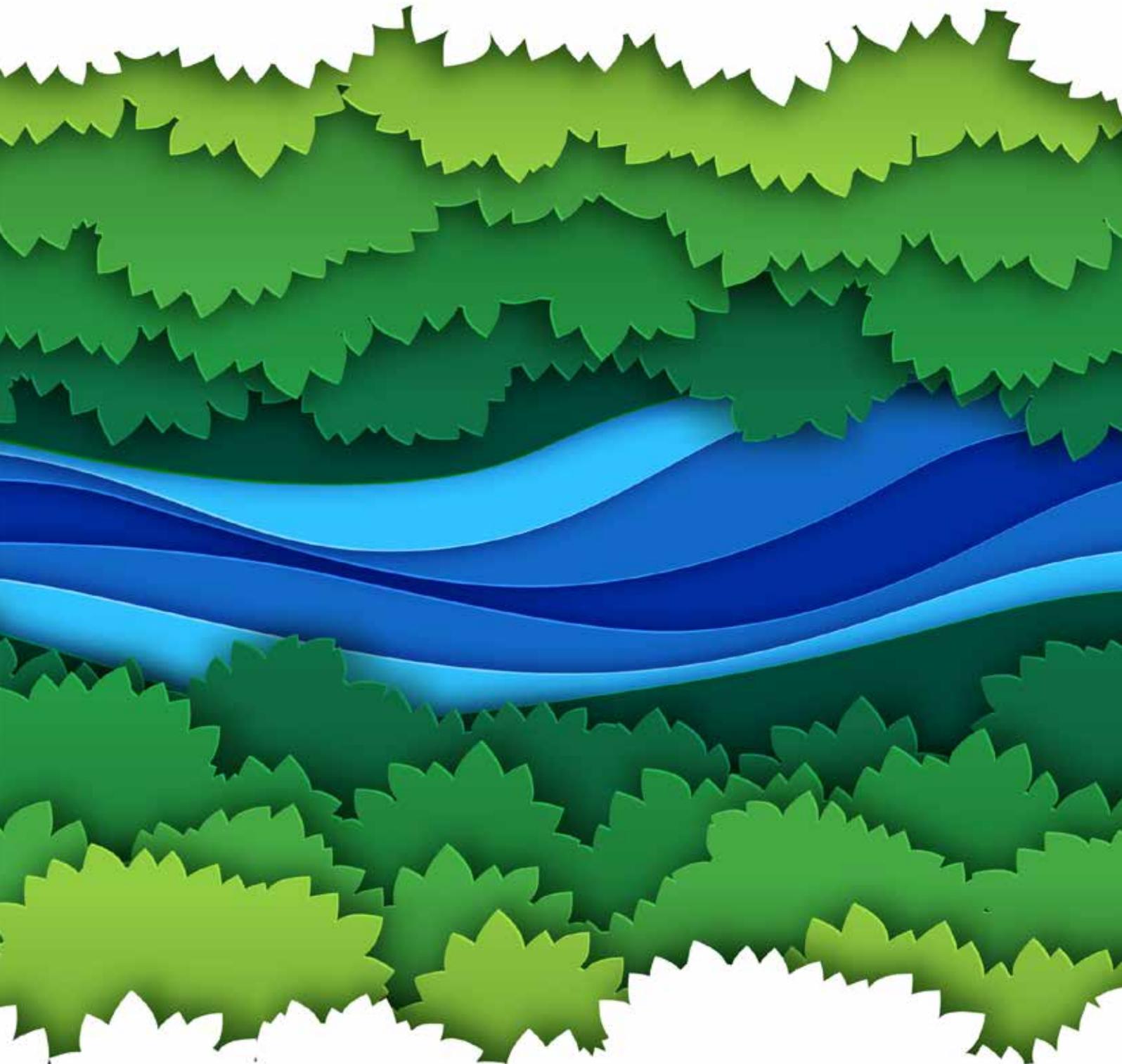
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EXECUTIVE SUMMARY



What is green growth for Uzbekistan?

Uzbekistan has a unique opportunity to make early investments to 'green' its ambitious economic and market transition. A greener economic growth model in Uzbekistan, based on the sustainable and efficient use of natural and energy resources, would minimize pollution, reduce climate and environmental impacts, and strengthen resilience to natural disasters and climate change. It would allow the country to overcome limits to growth under its present development pattern by capturing the dynamics between transformative technology and natural capital, delivering growth and create jobs while improving sustainability, resilience, and inclusion. A greener growth model could also help strengthen Uzbekistan's economic competitiveness in a more climate- and environmentally aware global marketplace.

Why is green growth relevant and beneficial for Uzbekistan?

Uzbekistan stands to gain enormously from better use of its natural resources. On a gross domestic product (GDP) basis, it is the most greenhouse gas (GHG) emission-intensive economy in Europe and Central Asia and the fifth most intensive globally.¹ In water productivity, the country ranks in the bottom 20 countries in the world (World Bank Data Bank 2021).

What are the challenges for Uzbekistan to grow in a greener and more sustainable way?

Green growth involves economy-wide changes that call for strong policy coordination and an institutional and regulatory framework that cuts across sectors. Strong political commitment is key to managing sectoral tradeoffs and sustaining action over successive governments. It must be supported by objective technical advice, adequate data and analytics, knowledgeable staff in government, catalyzing finance, engaging the private sector, and a low-emission development strategy.

How can Uzbekistan transition to green growth?

Anchored by a low-emission development strategy, Uzbekistan can chart a sustainable pathway for economic development along six green growth blocks:

Sustainable and Efficient Use of Natural Resources (Land and Water)

Priorities:

- Promoting sustainable agricultural production and processing to achieve food security
- Creating jobs in agriculture, natural resources, and ecotourism
- Reducing demand for, and improving the efficiency of, water use and irrigation
- Reducing land and forest degradation from crop and livestock farming.

Building a green growth model now is more affordable than mitigating risks in the future.

Strengthening Resilience to Natural Disasters and Climate Change

Priorities:

- Addressing the impacts of desertification of the Aral Sea and a changing climate
- Strengthening planning and preparedness through improved hydrological, weather, and climate information
- Combining nature-based engineering solutions with built infrastructure solutions to improve the resilience of infrastructure
- Building financial resilience of the economy, households, and businesses to allow them to better weather natural disasters.

¹ World Resources Institute. 2018. IEA Energy Statistics <https://www.iea.org/data-and-statistics>, CAIT Climate Data Explorer.

Green and Low-Carbon Development of Industry and the Economy

Priorities:

- Diversifying the energy mix to support a growing economy, while reducing energy intensity, pollution, and carbon emissions
- Adopting global best practices to reduce the environmental impact of mining
- Leveraging the country's mineral resources to meet growing global demand for metals for the green energy transition
- Adopting circular economy practices to extend the life cycle of products and modernize industrial enterprises.

Innovation and Effective Green Investment

Priorities:

- Developing policies to support technology development and adoption are useful tools for spurring green growth
- Supporting the adoption of advanced technology to take advantage of global investment opportunities and the vast number of new jobs that will be created by the green transition.

Innovation for Development

Uzbekistan can shape its development path by coupling its comparative advantages to green, innovative global trends as other countries have done. For example, Denmark became a leader in wind power, Korea transitioned to a high-income country by becoming a global leader in innovation and technology, and Mexico speeded up its digital transformation to empower low-income households.

Sustainable and Inclusive Urbanization

Priorities:

- Transitioning to more compact cities and more inclusive urban growth to remedy the recent, unsustainable peri-urban sprawl
- Addressing the lack of access to, and quality of, basic services
- Promoting green and integrated urban transport to reduce traffic congestion, use of cars, demand for parking, and emissions
- Reducing waste and improving waste management in cities to reduce soil, air, and water pollution
- Reducing urban air pollution to improve health of urban citizens and reduce health-related costs
- Developing environmentally sustainable tourism along the ancient Silk Road to revitalize urban economies.

Support for People and Places Most Impacted by the Transition

Priorities:

- Creating good jobs in more environmentally sustainable sectors for lower-skilled workers and those living in lagging regions of the country will be a priority, together with training and reskilling workers
- Put in place new systems to protect the most vulnerable from the effects of a green economic transition.



1. A GROWTH PATH OF INNOVATION AND SUSTAINABILITY



What is green growth for Uzbekistan?

Green growth is an approach to economic development that encompasses the sustainable use of natural resources (minerals, land, water and clean air, and biodiversity), reduction of greenhouse gas (GHG) emissions, strengthened resilience to climate change, and a focus on market openness and technological innovation to stimulate new industries and jobs. There are clear benefits to green growth: just tackling resource efficiency can deliver broad positive effects to the economy.

Subsidies for fossil fuel, water, and agriculture are often the cause of resource intensity and waste. They are environmentally harmful and create a fiscal burden. Addressing market and governance failures that stunt the economic system will create an enabling environment for growth that is cleaner, while reaping a fiscal dividend that can be directed toward green investments, innovation, and reskilling. For Uzbekistan, a greener approach to growth can shift the economy away from imminent growth-limiting hurdles under the current development trajectory. The current resource-intensive and inefficient economic model has placed an unsustainable burden on air and water quality and other natural assets, threatening food production, human well-being, and future economic growth.

A greener growth model can unlock opportunities for innovation, investment, and value creation, thus reducing economic and fiscal losses and strengthening productivity. As consumer preferences and global trading regimes become more climate- and environmentally aware, Uzbekistan has more reason to pivot away from a business-as-usual approach to one that enhances innovation-driven development in the private sector.

Why is green growth relevant and beneficial for Uzbekistan?

Since 2017, progress on reforms has been strong in Uzbekistan. The 2017–2021 Development Strategy was ambitious in its intent to rapidly dismantle barriers to a market-based economy and shared prosperity. The economy's robust performance in 2019 was largely due to the first phase of reforms: new firms and jobs were created, horticultural exports increased, tourism arrivals reached record levels, and poverty declined. Foreign direct investment (FDI), which nearly doubled relative to the prior year, flowed to an unprecedentedly diverse range of economic sectors. The COVID-19 (Coronavirus) pandemic has, for now, tempered the impact of these reforms but more measurable results should be forthcoming provided the country can navigate a green transition out of the pandemic.

A growth model that disregards the environment and climate constraints is no longer sustainable in Uzbekistan and globally. Economic growth has heavily relied on natural resources to a scale that is now putting at risk long-term growth prospects and social achievements. 'Greening' the economic model will allow Uzbekistan to capture the dynamics among transformative technological advances, preserve essential natural capital, and generate the full health benefits of cleaner air and a safer climate. This includes the containment of future pandemic diseases. In quantifying the benefits of green growth, the New Climate Economy 2018 report² found that these approaches, when applied globally, could yield a direct economic gain of \$26 trillion through to 2030 compared to business as usual.

Having just started the transition process, it is an opportune time for Uzbekistan to invest early, and at a relatively lower cost, to build a greener economy. There are clear limits to Uzbekistan's current natural resource dependent growth model. Uzbekistan needs a path that will increase the efficiency and sustainability of its natural resources, lower carbon intensity, and help ensure that the benefits of the transition are durable and inclusive for all its citizens. By following a path that prioritizes green investments, embraces systematic innovation, and manages risks and trade-offs, the country can deliver lasting benefits for its people. This path will increase the resilience of the country's economy, which is acutely vulnerable to a changing climate and declining access to water—risks that are no longer distant but imminent. Adopting new technologies and processes could also enable Uzbekistan to increase its competitiveness in the global marketplace as trading

² New Climate Economy Report. 2018. <https://newclimateeconomy.report/2018/>.

preferences become more sensitive to environmental impacts.

Shifting to an environmentally sustainable growth model is particularly important for a highly natural resource-dependent country like Uzbekistan for several reasons. First, Uzbekistan has a significant comparative advantage in natural resources and is highly dependent on them for exports, government revenue, and perhaps most importantly, as a source of livelihood for most of its rural population. Second, this reliance on natural resources, coupled with significant sensitivity to climate change, exacerbates the country's vulnerability. Third, with the country undergoing rapid structural, spatial, and social transformation, it is at a stage where policies and investment choices can substantially shape its development trajectory.

History shows that it is possible for countries to shape their development path by coupling their comparative advantage to innovative global trends. Examples include Denmark, which became a world-leading expert in wind power, Korea that transitioned to a high-income country by becoming a global leader in innovation and technology, and Mexico that speeded up its digital transformation to empower low-income households. The right conditions for technology to thrive are important—whether for the adoption and localization of imported technology or for indigenous innovation. Both would generate benefits and policy makers need to steer a careful path and set attainable goals.

The transition to green growth will bring new green jobs in many new sectors, yet significant changes in the labor market will require a workforce with the right skills in the right places. The transition will also reduce jobs in less environmentally sustainable sectors. This will negatively affect workers, local economies, and the communities dependent on them. Protecting livelihoods for vulnerable groups, which face the greatest risk, and effectively managing entrenched interests will be important for ensuring a sustainable transition to a greener economic model.

What are the challenges for Uzbekistan to grow in a greener and more sustainable way?

While the drivers of green growth are clear and the benefits are tangible, some key ingredients are required for implementing the green transition. A green growth strategy will require multi-sectoral reforms under a unified direction. This calls for central coordination of economic policy among multiple government and nongovernment actors and an institutional and regulatory framework that cuts across sectors. Many aspects, such as decarbonization, have an extended time horizon and require effective long-term planning, implementation, and a credible commitment to ambitious policies over multiple political cycles. Green policies may be debated and contested, and tradeoffs may have to be made between sectors and constituencies. Strong political commitment is needed, and this must be supported by technically informed and objective recommendations. Finally, there will be technical and resource needs. There will be data gaps that need to be filled to support modeling and options analysis. The government needs to be adequately staffed and knowledgeable about green growth.

Pursuing a long-term low-carbon development strategy is consistent with sound economic growth. Building a sustainable growth model now—at the earlier stages of the transition to a full market economy—is a smart insurance strategy for avoiding higher and costlier risks in the future and for advancing more expeditiously on policies and the adoption of innovative technologies. However, there is no 'one-size-fits-all' prescription for fostering greener growth. Uzbekistan will have to chart its path based on its policy and institutional settings, level of development, social structures, resource endowments, and environmental pressure points. Consistent with good international practice, Uzbekistan's green transformation priorities should be anchored by a long-term (for example, to 2050) low-carbon development strategy.

How can Uzbekistan transition to greener growth?

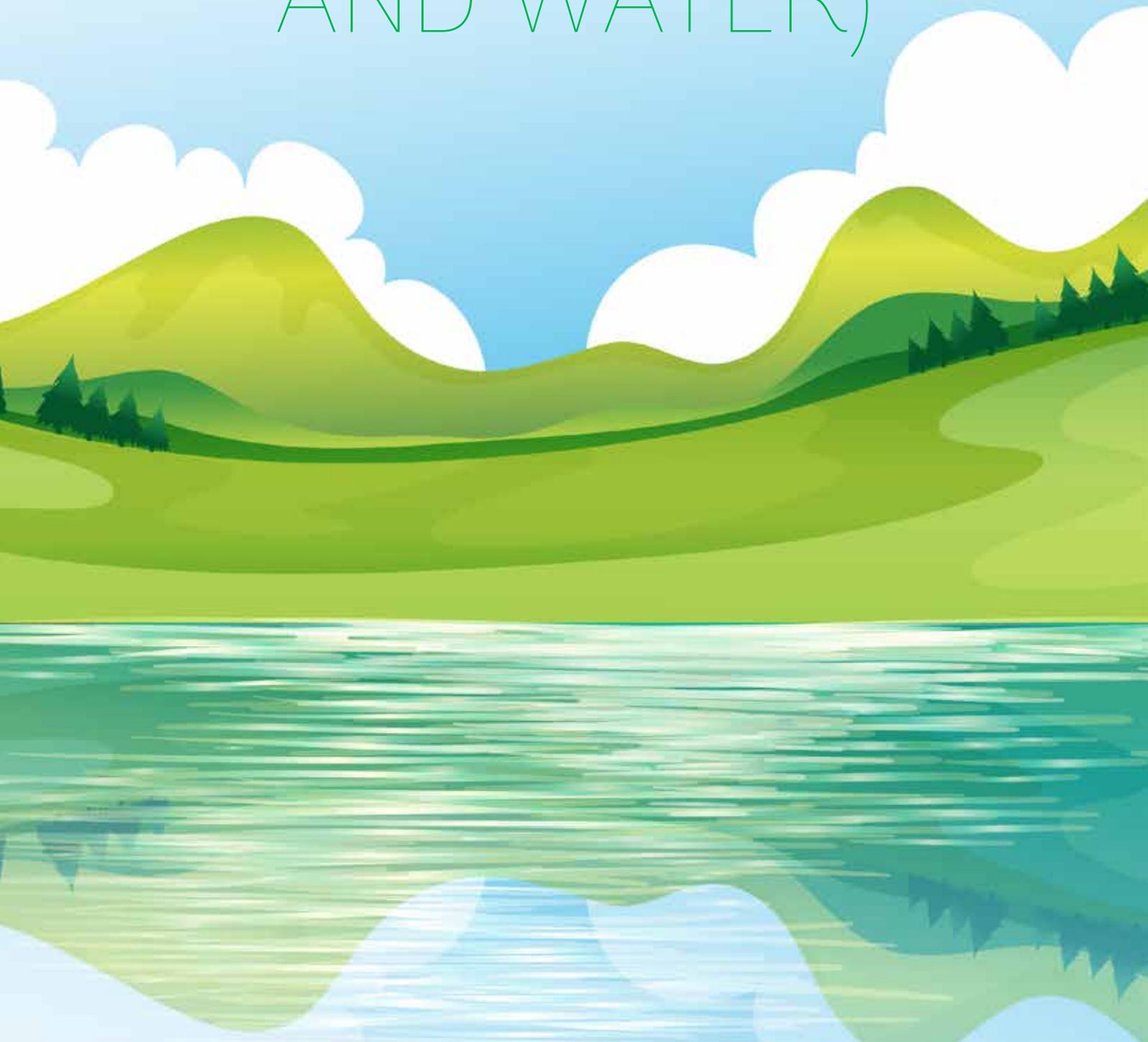
This note proposes that that the pathway to greener growth for Uzbekistan is organized into six areas with specific sectoral priorities embedded within these main blocks: Sustainable and Efficient Use of Natural

Resources (Land and Water), Strengthening Resilience to Natural Disasters and Climate Change, Green and Low-Carbon Development of Industry and the Economy, Innovation and Effective Green Investment, Sustainable and Inclusive Urbanization, and Support for People and Places Most Impacted by the Transition.

Capacity building and human capital development, an enabling policy environment, effective institutions, and the development of green finance flows could be integrated in each thematic building block. The key cross-cutting themes that will drive the green transition are job creation, capacity building and reskilling, institutional reforms, policies and regulations, strengthening of enforcement mechanisms and cross-sectoral coordination, and leveraging private sector investments.



2. SUSTAINABLE AND EFFICIENT OF USE OF NATURAL RESOURCES (LAND AND WATER)



Embracing market-oriented, inclusive, and private sector-led agriculture and water policies to improve efficiency are necessary to support the growing economy while improving the quality of life for citizens in rural areas.

Agriculture is the largest employer in Uzbekistan's economy and development of this sector can play a large role in reducing poverty and inequality, including through job creation. In 2019, about 27 percent of Uzbekistan's labor force worked in agriculture. Just under 10 percent (3.2 million) of Uzbekistan's population lived below poverty line (World Bank 2019). Eighty percent of the poor are in rural areas and their livelihoods largely depend on agriculture (World Bank 2020a). Evidence shows that globally, growth in agriculture has led to 2–3 times greater poverty reduction than growth in any other sector, and the largest impact has originated from being employed in agriculture (World Bank 2020b, c).

Sample Opportunities:

- Job creation and food security through more sustainable agriculture
- Substituting pump irrigation (electric) with gravity, drip, and solar irrigation
- Food, forage, and lumber from reforestation
- Watershed management, erosion prevention, and decarbonization from landscape restoration
- Crop diversification.

Achieving food security is one of the country's top priorities and finding agricultural solutions that provide food for a growing population while conserving water resources is essential. Agriculture produces one-quarter of the gross domestic product (GDP) in Uzbekistan. However, agricultural land productivity in the country is well below average for lower-middle-income countries and Uzbekistan ranks in the bottom 20 countries globally for water productivity. Water withdrawal rates exceed 90 percent of the total renewable resource, driven primarily by their inefficient management. Widespread land degradation caused losses equivalent to 4 percent of GDP due to a failure to protect land.

Crop and livestock farming is causing land and forest degradation, harming rural livelihoods throughout the country. Ecosystem productivity has been declining and soil degradation in the wider landscape has increased due to intensive grazing, unsustainable agricultural practices, poor water management, and the degradation of forest belts.

Supporting reforestation will generate multiple benefits not only by providing forage, food, and construction materials, but also by improving watershed management and preventing soil erosion. Natural resources generated by sustainable landscapes could provide a strong input for agriculture and industrial and service sectors and become one of the pillars for a sustainable ecotourism sector.

Landscapes also have the potential to support decarbonization efforts and may be a win-win opportunity for Uzbekistan. Investing in landscape restoration is critical to address the complex nexus of local livelihoods, land degradation, climate change, environmental security, and economic growth. A public works 'green-wagers' program that restores natural capital can create jobs and lay the foundation for economic growth for future generations by establishing natural-resources-based businesses in rural areas. Evidence (Mirzabaev et al. 2016; Quillérou et al. 2016) suggests that every dollar invested in sustainable landscape restoration can yield four dollars in returns over a 30-year period. This is regionally significant given the worth of ecosystem services by 2035 in Central Asia is estimated to be \$1,527 billion (Li et al. 2019). There are some high-profile examples of how reforestation can be very successful in restoring the quality of the land and even generating ecotourism and other sustainable industries. Fortunately, countries like Costa Rica provide a model for a way forward.

SOE reforms, including reform of the heavily subsidized pump irrigation system, are critical for future sustainable growth; the introduction of a cost recovery water tariff is a first step in rationalizing water usage. Approximately 80 percent of the country's agricultural production depends on inefficient pump irrigation systems, which suffer from high water losses due to aging and poorly maintained and operated

infrastructure. Financing models for irrigation sector investments and service delivery focused on substitution of pump irrigation with gravity, drip, and solar irrigation are the domain of public funding which has led to perverse incentives. While Uzbekistan has undertaken reforms, including increasing water prices and a Presidential Decree requiring cost recovery, tariffs remain far below cost recovery levels. Calculating a price that reflects the true value of water and thereby contributes to the long-term sustainable management of water resources, is clearly not a simple task. However, it is critical, for both the effectiveness and the integrity of the proposed water pricing systems.

Costa Rica's Reforestation

Costa Rica is a successful case study in how a country can utilize fiscal instruments to fight deforestation and forest degradation. By the late 1980s, Costa Rica had lost about half of its rainforests to land clearing to make way for crops and livestock. In the 1990s, the government introduced a ban on forest logging and a Payment for Environmental Services (PES) designed to protect watersheds, conserve biodiversity, or mitigate carbon dioxide emissions.

The PES scheme pays an average of \$64 per hectare per year for basic forest protection, according to FONAFIFO,* the nation's industry fund. FONAFIFO is financed by a dedicated gasoline tax to support payments for ecosystem services. Today, close to 60 percent of the land is once again forested, home to a plethora of plants and animal species and the ecotourism sector is considered a model for the rest of the world and is a solid foundation for resilient and sustainable economic growth.

* <https://www.fonafifo.go.cr/es/servicios/estadisticas-de-psa/>



Opportunities for private sector financing of irrigation through public-private partnerships (PPPs) are growing. One initiative utilizing a 'farmer-centric' model was created and strengthened in Central Asia's Fergana Valley to disseminate knowledge on improved agronomic and irrigation management practices among researchers and farmers with the goal of improving water productivity at the field level. As a result, yields of cotton from 25 demonstration sites in the three countries of Fergana valley—the Kyrgyz Republic, Tajikistan, and Uzbekistan—were, on average, 28 percent higher than the average yield of cotton in the rest of the valley, suggesting that the proposed institutional mechanism was very effective in disseminating information to farmers.

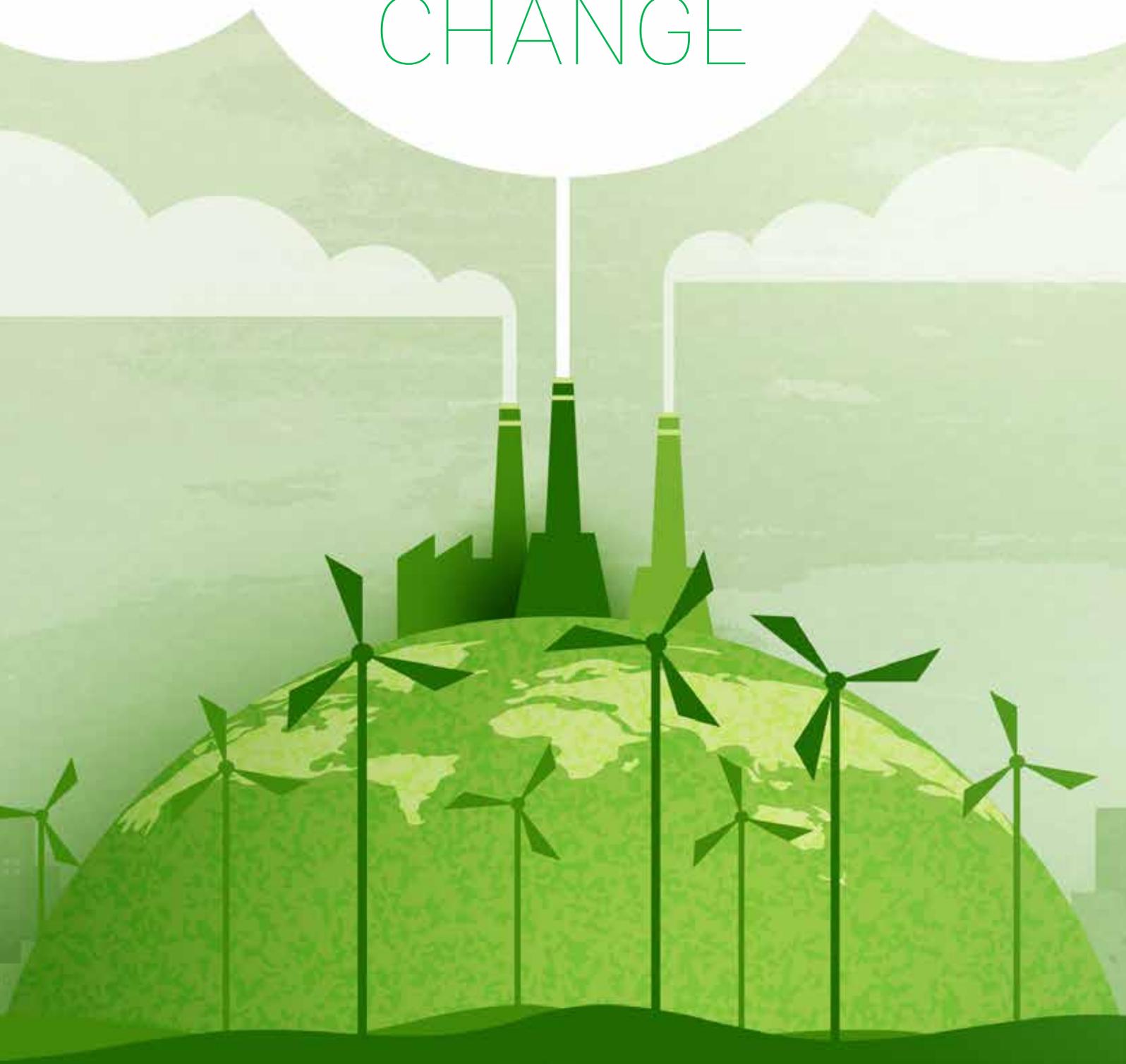
Crop diversification and the introduction of water-saving agricultural techniques such as drip irrigation coupled with landscape restoration could provide opportunities for Uzbekistan, but they are also rife with challenges. Drip irrigation, a technology introduced in the 1960s to reduce water evaporative losses and fertilizer use has been adopted by a wide range of water-scarce countries from Pakistan and China to Mauritania and Morocco. One of the challenges is that it can encourage an expansion or intensification of cultivation of more water-thirsty crops. In Uzbekistan, for instance, the ongoing shift from cotton and wheat to higher value-added crops, like potatoes and vegetables, has increased demand for water and fertilizer. Increasing yields requires drip irrigation and nutrients reaching the crops through effective landscape restoration. Moreover, if drip irrigation is used as part of a program to restrict individual consumption in combination with increasing farm productivity, major gains are possible.

Vertical hydroponic agriculture is another possible high-tech solution to the dual problems of limited land

area and constrained water resources, thus providing better opportunities for sustainable food production. While not a new idea, it is getting more attention in several countries because of advances in hydroponic and aeroponic technology, lighting through LEDs, and energy provided from solar cells. It is now possible to have agriculture in cities and possibly even in individual households with very little land that would produce food that would not need to be shipped far to end consumers. Denmark was a pioneer in the 1950s but South Korea, Japan, China, and Jordan, among others, are moving ahead in the development of vertical farming projects.



3. STRENGTHENING RESILIENCE TO NATURAL DISASTERS AND CLIMATE CHANGE



Strengthening resilience to natural disasters and climate change will require a comprehensive program of investments and institutional reforms to reduce risk exposure, mitigate physical impacts, and protect people and public finances against the worst effects of disasters.

Investments in critical assets and infrastructure to reduce exposure to disaster risks are required. The economic and social costs of weather-related hazards and damages are set to rise with a changing climate. In Uzbekistan, earthquakes and floods affect 1.4 million people every year causing almost \$3 billion in losses.³ Severe drought, which is expected to become an increasingly regular occurrence in Uzbekistan, based on climate projections, will have similarly large economic impacts. Many public buildings and assets are also in flood hazard zones, affecting approximately 34 percent of Tashkent's major roads, 18 percent of schools, and 23 percent of hospitals.

Sample Opportunities:

- Improved resilience of infrastructure through combining nature-based engineering solutions with built infrastructure solutions.
- Modernized hydrometeorological information service
- Development of insurance sector as a risk manager, underwriter, and investor equipped with new financial tools.

Climate change is affecting the water balances and is linked to the desertification of the Aral Sea, one of the biggest environmental challenges for the region. According to the United Nations (UN), the drastic loss of river flow into the Aral Sea over the past 50 years has triggered a complex set of environmental-climatic, socioeconomic, and demographic problems. Previously, the Aral Sea regulated the climate in the region by making the winters milder and the summers cooler. Now, the resulting shorter and hotter summers, longer and colder winters, and a decrease in precipitation pose further risks to populations living in the area. Since the World Bank restoration program began, the North Aral Sea level in Kazakhstan has increased by up to four meters, and its salinity has halved. However, the Southern Aral Sea in Uzbekistan is still a desert, and the seabed is a frequent source of sand and dust storms with air contaminants having a negative impact on the health of the population and on agricultural productivity in the entire Central Asia region.

Timely supply of hydrological, weather, and climate information are a foundation for assessing and mitigating climate risks. Recent decrees by the Government, which set out ambitious modernization goals for Uzhydromet, recognize this critically robust information for decision-making across timescales. Automation, digitization, and commercialization of hydrometeorological and climate services can help achieve these goals; however, it should also be ensured that basic information and services needed to protect lives and livelihoods are freely accessible to all relevant stakeholders and decision-makers, supported by the central public budget. The World Bank's support to the Hydromet Modernization project in the Russian Federation could be a model for Uzbekistan to enhance its hydrometeorological information services in the country.

Nature-based approaches, or combining nature-based engineering solutions with built infrastructure solutions, are increasingly promoted as ways to improve the resilience of infrastructure, particularly in urban areas. The idea behind this 'nature-smart' approach is to work with a country's natural environment, for example, to protect against flooding by restoring wetlands or investing in nature-based watershed management solutions. There is a growing body of evidence demonstrating that putting nature to work can be a cost-effective way to deliver infrastructure services with greater impact while reducing risks from natural disasters, and thus enhancing climate resilience.

Financial resilience and physical resilience complement and reinforce each other at the household, business, and national levels. Financial resilience includes actions to address the growing climate risks and prevent the creation of new ones through climate risk finance (World Bank 2021). It is particularly important to strengthen the financial resilience of vulnerable households in Uzbekistan, including low-income families, many of whom live in rural areas and rely directly or indirectly on agriculture. For instance, only about 10 percent

³ World Bank, UNDRR, Disaster Risk Profile: Uzbekistan, <https://www.gfdrr.org/en/publication/disaster-risk-profile-uzbekistan>.

Russia: Hydrometeorological Service (Hydromet) Modernization Project

The World Bank supported modernization of the Russian Hydrometeorological Service is enhancing the country's capacity to deliver reliable and timely weather, water, and climate services, including in the Arctic, and facilitates decision-making on climate adaptation issues. The technical capability of Russian Hydromet has improved to issue weather forecasts with better lead time, accuracy, and spatial resolution. The lead time for preparation and response has increased by one additional day. The accuracy of natural hazard warnings has also increased to 95.5 percent—comparable to that of leading world meteorological services. These improvements were possible thanks to new equipment and new forecasting methodologies deployed by the project. In parallel, the volume and quality of data, including climatic information, that is shared with the global centers have increased, which is important for improvement of the outputs of the global forecasting models. The project supports modernization of upper air stations and remote stations in the Arctic where the network is very sparse and data are vital for better weather forecast and climatic projections. Installation of a new supercomputer in the Russian Hydrometeorological Center has expanded its capabilities as a global forecasting center and enabled provision of support to Central Asian countries, including Uzbekistan, generating new local area models for better prediction of hazardous weather events.



of households have catastrophic insurance, while the remaining uninsured homeowners require government financial support in the event of a major disaster. For businesses, the insurance industry is also relatively underdeveloped, and firms hold large exposure in the event of a large disaster. These challenges are compounded by outdated technical regulatory frameworks and insufficient regulatory oversight. One possible response is to have an integrated financial resilience policy. New financial instruments, such as disaster insurance, can be developed and combined with national planning and budgeting for contingent liabilities to disasters or contingent credit arrangements (World Bank and GFDRR 2018). This partnership leverages the risk information and pricing expertise of the insurance sector to deliver innovative risk transfer products and services. Enhancements to distribution channels and payout mechanisms can also be explored. For instance, there is complementary development of financial instruments to help build financial resilience and aid recovery from natural disasters under the European Union (EU) Green Deal (2019).



4. GREEN AND LOW-CARBON DEVELOPMENT OF INDUSTRY AND THE ECONOMY



Diversifying the energy mix to support a growing economy, while reducing energy intensity, pollution, and carbon emissions are important objectives. Adopting circular economy practices will drive the greening of infrastructure and the modernization of industrial enterprises.

Uzbekistan is the most GHG emission-intensive economy in Europe and Central Asia (ECA) and the fifth most intensive globally. Emissions intensity in Uzbekistan is more than twice the level of its Central Asian peers, more than six times the global average, and eighteen times the average in the ECA region.⁴ This is despite the emissions intensity falling sharply and steadily over the last two decades, as economic growth and structural transformation of the economy accelerated. Fossil fuel subsidies are significant in Uzbekistan and represent major disincentives for efficient resource allocation.

Sample Opportunities:

- A long-term shift toward lower energy, carbon, and material intensity in all sectors
- Optimized use of resources through a circular economy approach
- Economic opportunities and jobs related to export of minerals and metals used for clean energy production.

New opportunities for Uzbekistan can emerge from building new sustainable industries in a sustainable way. A circular economy is an alternative model to the current linear economy of 'take-make-dispose'. It is driven by growing consumer and corporate awareness of the need to reduce carbon and material intensity and environmental impacts generated by the throwaway economy. It is a model of production and consumption which involves 'reduce-reuse-recycle' existing materials and products as far as possible. A circular economy approach supports green growth and green industrialization by designing out the waste and developing regenerative and circular systems. While the circular economy has been mostly seen as a rich country agenda, it has enormous potential for lower- and middle-income countries and can open new possibilities across value chains based on optimizing the use of resources and reducing waste. By some estimates, leveraging the circular economy could open market possibilities that total up to \$4.5 trillion globally (Lacy and Rutqvist 2016).

The growing demand for minerals and metals from the global clean energy transition, for example, will provide economic opportunities and jobs for resource-rich countries like Uzbekistan. It is estimated that over 3 billion tons of minerals and metals will be needed to deploy wind, solar, and geothermal power worldwide, and the production of minerals such as graphite, lithium, and cobalt may increase by nearly 500 percent by 2050. If unchecked, the volume of mining over the next few decades could increase global emissions, water use, and global waste, and potentially result in conflict among communities. That is why it is essential for public and private partners to manage natural resources responsibly, maximize the life cycle of the metals and minerals used (improve circularity), and extract them in an environmentally sensitive manner. Digitalization of the mining sector can be adopted to monitor environmental performance, as well as to track and map information on products, components, materials, and value chains to produce digital product passports.

The country faces transition risks from a global policy environment that is shifting rapidly in favor of action to address climate change. In the short term, as the EU considers adoption of carbon border adjustment taxes, industrial and energy production, which remains carbon intensive in Uzbekistan, may face some barriers in key export markets. In the first phase (expected to start in 2023), the main sectors that could be affected are chemicals and some non-ferrous metals. In the long term, as the coalition of countries aiming to adopt carbon border taxes broadens and encompasses a wider range of sectors, the value of Uzbekistan's primary export commodities could be sharply reduced with significant fiscal and financial implications.

Addressing market failures and 'getting the price right' is part of a broader green growth policy package (World Bank 2012). Energy subsidies in Uzbekistan can be approximated by the quasi-fiscal losses of state-owned enterprises (approximately 6 percent of GDP) that reflect the Government's support to capital-

⁴ World Resources Institute. 2018. IEA Energy Statistics <https://www.iea.org/data-and-statistics>, CAIT Climate Data Explorer.

intensive industry. Green fiscal policies raise revenues in an economically and fiscally efficient way, making them good fiscal choices in addition to providing environmental benefits. Eliminating subsidies will increase innovation and develop financial markets by pricing environmental externalities (such as carbon) and creating tradable property rights (World Bank 2015).

The World Bank's Initiative to adopt global best practices to reduce the environmental impact of mining (climate-smart mining)

The Climate-Smart Mining initiative aims to help resource-rich developing countries benefit from increasing demand for minerals and metals while ensuring that the mining sector is managed in a way that minimizes social and climate impacts. This is the first fund of its kind and brings together governments, industry, financial institutions, and private investors to support responsible extraction and processing of minerals and metals.

Pressure on producers to extract in a more sustainable way comes from several other sources such as the EU Raw Material Initiative, which aspires to secure raw materials from sustainable suppliers to reduce environmental impacts. Producers in some countries seem to be responding to calls for greater accountability. For example, in Chile, the world's top copper producer, the largest copper mining companies (accounting for 97 percent of global production) voluntarily committed to GHG reduction targets.

The transformation of the electricity sector, based on unleashing an innovation potential for Uzbekistan, will help satisfy the anticipated increase in demand. Obsolete infrastructure results in high electricity losses, estimated at 20 percent of net generation, and frequent power outages, undermining economic activities and the well-being of citizens across the country. Emissions are dominated by the energy sector, which accounts for 89 percent of total GHG emissions. Since 2017, Uzbekistan has accelerated policy reforms toward a market-based system and opening of the country toward economic partnerships in the region and is working to reduce its dependence on natural gas and coal. Energy reform is among the highest reform priorities for the Government. Its key areas include addressing the inadequate operational and financial performance of the state-owned energy enterprises, removing infrastructure bottlenecks, restructuring of electricity and gas sectors and transitioning to a competitive market, decarbonizing the energy value chain, promoting the renewable energy, involving the private sector, and improving the institutional and market structure.

Initial steps have been taken to develop renewable energy resources with private sector participation.

In April 2020, the Government approved a 2020–2030 generation expansion plan,⁵ which includes the development of 5,000-megawatt solar and 3,000-megawatt wind power. This would increase the share of renewables in the power generation capacity mix from 0.2 percent to 25 percent over 2019–2030, a significant development. In August 2021, Uzbekistan began operating its first solar photovoltaic plant, which will produce 270 gigawatt hours per year of electricity from solar energy resources, enough to power more than 31,000 households, and prevent the release of 156,000 metric tons of GHG annually. New tenders on solar and wind power will follow to increase the share of renewable energy in the power mix and further contribute to the country's clean energy transition. Countries such as Morocco have followed this growth model and could provide some lessons as Uzbekistan considers how to build an ambitious energy future based on renewables.

⁵ In April 2020, the Government of Uzbekistan approved its 2020–2030 Generation Expansion Plan, which calls for development of about 15 gigawatts of net generation capacity (at an estimated investment cost of \$14.7 billion) by 2030, with 5,000 megawatts and 3,000 megawatts of solar and wind power, respectively. To this end, the development of 2 gigawatts of solar and 1 gigawatt of wind IPPs is under way in collaboration with international financial institutions (IFIs)—that is, World Bank Group (WBG), Asian Development Bank (ADB), and European Bank for Reconstruction and Development (EBRD)—on a competitive basis.

Morocco: Solar Technology

As part of its national goal to reduce dependence on fossil fuels, Morocco developed a world-class solar and wind industry as a major share of its green energy future. The Solar Plan is a critical component of the country's goal of producing 52 percent of its electricity through renewable energy by 2030.

When the 580-megawatt Noor-Ouarzazate complex is completed, it will be the world's largest Concentrating solar-thermal power (CSP) energy generating plant. Along with providing power to over 1 million people, it will decrease Morocco's dependence on oil by about 2.5 million tons per year and reduce carbon emissions by 760,000 tons per year. The Noor-Midelt complex will be Morocco's second CSP complex built under the Noor Solar Plan.



United Kingdom: Clean Growth Strategy

The UK Clean Growth Strategy (2017) maximizes the economic and social benefits of reducing emissions through support for innovation, national green finance, and policies to deliver social and economic benefits to drive clean growth in the country and globally.

The Clean Growth Strategy includes specific actions for improved industrial efficiency; a shift to low-carbon transport; clean, smart, and flexible power systems; an improved value of natural resources; and continued government leadership.

Under the strategy, the UK government aims to eventually decarbonize all sectors of the country's economy, beginning 2020, to achieve a 57 percent reduction in GHG by 2032. It has since become the basis of the UK's Net Zero Carbon plan for 2050.

Government of the United Kingdom. 2017. "Clean Growth Strategy." Department for Business, Energy and Industrial Strategy, 2017, <https://www.gov.uk/government/publications/clean-growth-strategy>.



5. INNOVATION AND EFFECTIVE GREEN INVESTMENT



Adopting new technologies that leverage private sector investment will be essential to take advantage of global investment opportunities and the vast number of new jobs that will be created by the green transition over the next decade.

Uzbekistan will require significant investment, both public and private, foreign, and domestic to unlock its growth potential.

But the current demand for green investment is low because of policy and institutional incentives that favor energy-, carbon-, and material-intensive investment over green investment. Key policy reforms are required to unlock the potential of economic agents to invest in low-carbon technologies in state-owned enterprises, remove barriers for green investments of private companies, and to seek financing for them. The financial sector in Uzbekistan seems to be excessively exposed to capital- and energy-intensive sectors and projects. The readiness of national innovation systems to support a green transition is fundamental.

Sample Opportunities:

- Incentive to rapidly update the legal and policy environment and governance to attract and maintain green investment
- Early adoption of new technologies, potentially in the area of digital platform, renewable energies, and e-commerce.

New digital technologies enhance opportunities for participation in global value chains. Digital platforms and customization also create opportunities for e-commerce and reaching new customers. Taking advantage of these opportunities requires firms and the Government to innovate by adopting new business models, upgrading their products and processes, and adopting more sophisticated technologies. Innovation policy—implemented with the set of public policy instruments to support innovation directly or indirectly—is central for the green transition of Uzbekistan. Innovation is not anymore about research and development (R&D) activities, but much more about not missing out on opportunities for broad productivity growth by investing in upgrading and adopting technologies that already exist (Cirera et al. 2020).

The financial sector faces key challenges to reduce risk from exposure to assets that are vulnerable to the physical impacts of climate change and to the impacts of global green transition. Establishing a pathway toward the greening of finance flows and leveraging public finance from less sustainable to more sustainable innovations is critical to managing the economic transition to a market economy. The key to this is faster productivity growth, which, in turn, requires attention to innovation and competition policies and a careful review of the role of the state in the economy, including in greening the industrial policies. To unleash its private sector investment, entrepreneurship, and growth potentials, Uzbekistan would need to bring down barriers to business activity and strengthen the institutional and regulatory frameworks for private investors. The quality of governance, perceptions of state partiality, and security of property are important constraints that each country addresses in its own way.

Innovation and policies to support technology development and adoption are potentially useful tools for spurring green growth. Mobile payment systems and digital banking represent one interesting example of path-creating leapfrogging. The digital payments sector in Uzbekistan presents an opportunity as it is an industry that is underdeveloped but growing rapidly and attracting private sector investment. By conservative estimates, only 50 percent of Uzbekistan's population have bank accounts and only about 15 percent use mobile apps or internet banking. Payme is among the most successful of the first wave of digital payments platforms to emerge in Uzbekistan over the past decade with an estimated 3.4 million users. In 2019, Georgia's TBC purchased 51 percent of Payme and the following year received a license to open a full-fledged digital bank called TBC UZ, which provides services such as loans, deposit accounts, and foreign exchange. Full-fledged digital banking is therefore in its infancy and presents growth opportunities. The Central Bank of Uzbekistan is working with the International Finance Corporation (IFC) to improve the regulatory environment further and to develop financial literacy within the population.

Green Base-of-Pyramid Innovations

Base-of-pyramid innovations are defined as innovations that meet poor consumers' needs. They include formal innovations for the poor, as well as informal innovations by local grassroots inventors, largely through improvisation and experimentation. Often facilitated by co-creation with poor consumers themselves, the innovations typically seek to better meet the needs of poor households at dramatically lower costs per unit, aided by significant scale-up in volumes. These innovations can be fostered by local private companies, and often with the support of public institutions, public subsidies, or produced through PPPs (such as medicines for neglected diseases and seeds for 'neglected' soil types and climates).

Affordable green housing. In Mexico, Vinte specializes in building affordable, sustainable housing for low- and middle-income families. Its research and development in new technologies helped it introduce innovations such as home designs that reduce energy costs by 75 percent.

Aakash Ganga ('river from sky'). In Rajasthan, India, ancient rainwater harvesting systems have been modernized to collect safe drinking water. This low-cost adaptation in arid regions has spurred additional innovations, generating many co-benefits for efficiency and inclusiveness:

- Automation of the traditional surveying system with satellite imaging, which shortens design time, minimizes earthwork, and reduces material costs
- Creation of a numbering plan for reservoirs, which facilitates co-investments
- Stimulation of demand for stretchable roofs, which has spurred more innovation.

Dutz, M. A., and S. Sharma. 2012. "Green Growth, Technology and Innovation." *WB Policy Research Working Paper 5932*.





6. SUSTAINABLE AND INCLUSIVE URBANIZATION



Promoting greener, more compact, and inclusive urbanization will have multiple benefits for citizens, the private sector, and government. Urban reforestation, sustainable transport and waste management, clean air, and green tourism will all increase the liveability and productivity of Uzbekistan's cities and towns.

Uzbekistan's rapid urbanization is deepening the challenges of service delivery and inclusion for residents who face significant gaps in access to and quality of basic services.

A large share of households are not connected to water, sewage, and/or heating networks. Much of current growth is found in peri-urban areas and is characterized by sprawl and disorganized growth, which creates additional costs and complexities for infrastructure and runs the risk of locking the country into increasingly unsustainable patterns of urban development. Efficient public transport services have lagged, increasing traffic congestion with private and ride-share vehicles resulting in elevated levels of air and noise pollution, inadequate waste regulation, and the loss of green spaces.

Sample Opportunities:

- Managing rapid urbanization while improving environmental standards and liveability of cities
- Integrated urban planning for highly productive and green cities.

Specifically, sprawl, the predominant form of urban growth in recent years, is leading to urban areas being unproductive, unlivable, and expensive to service. New research shows that cities in Uzbekistan are sprawling more and densifying less than cities in other Central Asian countries. This is making their form and spatial structure inefficient, services and jobs inaccessible to the population, and provision of infrastructure expensive. This also leads to loss of arable land to suburban built-up expansions. Additionally, these inefficient urban forms lock cities into reliance on private vehicles as the main mode of transport making them highly dependent on fossil fuels and energy-intensive transport. At the same time, sprawling cities stand greater risk of exposure to disasters due to weaker infrastructure coverage and poorer accessibility of urban fringes. This problem largely stems from weak land market, inadequate planning system, and low capacity of urban administrations to manage urban growth.

A strategy for sustainable and resilient cities needs to be developed for Tashkent and medium-size cities to make sure they contribute to the economic development of Uzbekistan, building on the opportunities that high urbanization provides. This strategy together with capacity building will pave the way for reform in governance and planning of cities, taking a holistic approach to sustainable urban development and leading to the efficient use of resources, while giving municipalities more freedom in their financial management.

Urban forests are not just vital for aesthetics and improving the physical and mental health of inhabitants.

They also generate sizeable economic benefits by creating employment in recreation, maintenance, and tourism; reducing noise and air pollution; reducing the cost of energy and urban infrastructures; and providing means for climate mitigation and adaptation. The benefits of urban forests are so obvious in fact that cities around the world are taking note. To preserve the world's largest water system, for instance, New York City opted to invest \$1.5 billion in watershed protection projects, including improved forest management—instead of building a filtration plant estimated to have cost \$6 billion to build and an additional \$250 million per year to maintain.

Building retrofits represent a tremendous investment opportunity as green building projects have one of the highest rates of job creation per dollar spent, according to the IFC's Green Reboot Report. The other two critical areas, according to the report, are municipal waste and greening urban transport. In Uzbekistan, both residential and industrial buildings are aged and inherently energy inefficient with deteriorated heating system causing heavy energy losses. Building upgrades and new building standards can address a range of issues for the building sector, including raising the chronically low energy performance of buildings and addressing earthquake risks in the region by incorporating seismic-resilient building design. Solid waste management also remains underdeveloped: garbage separation and recycling are uncommon, while landfills

often lack adequate safety standards, posing a risk of soil, air, and water pollution and contributing to release of methane.

China: Building Infrastructure Resiliency with Nature-Based Solutions

Cities are densely packed with impervious surfaces like concrete, bricks, and steel that leave water with nowhere to go, causing it to accumulate and triggering floods. Urban landscapes can be retrofitted with features that mimic the sponge-like qualities of soils, forests, and natural water bodies. In the city of Wuhan, for example, which is prone to severe flooding, urban designers have built an expansive central park engineered out of artificial wetlands and ponds, grasslands, and permeable pavements. These capture excess water when it rains, then funnel it into underground reservoirs that release it back into the environment at a controlled rate once water levels subside. Wuhan is now one of 30 'sponge cities' in China that are making urban areas more flood-resilient, protecting citizens, and creating new wildlife habitats.

Sustainable and Green Cities

Cities exist because people value proximity to other people, to employers, and to urban amenities. Density reduces distances and provides easier access to everything the city has to offer. Within the United States, incomes typically go up by around 6 percent as density doubles, holding individual age and education constant. In China, incomes increase by around 20 percent when density doubles. Singapore is a striking example of the link between density and productivity, for it is both the second densest country in the world and among the most productive. At the same time the country strives to demonstrate that the efficiencies of urbanization do not have to come at the price of liveability. Guided by its 'Liveability Framework' the city-state's development policies place a Sustainable Environment, with a particular importance on green spaces, as one of the key principles, alongside Integrated Master Planning and Development and Dynamic Urban Governance. Today Singapore is one of the world's leading commercial hubs while being widely regarded as a clean and green city that offers a high quality of living.

Urban Solutions, Issue 2 (2013), Centre for Liveable Cities, Singapore; and Green Growth Best Practices Case Study Series (2014), Sustainable City Singapore.

Cleaner urban air can be achieved through an integrated policy approach, which targets multiple sources at a city/airshed level. According to Global Burden of Disease (2019) estimations, the annual mortality rate (per 100,000 inhabitants) from air pollution in Uzbekistan was 89 in 2019, compared to an ECA average of 50 and an EU average of just 38. The cost of air pollution in Uzbekistan is estimated as equivalent to 6 percent of its GDP.⁶ Significant improvements in air quality require comprehensive airshed-based strategies that include better monitoring and planning while targeting a range of key sources in a particular location, such as residential heating, transport, industry, power, agriculture, and dust from municipal activities or/and desertification. In the long term, cleaner sources of heating and energy (including natural gas as an interim fuel, particularly for heating) will significantly reduce air pollution, with major health and economic benefits. However, during transition, climate and air pollution policies may prioritize different sources and measures, calling for an approach that balances the need for clean air with decarbonization.

There are numerous opportunities to develop tourism along Central Asia's famed Silk Road that will revitalize the urban economy. Many of Tashkent's historic buildings, including a unique 600-year-old mosque, were fully rebuilt after the 1966 earthquake. Today, this modern city of more than 2 million people, is a gateway destination along the region's famous Silk Road and pre-COVID-19, was experiencing a boom in tourism arrivals. The Central Asia region hosted about 11 million tourists in 2014 and was gaining more attention as an emerging tourism destination with strong potential for further development under the common brand of the Great Silk Road. There are five United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage

⁶ United States of America: Institute for Health Metrics and Evaluation (IHME). 2021. Global Burden of Disease Collaborative Network. *Global Burden of Disease Study 2019 (GBD 2019) Reference Life Table*. IHME: Seattle.

Sites in Uzbekistan, including Bukhara, a long-standing center for trade, scholarship, culture, and religion. The city's historic center was declared as a UNESCO World Heritage Site in 1993 and has been attracting visitors from across the globe. Investment in building out the tourism infrastructure, including for ecotourism, is expected to resume post-COVID-19. Hyatt Hotel Corporation has entered into a franchise agreement with Metric Ventures to create Hyatt Regency Bukhara, located just outside the historic city center, to accommodate visitors wanting to experience the city's mosques, madrasas, and bazaars.



7. SUPPORT FOR PEOPLE AND PLACES MOST IMPACTED BY THE TRANSITION



Comprehensive policies supporting training and skills development, labor mobility, and local economic development during the green transition will be needed to facilitate the delivery of better jobs over the long term.

Green employment in various sectors and activities offers significant prospects for job creation. Globally it is estimated that renewable energy could employ more than 40 million people by 2050 and that total energy sector employment could reach 100 million by 2050, up from around 58 million today. Energy efficiency also offers significant opportunities for rapid job creation, with an estimated potential of up to 2.5 million new jobs per year.

Jobs in ecosystem restoration and organic agriculture are both important potential sources of employment in the green economy. Several studies have found that labor requirements per hectare on organic farms are higher than their conventional counterparts given that they have more labor-intensive production activities, and a higher share of labor-intensive crops and less mechanization.

Sample Opportunities:

- Creation of better jobs for more people
- More skilled workforce
- Targeted safety nets and strong local institutions to protect the most vulnerable.

For Uzbekistan, completing the economic transition along a greener path will offer an opportunity to address its structural labor market challenges, thereby creating better jobs for more people. The transition to green growth will bring significant changes in the labor market with the creation of green jobs in sectors such as waste management, recycling, carbon footprint assessment, biofuel crop farming, and other environmentally friendly commercial activities. As the country seeks to accelerate green growth and raise productivity, creating good jobs for lower-skilled workers and those living in lagging regions of the country will be a priority. This can be supported through targeted stimulus measures, yet will require structural reforms to strengthen skills and reduce barriers to employment.

While creating many opportunities, the green transition will also create new challenges to the livelihoods and identities of low-income and marginalized groups. The shifts in sectoral employment that will accompany the green transition will likely be uneven. For example, while the agricultural modernization strategy will bear large dividends in productivity gains and climate and environmental benefits, the diversification away from cotton will disproportionately affect rural women who made up 65 percent of cotton pickers in the 2020 harvest. While the transition from cotton production to higher-value cotton garment and textile manufacturing has the potential to create millions of decent jobs for women, the location of these jobs, and the skills requirements to do them, will be different. One measure that can be adopted by the Government to address this issue is to subsidize new employment positions for workers displaced in the cotton sector.

Green employment will require new skills both for new emerging jobs and for existing jobs that are evolving. A successful green transition will require a suitably trained workforce. Skills gaps and shortages are already recognized as a major bottleneck in several sectors, such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services, and manufacturing. The availability of workers and enterprises with the right skills for green jobs not only plays a critical role in initiating the transition to a green economy, but also in enabling a just transition that ensures social inclusion and decent work.

Comprehensive measures for vocational training and reskilling can improve transferability across firms and sectors, thus enhancing ability to successfully relocate as needed. While the energy transformation is likely to have an overall net-positive impact on employment, millions of fossil-fuel workers will need to find new jobs. Policies for a just transition can also facilitate the process of retraining fossil-fuel workers at risk. Partnerships between governments and industry can be built to finance reskilling and to ensure that training content meets the evolving needs of the sector.

New systems (tariffs, cross-subsidization, safety nets) can protect the most vulnerable from the effects of green transition. Vulnerable groups, such as the poor, female-headed households, and ethnic minorities are disproportionately affected by shocks such as natural hazards, pollution, and climate variability but they also bear the risk of being the hardest hit by the economic disruption associated with the transition to a more sustainable model. For example, female-headed households, which make up 20 percent of Uzbekistan households, have lower incomes than male-headed households and are less likely to afford increased utilities or food prices that might arise from the green transition. Local self-governance systems, such as *mahalla* committees, are common across Uzbekistan and citizens often rely on them to solve issues, access public goods, and recover from crises. However, survey data from Uzbekistan shows that female-headed households do not benefit from community social capital to the same extent and may have fewer friends and relatives to turn to for financial support. Interventions to increase their connectivity to other community members and access to financial, social, and other resources would help increase their resilience during the transition to a more sustainable model of growth.







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