

COP Out

**AZERBAIJAN, THE CAUCASUS, AND CENTRAL ASIA
BUILDING THREE TIMES AS MUCH FOSSIL
AS WIND AND UTILITY-SCALE SOLAR CAPACITY**





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ABOUT THE GLOBAL INTEGRATED POWER TRACKER

The [Global Integrated Power Tracker \(GIPT\)](#) is a free-to-use Creative Commons database of over 116,000 power units globally that draws from GEM trackers for coal, gas, oil, hydropower, utility-scale solar, wind, nuclear, bioenergy, and geothermal, as well as energy ownership. Footnoted wiki pages accompany all power facilities included in the GIPT, updated biannually. For more information on the data collection process that underpins GEM's power sector trackers, please refer to the Global Integrated Power Tracker [methodology](#) page.

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ABOUT THE COVER

Oil well derricks near Bibi-Heydat in Azerbaijan. Image via Karsten Smid / Greenpeace (2004).

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FURTHER RESOURCES

For additional data on existing and in-development capacity per country/area and region, refer to the [Summary Data](#) of the Global Integrated Power Tracker. For an interactive visualization tool of all power facilities globally, refer to the Global Integrated Power [Tracker map](#). To obtain the underlying facility-level data from the Global Integrated Power Tracker, see [Download Data](#).

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EXECUTIVE SUMMARY

The COP29 climate change conference falls at a critical time, as countries evaluate their pledges to climate action before submitting revised ambitions in respective Nationally Determined Contributions — or NDCs — next year. Stimulating collective ambition requires leadership, precisely what COP29 host Azerbaijan has yet to deliver. The host nation's climate plans lack ambition, with wind and solar projects in development only expected to bring about a 10% increase in renewables share of capacity by 2027 and no plans for further projects beyond that date. Global Energy Monitor's Global Integrated Power Tracker data indicate similarly low levels of progress against unambitious targets across the region, with a 13 GW deficit in targeted renewable capacity additions among Caucasus and Central Asia (CCA) countries. At the same time, the fossil-powered buildout continues apace, with more than three times as much fossil capacity under construction in the CCA region than from wind and utility-scale solar. Course correction is essential to uphold the collective pledges on energy made at COP28.

KEY FINDINGS

- **Power projects in development fall short of meeting the renewable energy targets of countries in the Caucasus and Central Asia (CCA) region.** Six CCA countries detail targets in the 2030–2040 range for renewable capacity additions — including wind, solar, and hydropower — adding up to 43 GW (Turkmenistan and Kyrgyzstan lack specific targets). However, GEM data show 30 GW of renewable capacity in development across

these same six CCA countries, a 13 GW deficit. Georgia and Tajikistan's targets rely on large hydropower projects, which, aside from associated environmental and financial sustainability concerns, may offer a limited contribution in the 2030 time frame due to long construction lead times.

- **COP29 host Azerbaijan shows no in-development wind or utility-scale solar projects beyond those due for completion by 2027, implying capacity additions are just sufficient for achieving the country's stated target of a 30% renewable share of capacity by 2030 — roughly a 2 GW addition.** Recent announcements from the Azeri Government suggest a rollout of wind and solar capacity by 2030 of up to 8 GW. However, the lack of further renewables projects in the project pipeline calls into question the integrity of the energy transition in Azerbaijan. Furthermore, the 30% target, first announced five years ago, only represents an approximate 10% increase over legacy hydropower capacity, and suggests limited ambition in the current renewables target.
- **All eight countries in the CCA region are developing additional coal or oil and gas plant capacity.** Oil and gas plant capacity leads the buildout, with 24 GW of capacity in development, half of which is under construction. By comparison, new coal plant capacity is getting built at a far lesser rate, with only two small coal units currently under construction in Kazakhstan, due to replace existing units up for retirement. However, the risk of further coal plant expansion remains, with nearly 8 GW capacity in development across four CCA countries.
- **More than three times as much fossil capacity is under construction in the CCA region than from wind and utility-scale solar.** Total capacity under construction from wind and utility-scale solar in CCA countries totals 3.5 GW, less than a third of the figure for projects fueled by coal, oil, or gas. An additional 4.8 GW of hydropower capacity is also under construction but mostly comprises two large projects that won't contribute to power generation before 2030.

INTRODUCTION

After back-to-back gatherings in the Middle East, the annual United Nations Climate Change Conference or Conference of the Parties (COP) moves to Baku, Azerbaijan, marking the first time the event has been hosted by a country in the Caucasus and Central Asia (CCA) region.

The Azerbaijani presidency faces the tall task of building on the achievements of COP28, namely the “UAE Consensus” that calls on countries to transition away from fossil fuels. Chief amongst a long list of priorities are agreeing on a new post-2025 finance goal, developing ambitious updated Nationally Determined Contributions (NDCs), and operationalizing the provisions of the Global Goal on Adaptation and carbon markets under Article 6 of the Paris Agreement.

However, Azerbaijan’s hosting of COP29 has attracted criticism, increasingly referred to as an [authoritarian petrostate](#), with concerns over the strength and integrity of the country’s role in shaping and progressing the conference agenda. Any mention of transitioning away from fossil fuels was absent in President-Designate Mukhtar Babayev’s “[action agenda](#)” of priority initiatives to be brought to the table in Baku in November, and an independent assessment has found the country’s climate actions “[critically insufficient](#).” The country’s active development of [new oil and gas fields](#) and renewed [crackdown](#) on media and civil society activism add to the concerns over the host’s legitimacy.

However, Azerbaijan is not the first and won’t be the last fossil fuel-producing country to take center stage in climate diplomacy. The door has not yet closed on the COP29 host to demonstrate [climate leadership](#), with one of its strongest available [actions](#) to submit an early and ambitious updated NDC. Such “bar-raising” actions could help push other

countries into higher levels of commitment, particularly amongst neighboring countries where fossil fuel extraction is still a cornerstone industry. As a powerful platform to promote a regional focus and encourage involvement and support, Azerbaijan’s COP29 presidency can raise international awareness for the Central Asia and Caucasus region and its possibilities for a clean energy transition.

Spanning three countries in the South Caucasus — Azerbaijan, Armenia, Georgia — and five countries in Central Asia — Kazakhstan, Tajikistan, Uzbekistan, Turkmenistan, and the Kyrgyz Republic (Kyrgyzstan hereafter) — the CCA region’s national governments have made strides in recent years with the introduction of carbon neutrality plans, and the geography harbors significant potential for solar, wind, and hydropower. Yet, investments still favor development plans for coal and oil and gas, and the challenges to energy transition in the region are manifest: aging Soviet-era transmission infrastructure, winter energy crises, energy security concerns, regional trade constraints, and a lack of domestic financial resources for investment.

As global attention turns to this year’s marquee climate change event, this report seeks to interrogate the status of power sector transition in the CCA region and highlight the distance still to go in phasing out fossil fuels. The report’s analysis draws upon GEM’s trackers for coal, gas, oil, hydropower, utility-scale solar, wind, nuclear, bioenergy, and geothermal, housed within the Global Integrated Power Tracker (GIPT). For a detailed analysis of each CCA country, see the dedicated country profile sections: [Azerbaijan](#), [Armenia](#), [Georgia](#), [Kazakhstan](#), [Tajikistan](#), [Uzbekistan](#), [Turkmenistan](#), and [Kyrgyzstan](#). See dedicated [summary tables](#) for summaries of GEM’s power sector data for CCA countries.

I. THE CCA POWER SECTOR IS LARGELY OLD AND FOSSIL-FUELED, WITH UNDERUTILIZED WIND AND SOLAR POTENTIAL

The power sector development in CCA countries reflects the region's endowments of coal, oil, gas, and hydropower resources. The region's operating oil and gas plants tend towards the south and west of the CCA region, concentrating around major gas fields in Uzbekistan (Kashkadarya and Fergana Valley), Turkmenistan (Amu Darya basin), and Azerbaijan (Shah Deniz and Umid). Oil and gas plants constitute the majority of total power capacity in Uzbekistan, Turkmenistan, Azerbaijan, and Armenia.

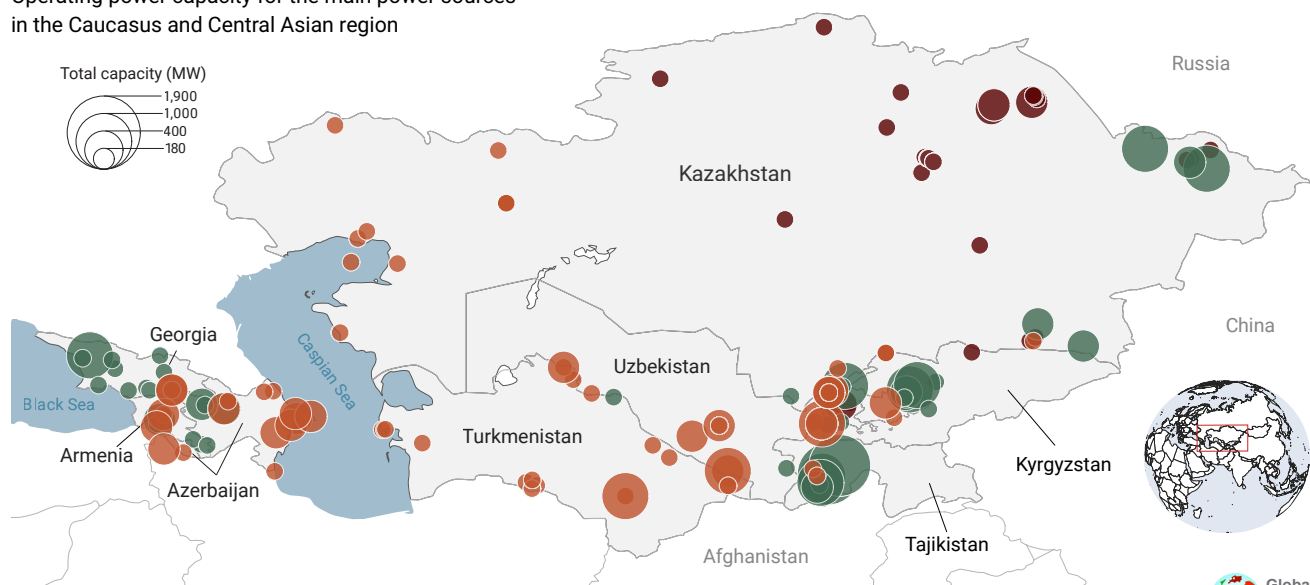
Four CCA countries operate coal plants, but only Kazakhstan relies heavily on this source, which makes up around 57% of the country's total operating capacity and 80% of the region's total operating coal capacity. Operating coal plants co-locate with major coal mines towards the northeast, particularly in the Palovdar region, host to the Ekibastuz coal basin and Kazakhstan's largest coal mine, [Bogatyr](#).

Three CCA countries have a majority share of hydropower in their respective power mixes, and all but Turkmenistan have operating hydropower facilities. These hydropower facilities cluster towards the mountainous south and east, particularly in Tajikistan and Kyrgyzstan, where hydropower is the primary power source. The Caucasus mountains also host numerous hydropower facilities, which Georgia relies on most heavily, accounting for nearly three-quarters of its power mix.

Operating power facilities across the CCA region are relatively old, with GEM data showing an average age amongst coal, gas, and hydropower plants of 40 years, double the global average. Azerbaijan and Turkmenistan have comparatively younger power plants. Still, upgrades were required at the countries' oldest and largest power plants, the [Azerbaijan thermal power plant](#) and the [Mary power station](#). In addition to lower

Coal plants are clustered in the northeast, hydropower in the southeast, and oil and gas plants across the south and west

Operating power capacity for the main power sources in the Caucasus and Central Asian region



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor



efficiency, older power sector assets are prone to equipment failure, prompting increased [supply interruptions](#) and accidents in recent years. As many thermal power plants in the eastern CCA countries are combined heat and power plants (CHPs), which also provide heating to the residential sector, plant failures leave some residents [without heat](#) during the region's harsh winters. Furthermore, the region's power grid faces a similar situation and suffers above-average [network losses](#) from worn-out or poorly maintained infrastructure.

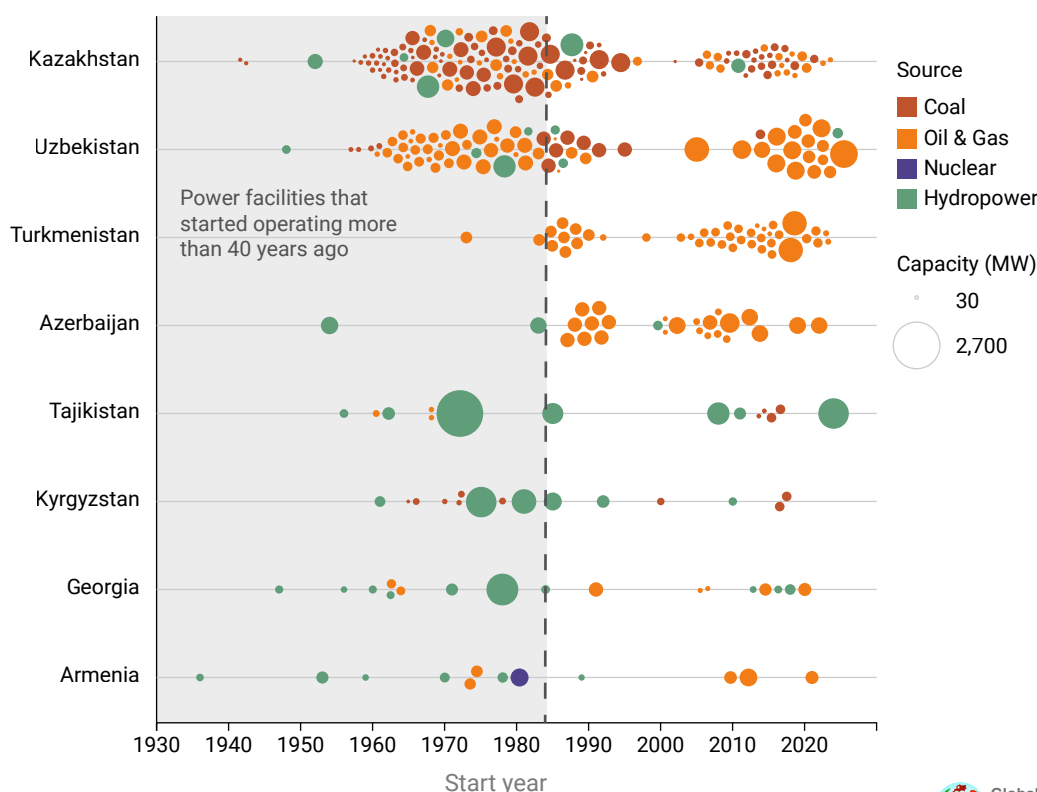
The region's predominantly state-owned national energy companies often lack incentives for investments, and regulated energy tariffs typically don't reflect the [cost of production](#), further indebting producers. Increasing power demand across the region, averaging [3%](#) per annum over the last decade, compounds the issues faced by the underperforming

power system. Despite many CCA countries' positions as major fossil energy producers, several have resorted to electricity imports in recent years to cover deficits, particularly in winter. A similar situation also occurs in the hydropower-dominated power systems of the CCA region, where aging infrastructure contends with seasonal water shortages and climate-affected water availability.

Despite the numerous challenges facing power sector development amongst CCA countries, the region also holds great potential for cleaner forms of electricity generation. Notably, the technical potential for wind and solar power is vast within the region, particularly in the lowlands and plains of [Central Asia](#). This potential is not only constrained to the region's largest countries. Azerbaijan has a technical potential for [157 GW](#) of offshore wind and [23 GW](#) of solar capacity.

Half of power facilities in the Caucasus and Central Asia region powered by coal, oil and gas, or hydropower are over 40 years old

Power plants by country, sized by unit capacity; year represents unit start date



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor



Additionally, several power sector developments point toward a nascent movement for energy sector transition in the region. For instance, Kazakhstan [pioneered](#) renewables targets with accompanying support mechanisms amongst CCA countries, evolving to a competitive process in subsequent years that saw the first online auction for renewables projects in 2018. The country currently hosts more than double the combined operating wind and solar capacity of all other CCA countries. Uzbekistan is following suit, introducing competitive bidding processes to attract foreign investment in large-scale solar projects, and was the

[leading recipient](#) in the region four years in a row for funding from the European Bank of Reconstruction and Development. Furthermore, several initiatives target enhanced regional electricity integration, notably efforts for Tajikistan and Turkmenistan to reconnect their national power systems to the [Central Asian Power System](#) (CAPS).

Despite these steps in the right direction and the great potential of wind and solar power in the region, fossil capacity additions remain the mainstay of power system development amongst CCA countries.

II. ALL CCA COUNTRIES HAVE FOSSIL-FUELED POWER CAPACITY IN DEVELOPMENT

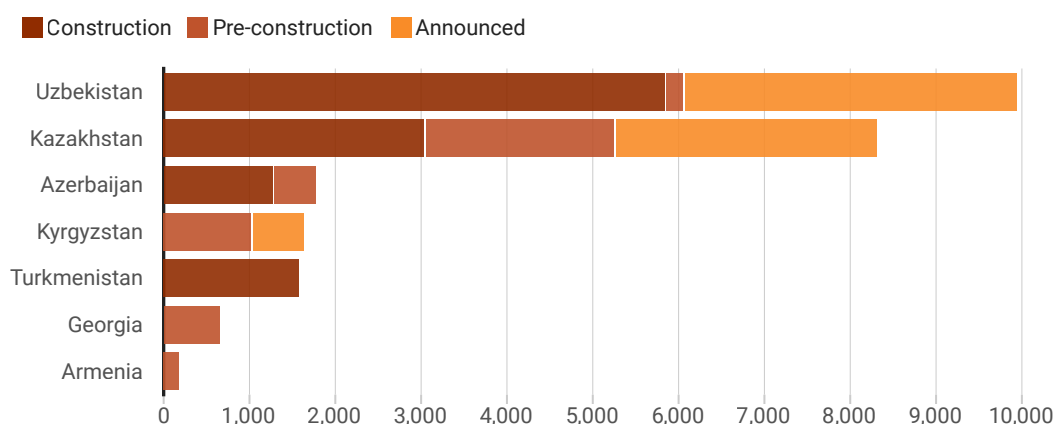
All eight countries in the CCA region have either coal or oil or gas plants at one of three “in development” stages tracked by GEM data — projects that have been “announced” or are in the “pre-construction” and “construction” phases. In-development oil and gas plants are more prevalent than coal, with all but Tajikistan currently considering new oil and gas capacity. Four CCA countries are planning new coal capacity, but only Kazakhstan has new units under construction.

With 24 GW capacity in development, oil and gas outnumber the same figure for coal (7.9 GW) by three to one. Nearly half of the total figure for in-development oil and gas capacity is made up of projects under construction (11.8 GW). This contrasts with in-development coal projects, where just two new units, totaling 195 MW, are under construction, according to GEM data.

Although most CCA countries are pursuing new oil and gas plants, only Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan have oil and gas capacity

Seven countries in the Caucasus and Central Asia region have plans for more gas, with four currently building new capacity

Oil and gas power capacity in development by country and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Note: Data include only gas units with a capacity of 50 MW or more.



under construction. Already the most gas-heavy countries in the region, the proposed oil and gas plants will radically augment existing capacity if built. For instance, in-development plants in Kazakhstan would triple existing operational oil and gas capacity. In Uzbekistan, if 10 GW of in-development oil and gas capacity is built, the country's operating oil and gas plant fleet would reach 24 GW, double the figure for any other CCA country.

Outside of these four countries, oil and gas projects in development also have the potential to significantly expand capacity in less gas-heavy power mixes. For example, in Georgia, the planned expansion of the [Gardabani](#) Combined Cycle power station would increase the current gas plant fleet by more than half. Kyrgyzstan currently has no operating oil or gas plant capacity but is actively pursuing over 1,600 MW of new oil and gas capacity over three separate project locations, equivalent to 40% of the total power capacity in the country.

According to GEM data, planned retirements of currently operating oil and gas plants are limited. Only three oil and gas units detail potential plans for decommissioning: a 60 MW unit at the [Atyrau CHP](#) power station in Kazakhstan and two 300 MW units at the [Syrdarya](#) power station in Uzbekistan, all in 2024. Thus, net oil and gas capacity additions in the CCA region prevail. GEM data show over 70% of in-development oil and gas capacity in the CCA region

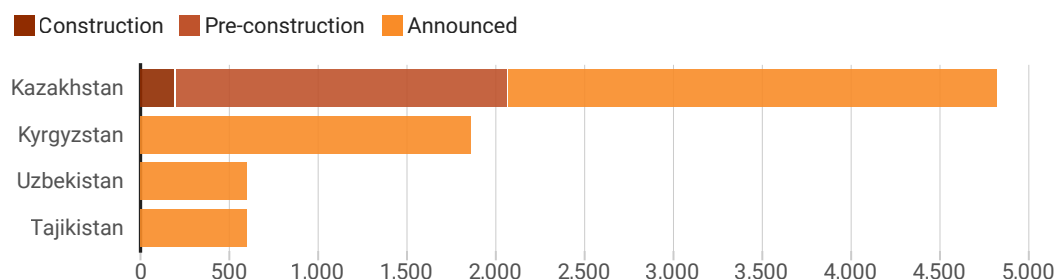
slated for operation by 2027. If built, the oil and gas capacity coming online by that year would constitute a 50% increase in the existing operating capacity of oil and gas plants in the CCA region.

Four CCA countries are planning new coal projects, totalling 7.9 GW of capacity in development. However, GEM data show a far smaller proportion of this in-development coal figure in the construction phase compared to oil and gas plants, some 195 MW, or less than 3%. The under-construction coal capacity will replace two existing units at coal plants in Kazakhstan, a 130 MW unit at the [Karaganda State Regional power station-2](#), and a 65 MW unit at the [Ust-Kamenogorsk TETS](#) power station. Kazakhstan also leads the CCA region for pre-construction and announced coal projects, totalling 4.6 GW, with over half the proposed capacity located in Ekibastuz, a major coal mining center in northeastern Kazakhstan.

Outside of Kazakhstan, the new coal capacity in Kyrgyzstan, Tajikistan, and Uzbekistan comprises announced projects only, totalling 3 GW. Kyrgyzstan accounts for 1,860 MW of this announced capacity across two projects: the 660 MW [Jalal-Abad](#) power station, with Russian contractor AB Energo as the proposed contractor, and the 600 MW [Kara-Keche power station](#), for which the Kyrgyz Ministry of Energy and China National Electric Engineering have a [memorandum](#) on construction. The future of announced coal plants in Tajikistan and Uzbekistan

Four Caucasus and Central Asia countries are planning new coal capacity, but only Kazakhstan has units in construction

Coal power capacity in development by country and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Note: Data include only coal units with a capacity of 30 MW or more.



appears less assured. If built, the [Fon-Yagnob](#) power station would more than double Tajikistan's operating coal fleet. However, the current development status of the project remains unknown. And while the announced 300–600 MW expansion at the [Angren power station](#) in Uzbekistan appeared to have attracted China Railway and PowerChina as investment partners, development updates were not forthcoming in 2024.

As well as new coal capacity in development, GEM data show 1,686 MW of operating coal-fired capacity

in the CCA region with a planned retirement date. Most of this capacity is due to come offline by 2027 and is associated with units at four plants: three in Kazakhstan (two at Almaty, plus the [Zhezkazgan](#) power station), and the [Bishkek](#) power station in Kyrgyzstan. Depending on whether in-development coal projects are realized, these planned retirements could see a net reduction in the total CCA operating coal fleet in the coming years. However, most coal units scheduled for retirement at these three plants are designated for conversion to gas-firing or replacement with gas plant technologies of equal or greater capacity.

III. NON FOSSIL-FUELED CAPACITY IN DEVELOPMENT IS 50% GREATER THAN THE FIGURE FOR COAL AND OIL AND GAS PROJECTS BUT IS BEING BUILT AT HALF THE RATE

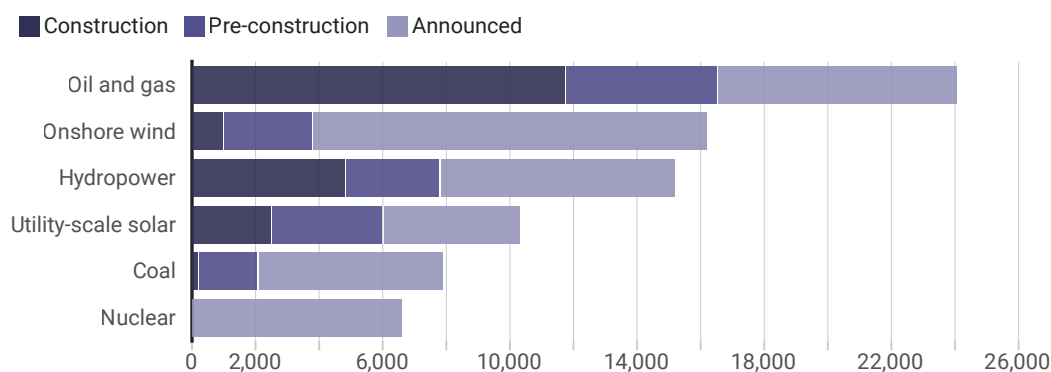
Looking beyond prospective coal and oil and gas projects, capacity in development across CCA countries appears to favor non-fossil sources. GEM data show in-development wind, utility-scale solar, nuclear, and hydropower projects in the CCA region totalling 48.3 GW capacity, about 50% greater than the equivalent figure for coal and oil and gas projects (31.9 GW).

However, only 17% of non-fossil power projects are in the construction phase compared to 34% for coal

and oil and gas projects. Furthermore, over half of the 8 GW non-fossil capacity in construction is accounted for by two large hydropower projects—the [Rogun plant](#) in Tajikistan and the [Kambarata-1 plant](#) in Kyrgyzstan. Two of the Rogun hydroelectric plant's six 600 MW units are now operational, but full commissioning is not expected until 2033. At the 1,860 MW Kambarata-1 plant, construction of the power facility itself won't commence until 2025, with full commissioning a further nine years off. Although the two

More oil and gas capacity under construction in the Caucasus and Central Asia region than all other power sources combined

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Data include phases/units equal to or greater than specific thresholds: solar 20 MW, wind 10 MW, hydropower 75 MW, coal 30 MW, oil and gas 50 MW.



projects are major components of a drive to increase generation and improve domestic and regional energy security, long construction times won't see their contribution before 2030. Furthermore, the projects face the added challenge of managing the region's shared water resources, which sees upstream Kyrgyzstan and Tajikistan replenish reservoirs in summer while downstream Uzbekistan and Kazakhstan depend on that same water during the main growing season.

GEM data show Armenia, Kazakhstan, and Uzbekistan with plans for new nuclear power facilities. Still, the majority of this new capacity is at the announced stage. The Armenian government is [considering](#) plans for additional nuclear capacity and is reviewing options for a [1,200 MW](#) plant and [smaller](#) modular units but has yet to identify a favored supplier. On October 6, 2024, Kazakhstan conducted a national referendum on the proposed 2.4 GW [Ulken nuclear power](#) plant, with [71%](#) of those who cast ballots voting in favor, [despite public opposition](#), reported irregularities at the polls, and silencing critics and activists. Announced plans for the 2.4 GW [Navoi nuclear power](#) plant in Uzbekistan appear to have halted. Instead, a new 330 MW six-unit small modular reactor (SMR) nuclear power plant is in development in the Jizzakh region of Uzbekistan, with a targeted commissioning year of [2028](#). However, the Uzbek Energy Minister [commented](#)

in a recent interview that the new nuclear plant is still at the design phase. So, as with hydropower projects, new nuclear plants are, at best, medium-to-long-term options for increasing generation.

Beyond these long lead-time hydropower and nuclear projects, construction phase projects for non-fossil power sources are extremely limited in the CCA region. GEM data show Uzbekistan making up virtually all wind and utility-scale solar projects under construction in the CCA region (a single project in Armenia — the 55 MW [Masrik solar farm](#) — is the only other). Under construction wind and solar capacity in Uzbekistan comprises two large 500 MW wind farms and nine solar farms, averaging 270 MW, totaling 2,447 MW. However, this is still less than the 5,848 MW oil and gas capacity under construction in the country (even when taking into account 600 MW due for decommissioning at the Syrdarya power station).

Capacity additions from small-scale facilities below the threshold GEM data covers could make important non-fossil contributions to the power mix in the CCA region. However, per-country research (see country profile sections below) suggests this small-scale segment has yet to make significant inroads in most CCA countries. For example, most CCA countries with hydropower resources are planning small-scale

Owner-operators based in the Middle East and China account for 80% of wind and utility-scale solar capacity in development in the CCA region

Company (country/area)	Wind capacity in development (MW)	% of total
ACWA Power (Saudi Arabia)	9,833	60%
Masdar + AMEA Power (UAE)	2,537	17%
Nebras Power (Qatar)	1,000	6%
Universal Energy (China)	563	3%
Others	2,261	14%

Company (country/area)	Solar capacity in development (MW)	% of total
Sum of 5 state-owned firms (China)	3,300	32%
Masdar + Tepelen Group (UAE)	2,685	26%
ACWA Power (Saudi Arabia)	1,600	16%
Others	2,713	26%

hydropower facilities. Yet, these additions are generally piecemeal and won't offer sufficient capacity to supplant dominant power sources. Planned small-scale hydropower additions of significant size were only identified for Uzbekistan ([438 MW](#)) and Armenia ([380 MW](#)).

The situation is comparable for distributed solar, where stated plans and support measures are rarely detailed and appear to be a missed opportunity amongst the CCA countries. However, the region holds examples of successful scale-up of distributed solar PV, again from Uzbekistan and Armenia. With support from a feed-in tariff, 35,000 residential households in Uzbekistan currently host [150 MW](#) rooftop solar PV. In Armenia, distributed solar PV capacity stood at [354 MW](#) as of September 2024, up from [18 MW](#) five

years previously, providing [9%](#) of national electricity generation in H1 2024.

Despite these examples of a distributed approach, wind and solar capacity in development across the CCA region generally favors larger, utility-scale projects. GEM data show that the majority of these in-development wind and solar projects are implemented or owned by firms based in the Middle East or China, notably the Saudi firm ACWA Power, Masdar of the United Arab Emirates, and several Chinese utility companies (e.g., China Gezhouba Group Co.). It will be important to monitor the development of this ownership pattern for new wind and solar capacity in the CCA region, to ensure the scalability and [long-term](#) financial sustainability of the capacity additions.

IV. WIND, UTILITY-SCALE SOLAR, AND HYDROPOWER CAPACITY IN DEVELOPMENT FALLS SHORT OF RENEWABLE ENERGY TARGETS IN MOST CCA COUNTRIES

All CCA countries have submitted updates to their first nationally determined contributions (NDCs) under the Paris Agreement, pledging varying degrees of climate actions contingent on the level of international support received. CCA countries have also adopted various energy strategies aligned with their international climate commitments, typically framed within respective national development plans (see [accompanying GEM Wiki page](#) for a compilation of climate pledges and energy sector targets).

Comparing GIPT tracker data for power projects in development with capacity targets detailed within these energy strategies reveals the distance between ambition and reality. Six CCA countries detail targets for renewable capacity additions in the 2030–2040 range—including wind, solar and hydropower—adding up to 43 GW (Turkmenistan and Kyrgyzstan lack specific renewables targets). However, GEM power tracker data show 30 GW renewable capacity in development across these same six CCA countries, a 13 GW deficit. An assessment of each CCA country

shows some cases where capacity in development exceeds stated renewable targets. Yet, these cases are due to reliance on large hydropower projects or due to unambitious targets.

Azerbaijan appears to be an example of the latter. The COP29 host has been keen to [highlight](#) how plans for 2 GW of additional renewables capacity will see the country exceed a 30% renewable share of total electricity capacity by 2030. GEM data suggest wind and utility-scale solar PV projects coming online by 2027 will fulfill nearly all of the 2 GW quota. Around 1,000 MW comes from projects implemented by Abu Dhabi Future Energy Company (better known as Masdar), in collaboration with SOCAR, the State Oil Company of Azerbaijan, including the [Bilasuvar](#) (445 MW) and [Neftchala](#) (315 MW) solar plants, as well as the [Absheron-Garadagh](#) wind farm (240 MW). Saudi energy group ACWA leads the [Area 1 / Khizi 3](#) wind farm (240 MW), with an additional 200 MW wind project [in discussion](#), while three additional solar projects account for a further 440 MW.

However, GEM data show no further renewable projects in development in Azerbaijan, calling into question the certainty of capacity increase beyond the 2 GW additions. Recent public statements by the Energy Ministry have indicated plans to commission 7 to **8 GW** of additional renewable capacity by 2030, with a pipeline of candidate renewable projects totalling **28 GW**. Although the 2 GW of wind and solar additions in development mark a significant increase from a low base, the actual generation that the new farms produce would be unlikely to match that of new gas capacity under construction, specifically, the 1,280 MW **Mingecevir gas power** station, due for commissioning by the end of 2024.

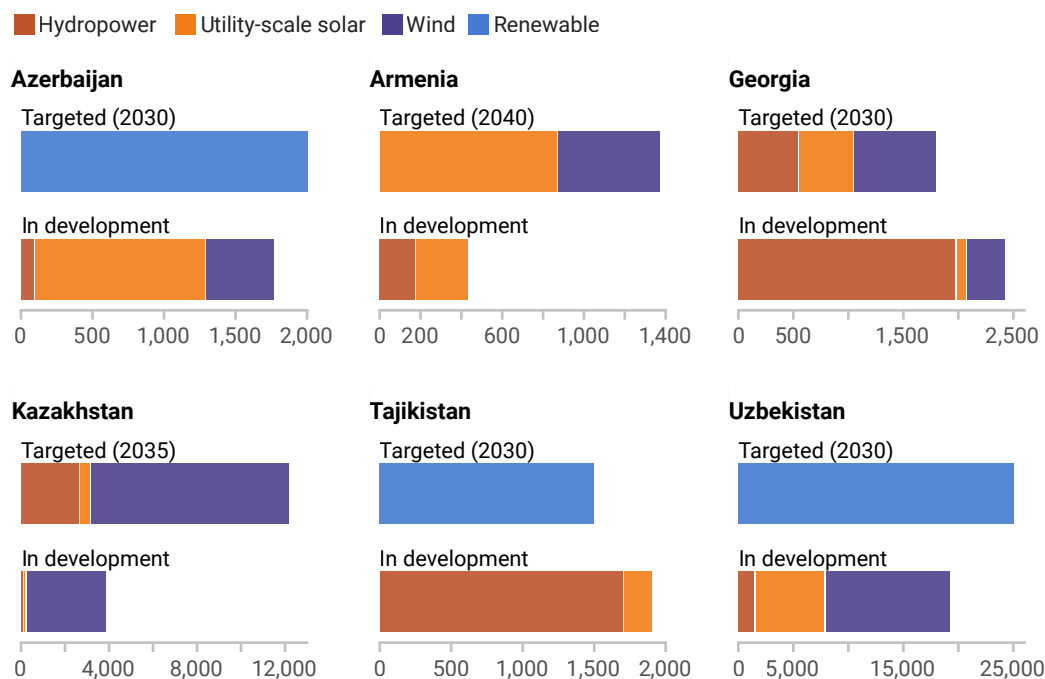
Neighboring countries of Armenia and Georgia both target high renewable shares in electricity generation: Georgia 85% by 2030 and Armenia 50% by

2040, helped by existing large hydropower facilities. However, GEM data suggest renewables projects in development in Armenia falling short of the targeted capacity increases, particularly for wind, with no known projects tracked. Compared to stated targets, the apparent excess of renewable capacity in Georgia is due to nearly 2 GW of hydropower projects in development. Aside from the long construction lead times of large hydropower projects, several of the proposed projects face public opposition due to associated environmental and social disruption, notably the 700 MW **Khudoni Hydro Power Plant**. GEM data for in-development wind and utility-scale solar in Georgia total only one-third of the targeted increase.

A similar diagnosis can be made for hydropower-dominated Tajikistan and Kyrgyzstan, where total capacity in development favors new hydropower. The

Wind, utility-scale solar, and hydropower capacity in development less than stated targets for most CCA countries

Additional capacity targeted by 2030–2040 and capacity in development, in megawatts (MW); each country on its own scale



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor.

See accompanying GEM Wiki page for compilation of energy sector targets.

Data include phases equal or greater than specific thresholds: solar 20 MW, wind 10 MW, hydro 75 MW.



available information on in-development hydropower in Tajikistan does not indicate how many of these projects would become operational in time to contribute to the country's target of 1,500 MW renewable addition by 2030. Kyrgyzstan's National Development Strategy from 2018 references a 10% share in the total energy mix from renewables (excluding large hydropower) but lacks any indication of the breakdown between sources or the necessary capacity additions. However, GEM data suggest that Kyrgyzstan has the most renewable capacity in development as a proportion of operating capacity. Although three-quarters of this 9,700 MW in-development total is for hydropower projects, the 2,480 MW of wind and utility-solar projects would constitute a substantial addition if built.

Despite Kazakhstan's pipeline of coal and oil and gas projects (the largest in the CCA region), a presidential decree issued in June 2024 includes targets for increasing the non-fossil share of electricity generation to 15% by 2030, rising to 50% by 2050. The Government's Power Sector Development Plan to 2035, from earlier in the year, includes targets of 9,000 MW wind,

500 MW solar, and 2,660 MW hydropower. However, GEM data from power projects in development are well below these figures, with no renewables projects in the construction phase.

In early 2024, the Senate of Uzbekistan voted to increase renewable energy targets to 27 GW by 2030 and the share of renewable power generation to 40% (including hydropower). GEM data show that Uzbekistan has the largest absolute volume of renewable capacity in development in the CCA region and the most capacity under construction. However, the total figure for wind, utility-scale solar, and hydropower projects in development still falls 30% short of the target, at 19.2 GW.

Turkmenistan's NDC details one of the least ambitious targets in the CCA region, and its reference to an intensity-based target is unlikely to bring about absolute reductions in emissions. Neither the Turkmen NDC nor the [National Strategy](#) of Turkmenistan on Climate Change details specific targets for renewables. This tallies with GEM data showing no renewables in development.

V. CAUCASUS & CENTRAL ASIA POWER SECTOR COUNTRY PROFILES

Azerbaijan

By global standards, Azerbaijan is a modest fossil fuel producer, pumping [less than 1%](#) of the world's oil and gas. However, fossil rents remain vital to the national economy, accounting for [over 90%](#) of all exports and [half](#) of the state budget. Oil's importance has lessened in recent years, with production falling 40% from peak volumes in 2010 to 30.2 million tonnes in 2023, of which 25.2 million tonnes were exported. Despite efforts to develop new fields, such as BP's commissioning of a [new offshore platform](#) in the Caspian Sea, which will partially stem the long-term decline of the [Azeri Chirag Gunashli field](#), dwindling oil revenues present an [increasing challenge](#) to the state's budget.

By contrast, gas production has seen a sevenfold [ramp-up](#) over the last two decades, driven by the

discovery and development of the [Shah Deniz](#) gas field. Gas production volumes are expected to reach 37 bcm in 2024, with an additional 30% increase targeted by [2033](#). Azerbaijan has pledged a doubling of gas export volumes [by 2027](#), aligned with Europe's goal of securing alternative sources of gas following Russia's invasion of Ukraine. Meeting these supply commitments is dependent on a ramp-up in domestic production, particularly from the [Absheron gas field](#) and increases in [pipeline capacity](#) in the final stretch of the Southern Gas Corridor.

Azerbaijan uses its abundant gas resources to power 12 gas plants, which provide over 90% of domestic electricity generation. Plans for new gas plants are motivated by steady increases in electricity demand,

rising electricity [exports](#), and a drive to generate power [more efficiently](#) to economize on gas use. The [Mingecevir gas power station](#) (1,280 MW) is currently under construction and will become the country's largest power station when commissioned by the end of 2024. The Azerbaijani Ministry of Energy is currently considering private investor proposals for the [Yashma gas power station](#) (500 MW), with construction planned for [2025](#).

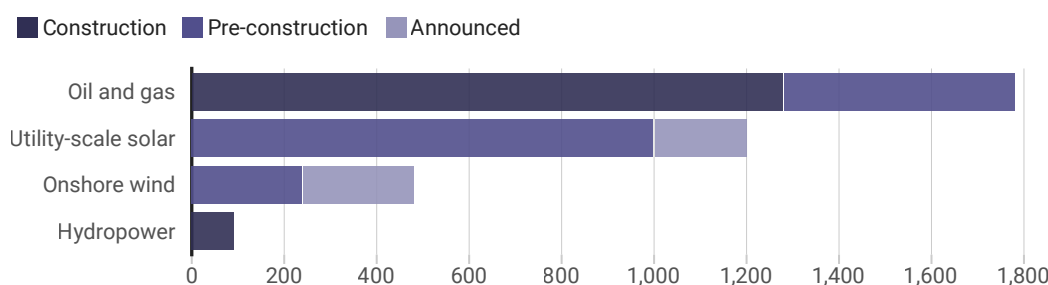
GEM data shows 1,200 MW of utility-scale solar PV projects in development in Azerbaijan. Masdar leads this development with projects totalling 1,000 MW. The [Garadagh \(230 MW\)](#) project was commissioned in 2023, while the Bilasuvar (445 MW) and Neftchala (315MW) projects are currently under construction. Masdar's projects will be undertaken in partnership with SOCAR, and include the 240 MW Absheron-Garadagh wind farm. Other notable wind projects include the [Khizi-3 \(162.5 MW\)](#) and [Area-1 \(78 MW\)](#) wind farms, which are due for commissioning in 2025, led by Saudi energy group ACWA, with an additional

200 MW wind project [in discussion](#). GEM data suggest no offshore wind projects currently in development in Azerbaijan. However, Azerbaijan released its [Offshore Wind Roadmap](#) in 2022, identifying up to 7 GW of potential offshore wind capacity by 2040, and has penned recent agreements with the [EU](#), [ACWA](#) and [Masdar](#) to develop offshore capacity further.

Azerbaijan [updated its NDC](#) in 2023, aiming for economy-wide GHG reductions of 40 per cent below 1990 levels by 2050. Mukhtar Babayev, minister of ecology and natural resources and current COP29 president, [stated](#) in March 2024 that national climate goals could be strengthened. Although Azerbaijan lacks a Long-Term Low Emissions Development Strategy, the country's near-term socioeconomic development strategy [targets](#) a 30% renewable share of electricity capacity by 2030 (~20% in 2023). Azerbaijan's energy minister [recently stated](#) that current investment commitments for up to 2 GW of renewables will see a 33% share in total capacity by 2027, with further aspirations for [8 GW](#) of total renewables capacity by 2030.

Oil and gas capacity under construction in Azerbaijan outnumbers capacity in development from any other source

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 20 MW, wind 10 MW, hydropower 75 MW, oil and gas 50 MW.



Georgia

Georgia relies on fossil fuel imports for over 80% of its total energy supply. Gas features heavily, with close to 80% of imports coming from neighboring Azerbaijan via the Karadaghi-Tbilisi gas pipeline. By contrast, electricity supply is largely covered domestically, with hydropower accounting for three-quarters of the total. Hydropower production in Georgia has a seasonal profile, with surplus production during summer months exported mainly to Turkey, while imports mainly from Russia supplement winter deficits.

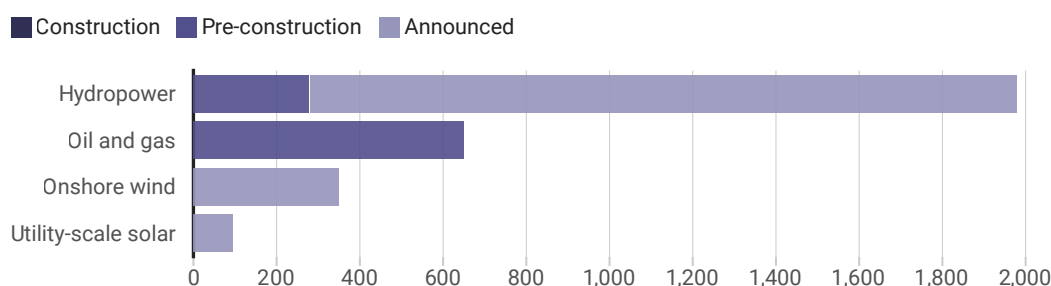
Substantial rises in electricity demand have largely been met by new thermal and hydropower capacity additions in recent years, with capacity additions planned to meet further demand growth. Hydropower represents the largest contribution to in-development capacity, with eight projects totalling 1,979 MW, or ~80% of current operational capacity. Several of these proposed hydropower projects face public opposition due to associated environmental and social disruption, notably the 700 MW Khudoni hydro power plant. The Georgian Oil & Gas Corporation is currently seeking

a private investor to expand the Gardabani 3 thermal power plant with a 400 MW gas-fired unit. GEM currently tracks plans for three new wind farms (Imereti, Kartli, and Ruisi), totalling 349 MW and the 100 MW Akhali Samgori solar farm. However, additional wind and solar projects may soon join this list following the results of an oversubscribed renewable energy capacity auction in February 2024.

Georgia released a revised first NDC in 2021 that commits to an unconditional emissions reduction target of 35% and a conditional reduction target of 50–57% by 2030 compared to the 1990 baseline. The NDC aims to achieve a 27.4% share of renewable energy in final energy consumption and 85% in the electricity sector by 2030 (currently ~76%). More recently, Georgia has developed its Long-Term Low Emission Development Strategy and draft National Energy and Climate Plan, which both refer to the same renewables percentage target, the latter of which estimates the following capacity requirements: 3,992 MW hydropower, 547 MW solar, and 750 MW wind.

Hydropower projects lead in-development capacity in Georgia

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Data include phases/units equal to or greater than specific thresholds: solar 20 MW, wind 10 MW, hydropower 75 MW, oil and gas 50 MW.



Armenia

Armenia has no proven reserves of gas or oil and imports these fuels from Russia for **over 80%** of its total energy supply. Imported gas is used in the country's two gas-fired plants (**Hrazdan** and **Yerevan**), covering **42%** of the country's electricity supply in 2023. Nuclear and hydropower are also major sources of electrical energy, accounting for **31% and 19%**, respectively, in 2023, while the contribution from solar was 6.8%.

Although electricity demand has increased **67% since 2003**, domestic load is comfortably met by existing capacity, and close to a fifth of generation has been **exported** in recent years, mainly to **Iran**. However, GEM data show that 60% of Armenia's generating capacity is over 50 years old, necessitating **plant upgrades** and new capacity. The Moscow-headquartered Tashir Group is financing the construction of a new 50 MW gas unit at the premises of the **Hrazdan power station** and has also proposed a new **126 MW gas plant**. Russia's state atomic energy company Rosatom will modernize and extend the operational lifetime of **Metsamor 2**, the only operating nuclear power station in Central Asia, to 2036. The Armenian government is **considering** plans for additional nuclear capacity, reviewing **1,200 MW** and **smaller** modular options.

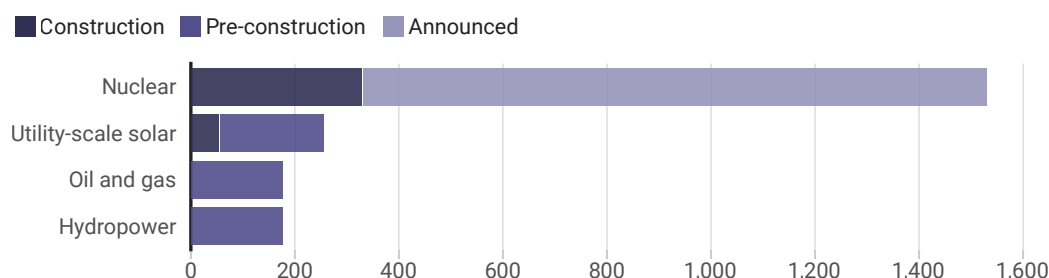
Much of the country's best hydropower resources have already been **exploited**, and **water scarcity** has contributed to the **lowest capacity factors** for hydropower in the last two decades. However, Armenia's **current**

energy strategy includes 150 MW of additional small-scale hydropower, while previously announced plans for three additional large-scale hydropower plants **do not feature** (**Meghri**, **Shnogh** and **Loriberd**). The **Masrik-1** (55 MW) and **Ayg-1** (200 MW) solar farms are due for completion in 2024 and 2025, respectively, and will double existing utility-scale solar capacity. Masrik-1 is led by Abdul Latif Jameel, a Saudi holding company, while Ayg-1 will be 85% owned by Masdar. Armenia has also shown impressive growth in the distributed solar sector, with over **350 MW** total capacity, most of which was installed in the last five years. By contrast, the wind sector is less developed, with four operational wind farms (**totalling 4MW**) and no known wind projects in development.

Armenia **updated its NDC** in 2021, setting an economy-wide GHG reduction target of 40% below 1990 levels in 2030. In December 2023, the Long-Term Low Emissions Development Strategy of the Republic of Armenia was **adopted**, with a headline commitment of reducing GHG emissions to 2.07 tonnes of CO₂ equivalent per capita by 2050 (down from **3.5 in 2022**). This long-term strategy is aligned with the country's Energy Sector Development Strategic **Programme**, which the IEA **estimates** will result in a 66% renewables share in the power sector by 2036, requiring an additional 950 MW solar capacity, 500 MW wind capacity, and 141 GW of large hydropower capacity.

In-development nuclear capacity in Armenia is two-and-a-half times greater than all other sources

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 20 MW, hydropower 75 MW, oil and gas 50 MW.



Kazakhstan

Kazakhstan is the region's largest crude oil producer, turning out **90 million tonnes** in 2023, with plans to expand **oil production**. Close to 80% of the crude production is exported, with around **81%** going through the **Caspian Pipeline Consortium** and another 13%, or 8.4 million tonnes, through the **Atyrau-Samara pipeline** — both pipelines run through Russia. Kazakhstan is exploring alternative export routes, including in partnership with Azerbaijan via the Baku-Tbilisi-Ceyhan (**BTC pipeline**).

Kazakhstan also has significant associated gas reserves, mainly concentrated in key fields to the west (**Karachaganak**, **Kashagan** and **Tengiz**). Gas production reached nearly 60 billion cubic meters in 2023. However, as gas is essentially a by-product of oil production in most of Kazakhstan's fields, commercial gas available after reinjection and processing was around **half** the total, and future gas production depends on oil sector developments.

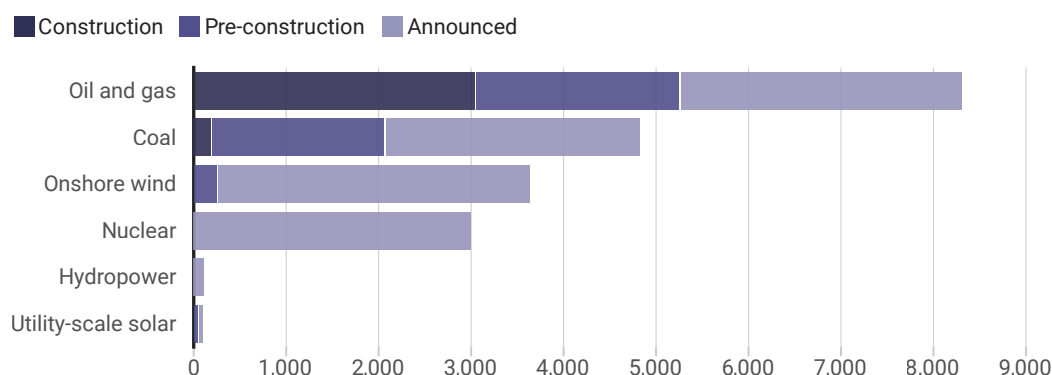
Kazakhstan also has abundant coal reserves and produced **112 million tonnes** domestically in 2023, making it a top-ten producer, globally. Domestically produced coal fueled **67%** of electricity generation in 2023, from 13.6 GW of coal-fired plants. Kazakhstan exported 28% of coal production in **2023**, mainly to Russia but also to

the EU and Asian markets, replacing some of banned Russian coal exports to the West. Coal production could increase on the back of major mining investments. The largest coal mine, **Bogatyr**, a joint venture between Samruk Energy and the Russian RUSAL, plans to increase production from 32 to 40 million tonnes per annum, while several other surface coal mines also plan expansions, according to GEM's data.

Despite its substantial energy endowment, Kazakhstan contends with meeting the growing demand for electricity with **aging** generating and **electricity transmission** assets. Increased electricity imports from **Russia** have not eased frequent **power outages**, often resulting from equipment failure. Since many thermal facilities are combined heat and power plants (CHPs), which also provide heating to the residential sector, the outages leave residents without heat during the country's harsh winters. In response to the looming power deficit in early 2024, the Ministry of Energy **developed an action plan** and published an order on **power sector development to 2035** that foresees the building of 26.5 GW of new capacity, predominantly coal and gas. The plan also includes 9 GW of wind capacity, 2.7 GW of hydro, 500 MW of solar capacity, and 2.4 GW of **nuclear capacity**.

Coal and oil and gas projects make up two-thirds of all in-development capacity in Kazakhstan

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Data include phases/units equal to or greater than specific thresholds: solar 20 MW, wind 10 MW, hydropower 75 MW, coal 30 MW, oil and gas 50 MW.



GEM data show 4,822 MW of new coal plant capacity in development, with the largest proposed projects in Ekibastuz, a major coal mining center in northeastern Kazakhstan, comprising units 3 and 4 (1,080 MW) at the [Ekibastuz-2 power station](#) and the proposed 1,200 MW [Ekibastuz-3 power station](#). In late 2023, Kazakhstan also signed agreements with the Russian Inter RAO to build three coal-fired CHPs in the northeast of the country totalling 960 MW of capacity ([Semey](#), [Kokshetau](#), and [Ust-Kamenogorsk-2](#)).

The plans for new coal projects clash with Kazakhstan's [Carbon Neutrality Strategy](#) adopted in 2023 and, more recently, amendments to the decree on the "[Transition to a Green Economy](#)" published in June 2024, which lay out plans to reduce coal-fired generation or supplement it with CCS technologies, with a target reduction of 50% by 2040 and 80% by 2050, under the "Baseline" scenario. Under the more ambitious "Carbon Neutrality" scenario, which is consistent with the adopted Carbon Neutrality Strategy, coal-fired generation would have to be fully eliminated or supplemented with CCS by 2050. Kazakhstan plans to implement the coal plant [retirement schedule](#) in 2025 for plants that are older than 30 years. Yet, with no announcements of retirements of the old coal plants, new coal power projects, if built, would represent over 25% of the country's total coal-fired capacity, according to GEM's data.

GEM's data document 8,303 MW of in-development gas plant capacity. If built, this would triple the country's operating gas fleet of 4,237 MW. This is despite the [ongoing deficit of gas](#) for domestic needs. Kazakhstan plans to increase commercial gas production, gas imports, and the gas share in power generation (currently at 21%). Over 3,000 MW of new gas proposals are already in construction. In the Almaty region, which benefits from the existing gas infrastructure, construction of new gas-fired units is underway to replace coal, including 558 MW at [Almaty-2](#) to replace

a similar quantum of coal capacity and at [Almaty-3](#) power station, where the gas units of 540 MW will bring incremental capacity by replacing 173 MW of existing coal capacity. The [Turkistan power station](#) with 1,000 MW of planned capacity and [Tengizchevroil Future Growth Project power station](#) with 650 MW are also planned for completion in the next few years.

Kazakhstan has signed several deals with international companies to build large-scale wind and combined battery storage systems, including the 1 GW [Jetisu wind farm](#) sponsored by ACWA Power, the 1 GW [Zhambyl wind farm](#) by Masdar, the 1 GW [Mirny wind farm](#) with Total Energies as the 60% shareholder, a 1 GW project developed in cooperation with the Russian company [Hevel](#), and 1 GW by [Chinese Power International Holding](#). Construction is yet to begin with planned commissioning in [2028](#). These projects are included in the government order on "[power sector development to 2035](#)" that foresees an additional 9 GW of wind power plants. The same order details a more modest 500 MW of solar PV additions. The [Hyrasia One](#) green hydrogen project, which focuses on export of hydrogen to Europe, has been in development since [2022](#) but is [not included](#) in the government's current hydrogen plan. A national referendum held October 6, 2024, saw [71% of voters](#) in favor of a proposed 2,400 MW [Ulken nuclear power plant](#). However, public rallies opposing the new plant were [quashed](#), while concerns remain over the environmental impact at the planned site at water-stressed Lake Balkhash in the southeast.

Kazakhstan [updated its NDC](#) in 2023 with unconditional and conditional targets of 15% and 25% GHG reduction by 2030 relative to 1990, respectively. Kazakhstan has also adopted a strategy to reach carbon neutrality by [2060](#). A recent presidential decree detailed plans to achieve a [15%](#) share of renewable energy in total generation by 2030, up from [5.9%](#) in 2023, rising to 50% in 2050.

Uzbekistan

Uzbekistan benefits from extensive gas reserves, using the fuel as its primary energy source. However, extraction rates have been [falling](#) and dropped 13% in the last two years to reach 46.7 bcm in 2023, leading to supply [shortages](#) in the winters of 2022 and 2023. In October 2023, Uzbekistan started receiving Russian gas through Kazakhstan, reversing its previous position as a gas exporter to [a net importer](#). The government [plans to invest \\$500 million](#) to expand the capacity of the gas transportation system to enable a [3.6x](#) increase in gas imports from Russia. Uzbekistan has historically exported gas to China and Kyrgyzstan. The deal with Russia is partly due to its [commitment](#) to export gas to China, but the government previously indicated that it would cease gas exports by 2025.

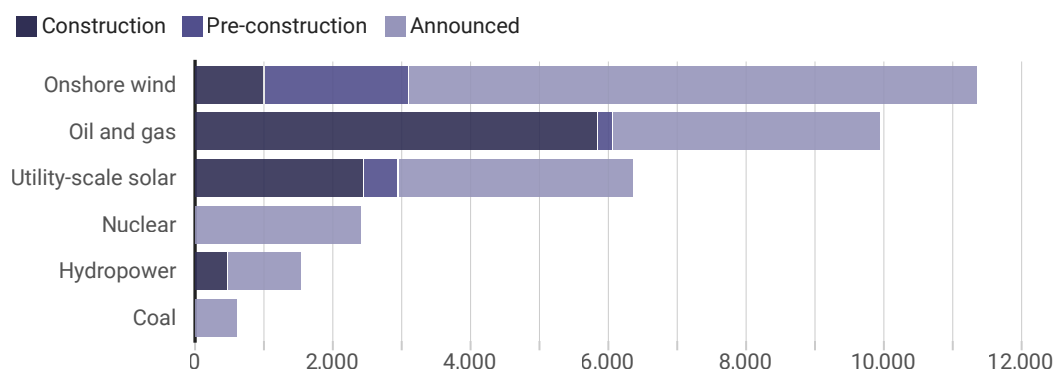
Gas is central to power generation in Uzbekistan, and construction of new gas-fired capacity has been booming in recent years. In contrast with other countries in the region, Uzbekistan has attracted investors from Turkey and the Middle East under the public-private partnership model. Several large gas-fired projects are already in construction, totalling 5.4 GW, or around 40% of the operating gas plant fleet. These include the 550 MW [Jizzakh CHP power station](#) developed by the Turkish Cengiz Enerji, the 1573 MW [Syrdarya 2 power station](#) and the 1560 MW [Surkhandarya power](#)

[station](#), developed by a consortium of international investors led by Nebras Power from Qatar. In contrast to gas, coal-fired generation plays a limited role in the electricity mix, with its 3% share coming from two coal plants, of which the larger 2,100 MW [Novo-Angren](#) plant co-fires with gas. Although a proposed 300–600 MW expansion at the 393 MW [Angren power station](#) appears dormant, the 2024 business plan of the national utility still listed the potential 300 MW project with China Railway and PowerChina as partners. Coal is mainly sourced via [imports](#) from Kazakhstan. However, domestic coal production grew by 15.5% in 2023 to [6.2 Mt](#), with plans to increase to [8 Mt by 2025](#).

Compared to the neighboring Tajikistan and Kyrgyzstan, hydropower resources in Uzbekistan are relatively limited, and operating plants contributed 9% of electricity generation in 2023. Of over 1,500 MW hydropower capacity in development, the 400 MW [Pskemskaya hydro plant](#) is the most advanced, with commissioning planned for 2026–2027. In Q1 2024, Masdar [partnered](#) with Uzbekhydroenergo to evaluate the potential of pumped-storage projects. Since 2018, Uzbekistan has been planning to build the 2.4 GW [Navoi nuclear power plant](#) based on its agreement with Russia. In 2024, plans appear to have shifted in favor of the smaller-scale nuclear facility, comprising

Wind and utility-scale solar are over half of in-development capacity in Uzbekistan but lag behind oil and gas under construction

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Data include phases/units equal to or greater than specific thresholds: solar 20 MW, wind 10 MW, hydropower 75 MW, coal 30 MW, oil and gas 50 MW.



6 x 55 MW units totalling 330 MW. Rosatom is the principal contractor, and preparatory construction work began in summer 2024.

Recently commissioned and construction-phase wind and utility-scale solar installations will lift renewable capacity from a relatively low base in the coming years. In late 2023, China Energy Engineering Corporation commissioned 400 MW of a 1 GW solar project. In Q1 2024, Masdar connected to the grid the 220 MW Jizzakh solar farm and the 220 MW Samarkand solar farm, while the larger 457 MW Sherabad solar farm is due to start operations in 2025–26. July 2024 saw a financial close for the Tashkent solar plant, which features a 200 MW solar plant and a 500 MWh battery energy storage system (BESS), the largest in Central Asia. The first phase of the 500 MW Zarafshan wind farm developed by Masdar started operations in late 2023 with 100 MW of capacity, with full operation expected by 2025. Bash wind farm and Dzhankeldy wind farm, both with 500 MW, are developed by ACWA Power with the planned

start of operations in 2025. In May 2024, ACWA Power signed a power purchase agreement (PPA) with the National Grid of Uzbekistan for Central Asia's largest 5 GW Aral wind farm, which extends ACWA Power's renewable energy portfolio in Uzbekistan to over 10 GW.

As per the Transition to a Green Economy Strategy from December 2022, Uzbekistan targeted 15 GW of renewable energy capacity and at least a 30% share of renewable power generation by 2030. However, in early 2024, the senate voted to increase renewable energy targets to 27 GW by 2030 and the share of renewable power generation to 40%. Later sources referred to a lower quantum of 25 GW by 2030. In 2021, Uzbekistan published its updated NDC, committing to reduce GHG emissions per unit of GDP by 35% by 2030 compared with 2010 levels. In addition, Uzbekistan announced in February 2021 its aim to achieve carbon neutrality in the power generation sector by 2050. However, a policy document or binding legislation has yet to cement this objective.

Turkmenistan

Turkmenistan is the largest fossil gas producer in the region, with volumes of 80.6 bcm in 2023. Over half of the gas production was exported, including around 32–33 bcm to China through the Central Asia–China gas pipeline, with the remainder exported to Russia, Kazakhstan, and Uzbekistan. Fossil gas production and exports in 2023 exceeded the government plans by 7 and 13 percentage points, respectively, thanks to the commissioning of a new well at Galkynysh field. Turkmenistan plans to ramp up fossil gas exploration and production, expand exports to China through an additional branch of the Central Asia–China gas pipeline, and diversify exports through the proposed Turkmenistan-Afghanistan-Pakistan-India Gas Pipeline (TAPI) and Trans-Caspian pipeline.

The power system is almost exclusively fueled by domestically sourced fossil gas, with 13 gas-fired power plants totalling 7 GW installed capacity. Increases in electricity demand have been met with new capacity and modernization of existing plants. Approximately

15% of electricity generation is exported to neighboring countries, using two dedicated plants (the Mary and Lebap power stations). The socioeconomic development program for 2022–2028 intends to increase electricity generation by 22.5% in 2028 compared to 2022, met in large part by the 1.5 GW gas-fired Balkan power station, with Turkish company Çalık Enerji leading the construction. Despite vast renewable energy resources, notably wind and solar, GEM data suggest no known renewables projects in development.

Turkmenistan submitted an updated NDC in early 2023 with a stated unconditional target of reducing GHG emissions by 20% in 2030 compared to levels in 2010. However, the NDC also refers to an emissions intensity-based target and projected emissions from the National Strategy of Turkmenistan on Climate Change that would see the country's emissions double over levels in 2012. Turkmenistan also joined the Global Methane Pledge at COP28, though the efficacy of self-reporting leakages remains to be seen.

Kyrgyzstan

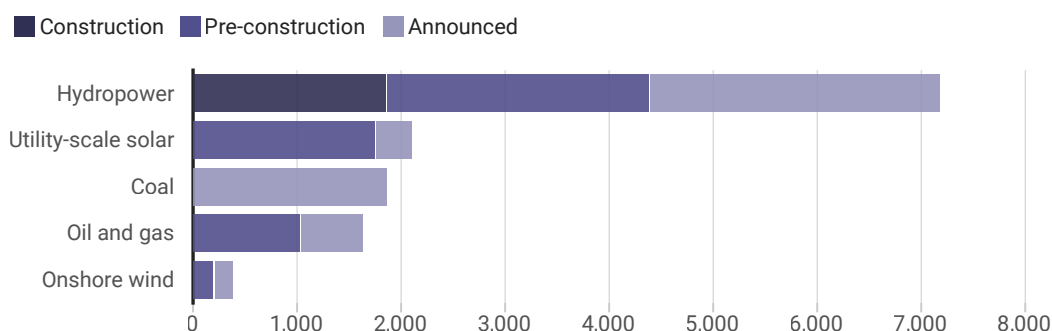
Kyrgyzstan has significant hydroelectric potential and substantial coal reserves. Still, it relies on imported gas, oil, and oil products, with the majority [imported](#) from Russia. Hydropower is the largest electricity source (86%), followed by coal (13%) and gas (1%). GEM data show that over 90% of the country's hydropower capacity is sourced from six plants between 120 and 1,200 MW capacity located on the Naryn River, with five of the plants using water released from the Toktogul reservoir. Hydropower generation [fluctuates](#) year to year depending on water inflow and accumulation in the Toktogul reservoir. Historically, electricity [imported](#) from Turkmenistan (via Uzbekistan) and Russia (via Kazakhstan) covering domestic shortfalls during the drier winter months was more than compensated by excess generation and export during periods of water abundance. However, growing demand and broadly flat domestic generation have turned the country from a net exporter to a net electricity importer over the last decade. Record high demand of [17.2 TWh](#) in 2023 coupled with low water inflow drove record high imports and the declaration of an emergency [decree](#) empowering the Energy Ministry to expedite new energy projects. In the longer term, shrinking glaciers across the region due to climate change may [permanently reduce](#) water in-flows upon which reservoirs along the Nyrin River depend.

Coal-fired generation comes from the 812 MW [Bishkek CHP plant](#), which also supplies heating to the municipal network. Several of the plant's units are over five decades old and prone to failure, most recently in the winter of 2024 when heat and power were lost after a plant [explosion](#), also injuring five workers. The events have expedited efforts to convert the boilers of the plant to run on gas. Domestic coal mining is increasing, reaching a record [4.1Mtpa in 2023](#), with further expansion expected to fuel new coal plant capacity. An agreement was signed in October 2023 with a Russian contractor, AB Energo, for a new 660 MW [Jalal-Abad](#) coal-fired power station. And in January 2024, the Kyrgyz Ministry of Energy and China National Electric Engineering signed a [memorandum](#) on constructing the 600 MW coal-fired [Kara-Keche power station](#). GEM data also shows a total of 1,628 MW of gas plant capacity in development, supported by Russian efforts to expand gas deliveries and distribution within the former Soviet republic and a memorandum of understanding between respective energy ministries for the construction of the 500 MW [Chaldovar power station](#). The 100 MW [Bishkek-2](#) and 100 MW [Bishkekselmash](#) power stations were also announced in early 2024.

In-development hydropower projects outnumber in-development fossil-fueled projects by nearly

More hydropower in development in Kyrgyzstan than all other power sources combined

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Data include phases/units equal to or greater than specific thresholds: solar 20 MW, wind 10 MW, hydropower 75 MW, coal 30 MW, oil and gas 50 MW.



two-to-one, with a total of 7,176 MW across 18 projects. The Kambarata 1 project (1,860 MW) is the only hydroelectric project in the construction phase and is also the largest in development in Kyrgyzstan. A joint venture between Kyrgyzstan, Kazakhstan, and Uzbekistan was announced in April 2023 with the aim of completing the [long-postponed](#) plant, though commissioning is still between [seven to nine](#) years off. In-development utility-scale solar projects total 2,100 MW across eight projects, with the two largest projects (Balykchy and Issyk-Kul solar farms) receiving backing from consortia of Chinese infrastructure [investors](#). GEM currently tracks three wind projects in development, totalling 380 MW capacity, with the

Issyk-Kul (100 MW) and Bataken (80 MW) projects being developed by a subsidiary of the Russian State Atomic Energy Corporation, [Rosatom](#).

The [updated NDC](#) of Kyrgyzstan includes an unconditional GHG emissions reduction target of 15.97% by 2030 and a conditional emissions reduction target of 43.62% by 2030, below a business-as-usual trajectory. Specific targets for power sector decarbonisation are not apparent for Kyrgyzstan. Only the National Development [Strategy](#) references a 10% share in the energy mix from environmentally friendly energy sources (which exclude large hydropower) without specifying a target date.

Tajikistan

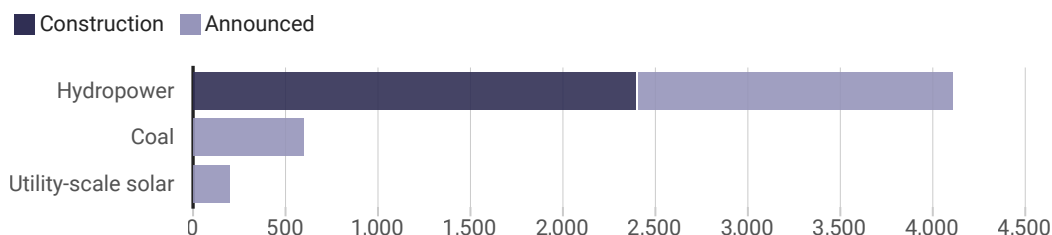
Tajikistan's electricity system is the most hydro-power-dominated in the region, with a total 5.8 GW installed capacity providing around 90% of the country's power. Seasonality in streamflow allows for generation surplus and exports, mainly to Afghanistan and Uzbekistan, during spring and summer. In the autumn-winter period, low waters, freezing temperatures, and limited interconnection exacerbate power shortages, during which electricity supply is often [restricted](#) to mainly rural residents for up to sixteen [hours per day](#). Thermal power plants are used to cover the seasonal supply deficit, mostly by Tajikistan's single coal-fired plant, the 400 MW [Dushanbe-2 power station](#). Commissioning of the plant in 2014–2016

spurred a dramatic [increase](#) in domestic coal mining activity. Gas plays a minor supporting role, with the 86 MW [Dushanbe-1](#) power station operating on gas sourced from Uzbekistan. The 120 MW gas-fired [Yavan](#) power station is understood to supply electricity to the TALCO Chemical industrial complex only. Tajikistan imports all oil and gas supplies to cover the remainder of its total energy supply needs.

Key to improving Tajikistan's energy security situation is rehabilitating and expanding the country's hydropower fleet, half of which is over 50 years old. This includes the country's largest facility, the 3,600 MW [Nurek](#) plant, which provides half of domestic

Hydropower in-development capacity in Tajikistan is five times greater than other sources combined

Power capacity in development by source and status, in megawatts (MW)



Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor
Data include phases/units equal to or greater than specific thresholds: solar 20 MW, hydropower 75 MW, coal 30 MW.



electricity but, due to equipment degradation, operates below [77%](#) of capacity. Of the 4,105 MW of in-development hydropower capacity tracked by GEM, the majority is from the 3,600 MW [Rogun](#) project. Two of the project's six 600 MW units are operational, but full commissioning is not expected until [2033](#). Completion of the project is aligned with efforts to improve regional interconnection and increase electricity exports from surplus generation once the plant is fully commissioned. As for thermal plants, the announced coal-fired [Fon-Yagnob](#) power station would more than double the country's operating coal fleet if built. However, the current development status of the project remains unknown. The Ministry of Energy also considered building the coal-fired [Dushanbe-3](#) power station with 450 MW, although this did not appear to be a realistic proposal.

GEM data track no operational wind or utility-scale solar PV projects in Tajikistan, and only a single

200 MW announced solar project. However, UAE's Masdar signed an [MOU](#) with Tajikistan's Ministry of Energy and Water Resources last year to develop ground-mounted and floating solar projects totalling 500 MW. And the Saudi Fund for Development, which has already invested [\\$100 million](#) into the Rogun dam has [reaffirmed](#) its commitment to developing further energy projects in Tajikistan at the first Central Asia-GCC Investment Forum held in Riyadh this year.

Tajikistan submitted its updated first [NDC](#) in 2021, setting an unconditional target of reducing emissions by 30–40% and a conditional target of reducing emissions by 40–50% by 2030 compared to 1990 levels. Tajikistan's national development [strategy](#) envisages reaching 10 GW power capacity by 2030, with 10% of that total coming from non-hydropower sources. Aligned with the strategy, the Ministry of Energy and Water Resources has [targeted](#) 700 MW utility-scale wind and solar PV.

VI. APPENDICES

Summary data tables for CCA countries, by source and development status. Construction projects include those where site preparation and equipment installation are underway. Pre-construction projects are those that are actively moving forward in seeking governmental approvals, land rights, or financing.

Announced projects include those described in corporate or government plans or media releases but have not yet taken concrete steps such as applying for permits. Retired projects describe those decommissioned or dismantled; this term is also used if the plant has been destroyed by war.

Operating power capacity in Caucasus and Central Asia countries

Country-level total operating power capacity by source, in megawatts (MW)

Country	Coal	Oil & gas	Utility-scale solar	Wind	Nuclear	Hydropower	Bioenergy
Armenia	–	1,346	–	–	448	811	–
Azerbaijan	–	5,861	250	50	–	954	37
Georgia	–	1,167	–	21	–	2,438	–
Kazakhstan	12,976	4,237	1,191	934	–	2,568	–
Kyrgyzstan	813	–	–	–	–	2,990	–
Tajikistan	400	206	–	–	–	5,756	–
Turkmenistan	–	7,087	–	–	–	–	–
Uzbekistan	2,493	13,852	209	–	–	1,543	–

Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 1MW; wind 10MW; hydropower 75MW; geothermal 1MW; bioenergy and coal 30MW; oil and gas 50MW.



Power capacity under construction in Caucasus and Central Asia countries

Country-level total power capacity under construction by source, in megawatts (MW)

Country	Coal	Oil & gas	Utility-scale solar	Wind	Nuclear	Hydropower	Bioenergy
Armenia	–	–	55	–	–	–	–
Azerbaijan	–	1,280	–	–	–	91	–
Georgia	–	–	–	–	–	–	–
Kazakhstan	195	3,048	–	–	–	–	–
Kyrgyzstan	–	–	–	–	–	1,860	–
Tajikistan	–	–	–	–	–	2,400	–
Turkmenistan	–	1,574	–	–	–	–	–
Uzbekistan	–	5,848	2,447	1,000	–	476	–

Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 20MW; wind 10MW; hydropower 75MW; geothermal 1 MW; bioenergy and coal 30MW; oil and gas 50MW.



Pre-construction power capacity in Caucasus and Central Asia countries

Country-level total pre-construction power capacity by source, in megawatts (MW)

Country	Coal	Oil & gas	Utility-scale solar	Wind	Nuclear	Hydropower	Bioenergy
Armenia	–	176	200	–	–	176	–
Azerbaijan	–	500	1,000	240	–	–	–
Georgia	–	650	–	–	–	280	–
Kazakhstan	1,872	2,211	50	255	–	–	–
Kyrgyzstan	–	1,028	1,750	200	–	2,528	–
Tajikistan	–	–	–	–	–	–	–
Turkmenistan	–	–	–	–	–	–	–
Uzbekistan	–	216	500	2,100	–	–	–

Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 20MW; wind 10MW; hydropower 75MW; geothermal 1MW; bioenergy and coal 30MW; oil and gas 50MW.



Announced power capacity in Caucasus and Central Asia countries

Country-level total announced power capacity by source, in megawatts (MW)

Country	Coal	Oil & gas	Utility-scale solar	Wind	Nuclear	Hydropower	Bioenergy
Armenia	–	–	–	–	1,200	–	–
Azerbaijan	–	–	200	240	–	–	–
Georgia	–	–	96	349	–	1,699	–
Kazakhstan	2,755	3,044	50	3,377	3,000	110	–
Kyrgyzstan	1,860	600	350	180	–	2,788	–
Tajikistan	600	–	200	–	–	1,705	–
Turkmenistan	–	–	–	–	–	–	–
Uzbekistan	600	3,875	3,400	8,252	2,400	1,060	–

Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 20MW; wind 10MW; hydropower 75MW; geothermal 1 MW; bioenergy and coal 30MW; oil and gas 50MW.



Cancelled power capacity in Caucasus and Central Asia countries

Country-level total cancelled power capacity by source, in megawatts (MW)

Country	Coal	Oil & gas	Utility-scale solar	Wind	Nuclear	Hydropower	Bioenergy
Armenia	–	540	–	494	–	–	–
Azerbaijan	–	1,789	–	379	2,500	–	–
Georgia	300	–	–	147	–	433	–
Kazakhstan	2,376	590	446	922	–	–	–
Kyrgyzstan	–	–	30	–	–	–	–
Tajikistan	650	–	–	–	–	–	–
Turkmenistan	–	127	–	–	–	–	–
Uzbekistan	300	140	200	2,100	–	–	–

Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 1MW; wind 10MW; hydropower 75MW; geothermal 1MW; bioenergy and coal 30MW; oil and gas 50MW.



Retired power capacity in Caucasus and Central Asia countries

Country-level total retired power capacity by source, in megawatts (MW)

Country	Coal	Oil & gas	Utility-scale solar	Wind	Nuclear	Hydropower	Bioenergy
Armenia	–	–	–	–	408	–	–
Azerbaijan	–	–	–	–	–	–	–
Georgia	–	–	–	–	–	–	–
Kazakhstan	210	–	–	–	90	–	–
Kyrgyzstan	150	–	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–
Turkmenistan	–	–	–	–	–	–	–
Uzbekistan	241	210	–	–	–	–	–

Source: Global Integrated Power Tracker, September 2024, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 1MW; wind 10MW; hydropower 75MW; geothermal 1MW; bioenergy and coal 30MW; oil and gas 50MW.

