



Access to affordable, reliable, sustainable, and modern energy for all

I. SUMMARY

In today's rapidly developing world, access to reliable and affordable energy is a crucial part of everyday life. With an increasingly nuanced understanding of climate change, it is becoming clearer that clean and renewable energy sources have a major place in the future of energy usage and production. The 2030 Agenda for Sustainable Development, especially Sustainable Development Goal (SDG) 7 (access to affordable, reliable, sustainable, and modern energy for all), provide good international targets that could be adapted to local contexts, including for North and Central Asia.

Many challenges and gaps exist in access to affordable, reliable, sustainable, and modern energy in the subregion. To achieve SDG 7 by 2030, countries in North and Central Asia must take actions as follows: (1) Ensure full and equitable access to electricity and clean fuels; (2) Improve energy efficiency by decreasing energy loss; (3) Promote renewable energy consumption; (4) Increase investment to develop renewable electricity capacity and infrastructure; (5) Strengthen subregional collaboration in energy connectivity.

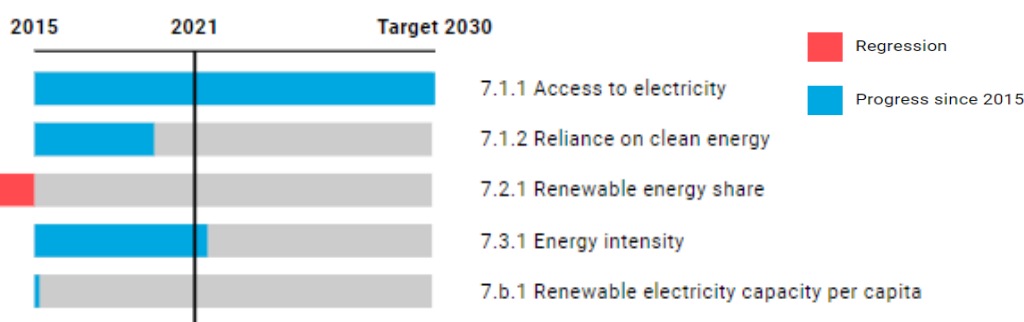
II. CURRENT STATUS & TRENDS

In the past decade, energy transition plans have been included in the national strategies of North and Central Asian countries. The subregion has seen progress on a number of aspects of SDG 7 (as shown in Figure 1): (1) The percentage of the population with access to electricity has been increasing and the time required for the subregion to obtain a permanent electricity connection has also decreased significantly; (2) Most countries in the subregion have expanded their access to clean fuels and technologies for cooking; (3) Energy intensity level of primary energy¹ has decreased in most countries in the subregion.

However, there are some areas that require further attention: (1) Some residents still lack access to electricity and need to wait for a long time to obtain a permanent electricity connection; (2) Huge gaps exist in access to clean energy in urban and rural areas, with many rural residents having no access to clean fuels and technologies for cooking; (3) The renewable energy share in total final energy consumption was lower than seven years ago in most of the countries in the subregion; (4) The average energy intensity is significantly higher than the world average; (5) Public investment flows into the renewable energy sector in the subregion are not enough.

¹ Energy intensity level of primary energy is the ratio between energy supply and gross domestic product measured at purchasing power parity.

Figure 1: The status of Sustainable Development Goal 7 in North and Central Asia

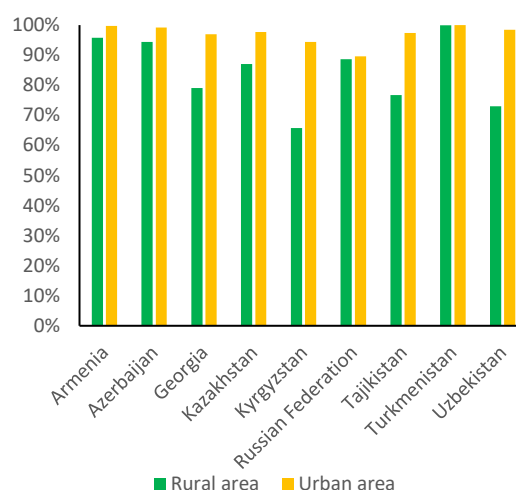


Source: Asia Pacific SDG Gateway, UN ESCAP

Target 7.1: By 2030, ensure universal access to affordable, reliable, and modern energy services.

The majority of people in the subregion have access to electricity, although some people living in the urban areas of Armenia (0.04%), Kyrgyzstan (0.50%) and Tajikistan (0.95%) still lacked access to electricity as of 2020. In 2019, Kyrgyzstan recorded the longest duration in the subregion to obtain a permanent electricity connection (approximately 111 days²) and the longest delay in obtaining an electrical connection³ (24.4 days⁴). This is mainly attributed to bureaucratic procedures which require much back-and-forth between customers and utility providers. In certain areas, delays occur when utility providers do not have readily available materials to provide electricity connection. Over the past decade, some countries like Kazakhstan made little progress in access to clean fuels and technologies for cooking, and the Russian Federation and Uzbekistan even saw a decline in access. In 2020, all the countries in the subregion recorded higher access to clean cooking in urban areas compared to rural areas, with huge gaps between rural and urban areas in Kyrgyzstan, Uzbekistan, and Tajikistan (as shown in Figure 2).

Figure 2: Share of population with clean cooking access in urban and rural areas (%) (2020)



Source: World Development Indicators, World Bank

Target 7.2: Increase substantially the share of renewable energy in the global energy mix by 2030. In 2018, except for Armenia, Uzbekistan and Kazakhstan, renewable energy consumption share in total final energy consumption was lower than seven years ago in most of the countries in the subregion, with the largest decrease in that of Tajikistan (as shown in Figure 3).

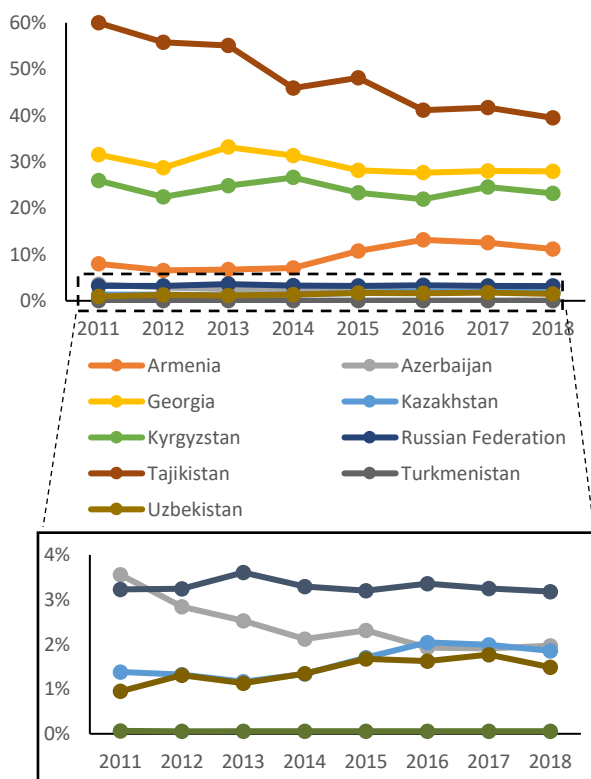
² Based on 2019 data from World Development Indicators published by the World Bank.

³ Delay in obtaining an electrical connection is the average wait, in days, experienced to obtain an electrical connection from the day an establishment applies for it to the day it receives the service.

⁴ Based on 2019 data from Doing Business published by World Bank Group.

In terms of the usage of renewable energy consumption, Armenia, Georgia, Kazakhstan, Kyrgyzstan, and Turkmenistan spent a lot on residential use, while Azerbaijan spent more on commercial and public services. The large proportion of residential energy consumption in Kyrgyzstan is mainly due to the poor energy performance of existing residential buildings, the majority of which are multi-apartment buildings built between the 1960s and 1980s⁵.

Figure 3: The renewable energy share in total final energy consumption (%), 2011-2018

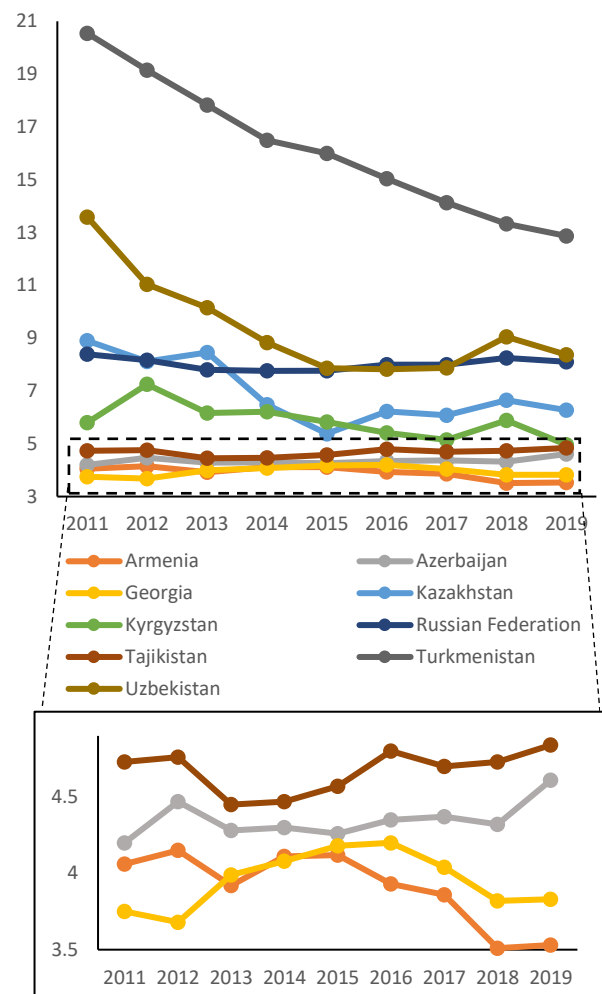


Source: World Development Indicators, World Bank

Target 7.3 Double the global rate of improvement in energy efficiency by 2030. Over the past decade, there is a decreasing trend in energy intensity level of primary energy in most countries in the subregion, with Turkmenistan achieving the largest decline. However, the energy intensity level in the

subregion is still higher than the world average. In 2019, the average subregional energy intensity stood at 7.8 megajoules per one unit of economic output produced, significantly higher than the world average of 4.7 megajoules per one unit of economic output produced⁶. Turkmenistan stood out with 12.87 megajoules per one unit of GDP.

Figure 4: Energy intensity level of primary energy (MJ/\$2017 PPP GDP), 2011-2019



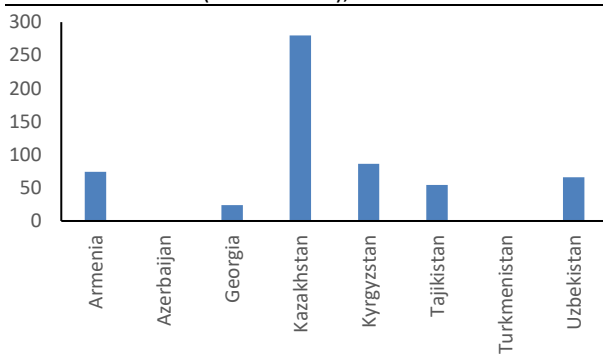
Source: The International Renewable Energy Agency
Notes: Data from Russian Federation cannot be found

⁵ Based on summary report "Keeping warm: urban heating options in the Kyrgyz Republic". Available at <http://documents1.worldbank.org/curated/en/555021468011161504/pdf/97409-WP-P133058-Box391503B-PUBLIC-Heating-Assessment-for-Kyrgyz-P133058-Final.pdf>.

⁶ Data were collected from <https://www.iea.org/reports/sdg7-data-and-projections/energy-intensity>.

Target 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies. In 2019, there were US\$279.85 million public flows in support of renewable energy in Kazakhstan, while only US\$0.04 and US\$0.01 million in Turkmenistan and Azerbaijan (as shown in Figure 4). In Kyrgyzstan, Tajikistan and Uzbekistan, public flows of investment mainly targeted hydropower, while Armenia and Georgia targeted solar energy, and Kazakhstan targeted wind and solar energy.

Figure 5: Renewable energy public flows (USD million), 2019

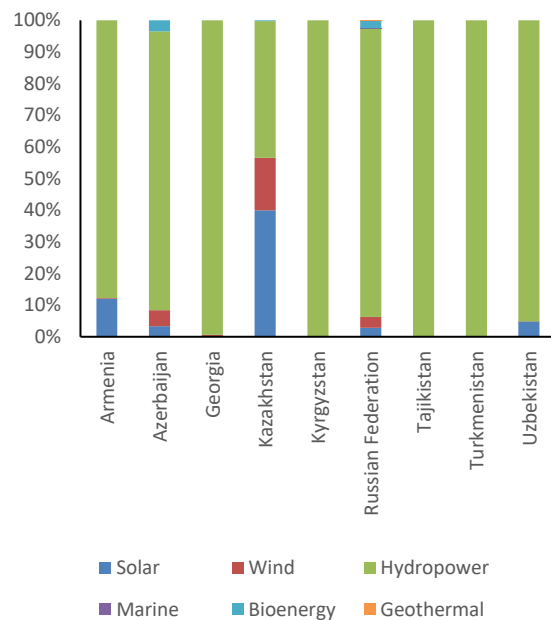


Source: The International Renewable Energy Agency
 Notes: Data from Russian Federation cannot be found

Target 7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, particularly LDCs and SIDS. Many types of infrastructures and technologies have been used to support renewable energy generation in the subregion. Among the top increases in renewable energy capacity in 2015-2020 are solar, wind and bioenergy. Azerbaijan, Kazakhstan, the Russian

Federation and Uzbekistan are among the countries which have considerably increased their solar power capacities. Except for Uzbekistan, these countries also recorded positive trends in wind power capacity. However, as of 2021, hydropower remained the main source of renewable energy generation in the subregion, and is the only source in Kyrgyzstan, Tajikistan, and Turkmenistan (as shown in Figure 5). Renewable electricity capacity is highly dependent on the renewable resources of each North and Central Asian economy. While landscapes and geography differ, a common feature shared by most countries in the subregion – except for the Russian Federation – is the lack of access to oceans, that is also why marine energy can only be found and used in the Russian Federation. Most of the countries in the subregion are landlocked, and Uzbekistan is double landlocked.

Figure 6: Installed renewable electricity capacity by source (%), 2021



Source: The International Renewable Energy Agency

III. AREAS REQUIRING ATTENTION & KEY CHALLENGES

High energy intensity. Energy intensity in the subregion is higher than the world average level, and annual improvements in energy intensity in the subregion are inadequate to achieve SDG target 7.3, which requires an average improvement in annual energy intensity of 2.6 per cent (IEA, 2019). Electricity loss is one of the areas which must be given due attention. In 2019, the share of electricity loss in electricity supply was the highest in Kyrgyzstan (16.49%), followed by Turkmenistan (14.96%) and Tajikistan (13.66%).

Unsustainable energy consumption pattern. The renewable energy share in total final energy consumption is not enough and even lower than seven years ago in most countries. The share of renewable energy infrastructure is still small, which cannot produce adequate energy from renewable sources for regular consumption. Besides, North and Central Asian countries offer high fossil fuel subsidies and set electricity tariffs at below cost-reflective levels, creating an uneven playing field for renewable energy in the electricity market. The heavy industries of chemical, steel, aluminum, and power – which consumes just under 10 billion cubic meters of natural gas per month in Azerbaijan – all enjoy subsidized prices for natural gas.

Inadequate investment and regional collaboration in renewable energy. Public investment flows into the renewable energy sector in the subregion are inadequate. Extractive industries in resource-rich countries are primary beneficiaries of public financing and foreign direct investment. Some countries have insufficient financing and investments on energy infrastructure. The exchange of energy between countries in the region has been limited and is well below the available interconnection capacity. This is mainly due to the lack of regional network management and harmonization, limited system synchronization, and absence of coordination in power generation, and planning.

Inequitable access to electricity and clean energy. Huge gaps exist in access to clean energy in urban and rural areas, with many rural residents having no access to clean fuels and technologies for cooking. For some urban residents, electricity access and stability are still major concerns. Additionally, value lost due to electrical outages should not be ignored. Clean energy and electricity infrastructure are not evenly distributed and underdeveloped in the subregion. Kazakhstan has underdeveloped domestic pipelines and lacks technical requirements for the integration of renewable energy facilities into the grid, and standards for renewable energy equipment. Kyrgyzstan, Tajikistan, and Uzbekistan also have outdated and overloaded energy infrastructure. Additionally, it is hard to build large-scale wind power plants in Kyrgyzstan and Tajikistan due to the difficult mountain terrain and lack of transport equipment and roads (Laldjebaev et al., 2021).

Less diversified structure of renewable electricity capacity. The subregion's total non-renewable electricity capacity was more than twice that of renewable capacity as of 2021 (IRENA, 2021). Countries like Azerbaijan, Kazakhstan, the Russian Federation, Turkmenistan, and Uzbekistan rely heavily on non-renewable energy for power generation, especially Turkmenistan, which is almost entirely powered by non-renewable energy. In comparison, the development of other sources of renewable energy rather than hydropower remains insignificant. A large share of renewable energy potential like solar power, wind power and biomass potential remain untapped in the region and subsidy and technical constraints limit the integration of renewable power into existing distribution networks. Additionally, subsidies and incentives for renewable energy production have been exercised to a limited extent and have largely focused on the conventional source of hydropower in North and Central Asia.

IV. GENDER & HUMAN RIGHTS CONSIDERATIONS

The clean energy transition can bring socioeconomic benefits to North and Central Asia. New renewable energy infrastructure projects are also expected to positively impact employment by creating more new jobs than non-renewable projects. New jobs created from renewable energy projects are also expected to contribute to more equal employment opportunities for men and women as there is a higher proportion of women being employed in the renewable energy sector compared to the overall energy sector (IRENA, 2020). Additionally, having access to electricity can greatly reduce the amount of time and effort required to perform unpaid work activities, such as cooking, cleaning, water collection and fuel collection. These tasks are typically done by women in North and Central Asia. For instance, in 2018, women who were older than 15 years old spent 15.9% of time on unpaid domestic chores, while men only spent 5.1%⁷. Thus, affordable and accessible electricity can greatly improve women's quality of life. The clean energy transition is also expected to bring environmental benefits, which in turn are likely to improve overall health outcomes. For example, air quality improves with the use of

clean fuels. Access to electricity could also reduce women's exposure to violence when collecting fuel and water. Lighting in exterior areas could also help reduce the risk of violent attacks by non-intimate partners. This is particularly important for women working outside of the home or when toilet facilities, cooking amenities and water sources are located outside. Besides, the types of fuels used for cooking can have significant impacts on health and safety of household members, particularly women, who are typically in charge of cooking and spend more time at home. The use of fuels such as firewood, in addition, impinge on women's time, as they are often in charge of fuel fetching as well. In times of disasters caused by natural hazards, these tasks are further hampered, in view of difficulties associated not only with collection but also ignition of wet fuels. In some countries in North and Central Asia, the climate crisis and deforestation have added additional burdens to women. In addition to the amount of time and effort required for wood collection, the health and environmental sustainability impacts of pollutants from wood fuel and open fires are of particular concern.

V. PRIORITIES FOR ACTION

Priority 1: Ensure full and equitable access to electricity and clean fuels. The development of off-grid renewable energy sources, especially in urban areas, can help overcome the problem of electrical outages due to infrastructure limitations and improve access to electricity. For example, the use of renewable-powered generators should be mainstreamed, especially for those not connected to grid electricity. Furthermore, cooking with clean fuels produces

fewer emissions, which limits damage to indoor and outdoor air quality. As women are typically in charge of fuel collection and cooking, the beneficial effects on women's health and time burdens are twofold. Good governance and transparency should also be prioritised. By using digitalization and e-governance in the subregion, governments and utility providers can leverage digital technologies to enhance efficiency and reduce the cost of utility service provision.

⁷ Data were collected from a database provided by UN Women. Available at https://data.unwomen.org/data-portal/sdg?annex=Gender%20Equality&finic%5B%5D=SL_DOM_TSPDDC&flocat%5B%5D=51&flocat%5B%5D=398&flocat%5B%5D=417&fys%5B%5D=2004&fyr%5B%5D=2018&fcdmx=sex&fcdmgc%5BFemale%5D=Female&fcdmgc%5BMale%5D=Male&fcdmgr=Male&cdmar=15%2B&cdmac%5B15%2B%5D=15%2B&fcdmlr=ALLAREA&fcdmlc%5BALLAREA%5D=ALLAREA&tab=line

Priority 2: Improve energy efficiency by decreasing energy loss. Doubling the current rate of energy intensity improvement – a key measure of the economy’s energy efficiency - from 2% to 4% per year over this decade has the potential to avoid 95 EJ a year of final energy consumption. Achieving this hinge on a global push on energy efficiency and related energy demand measures including electrification, behaviour change, digitalisation and material efficiency in industry (IEA, 2022). Energy loss comes from two aspects: energy supply and energy demand. Specific areas from the energy supply that can be targeted to improve efficiency include energy production, transportation, and transmission infrastructure, considering the significant energy loss in these processes. From the energy demand aspect, areas that can be targeted include cities and buildings, as well as the transportation sector, both of which are significant consumers of energy in the subregion. Improvements in energy efficiency are also expected to decrease emission levels, contributing to the environmental agenda. A key factor that can drive improvements in energy efficiency and the adoption of renewable energy is technology. Around a third of the avoided energy demand by 2030 needs to come from the deployment of more technically efficient equipment (IEA, 2022).

Priority 3: Promote renewable energy consumption. As the subregion seeks to transition towards more sustainable energy pathways, governments should take steps to phase out non-renewable subsidies and increase renewable subsidies. Governments need to ensure multistakeholder consultations are conducted for policies to be inclusive and that transition pathways fully embed the principle to leave no one behind. Phasing out of non-renewable subsidies needs to be targeted, with a clear imperative to minimise damage to natural resources, especially by large corporations and energy-intensive sectors.

Priority 4: Increase investment to develop renewable electricity capacity and infrastructure

Investment and financial support should be channelled into developing renewable energy capacity and infrastructure. Energy diversification needs to be a priority, and more importantly, diversification to new sources of renewable energy. Currently, the capacity of renewable energy resources such as solar, wind and bioenergy are underutilised in the subregion. As the cost of renewable energy continues to decrease, countries in the subregion should prioritise new renewable energy and its infrastructure over non-renewables. Additionally, supporting the development of infrastructure and technological expertise also requires significant investments and improvements to fully realise the benefits of renewable energy production. Studies show that the implementation of a 100% renewable power system in Kazakhstan is technically possible and economically viable, but the most important precondition is in the form of political will and full openness to foreign investors (Collins & Bekenova, 2017; Bogdanov et al., 2019).

Priority 5: Strengthen transboundary collaboration in renewable energy connectivity.

The landlocked status of most North and Central Asian countries highlights the need for transboundary cooperation on renewable energy matters. Since different countries have different potentials, capacities and public flows for every energy source, cooperation in the energy landscape is possible. Given their similar focus on developing sustainable and clean energy, countries in the subregion can strengthen cooperation to encourage knowledge sharing and standardization of technicalities which could better facilitate maintenance of transboundary energy infrastructure and technology transfer. Additionally, countries in the subregion can take advantage of their geographical location between Europe and other Asian economies to facilitate energy supply chain resilience. Countries can also leverage existing intergovernmental platforms, such as the ESCAP Committee on Energy, among others, to facilitate effective cooperation mechanisms for the subregional energy agenda.

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