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DEVELOPMENT OF THE COAL INDUSTRY OF UZBEKISTAN IN THE CONTEXT OF GLOBAL TRENDS AND PROSPECTS UP TO 2030

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Abstract

The article systematizes current trends and long-term scenarios of the global coal market, as well as evaluates the technological and institutional priorities of Uzbekistan's coal industry up to 2030. The findings highlight the necessity of integrating coal beneficiation technologies, CCUS (Carbon Capture, Utilization, and Storage), and "just transition" mechanisms to maintain the competitiveness of the coal industry under tightening climate policies.

Introduction

In the global economy, the fuel and energy sector plays a key role, forming about 10% of annual world GDP (equivalent to ~1.2 thousand USD per capita) [1]. Since the 1980s, the growth rates of global energy consumption have almost corresponded to the growth of world GDP, reflecting the close relationship between economic development and energy use [2]. As a result, secure access to energy resources and improvements in energy efficiency are universally regarded as fundamental elements of national security [3].

State of Coal Production Worldwide

Global coal production continues to reach historical records. In 2024, it amounted to about 9.15 billion tons, while global coal demand reached 165 EJ, which is equivalent to ~28% of the world's primary energy consumption. The undisputed leader is China (~4.8 billion tons in 2024); India for the first time

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exceeded the threshold of 1 billion tons, Indonesia ranks third (~836 million tons), while the USA and Russia reduced production to 465 and 427 million tons respectively. Table 1 shows the dynamics of global coal production and consumption for 2023–2024.

Table 1

Global Coal Production and Consumption in 2023–2024.

Indicators	2023.	2024.	Δ 2024/2023
Добыча, млрд т	8.98	9.15	+1.9 %
Спрос, ЭДж	163	165	+1.2 %

In 2024, the growth in demand was mainly driven by the Asia-Pacific region (+2%), primarily China, India, and Indonesia, while North America and Europe continued to reduce coal consumption [4]. Despite the projected imminent "plateau" of global demand, updated data show that only five countries – the USA, Russia, Australia, China, and India – account for more than 70% of all proven coal reserves, forming a long-term "anchor" of global supply [4].

Notably, the top ten countries by reserves are divided almost equally between developed economies (USA, Australia, Germany, and Poland) and countries with transitional or developing economies (Russia, China, India, Indonesia, Kazakhstan, and Ukraine), which underlines the multipolarity of the resource base. Table 2 summarizes estimates of proven coal reserves of the leading countries, indicating their share of global reserves and key coal basins.

Prospects of the Coal Industry

The global coal industry entered 2025 with a new record-high production level, but demand is expected to stabilize in the coming years. In 2024, coal production increased by ~1.5%, and according to IEA (International Energy Agency) estimates, global demand will remain on a "plateau" for at least 2–3 years. Coal still provides about a quarter of total energy consumption, while the combined share of fossil fuels accounts for ~86% in the global energy balance [4]. The resilience of the coal sector is supported by several factors:

Table 2

Top Ten Countries by Proven Coal Reserves

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	Country	Reserve, billion t	Share of World, %	Major Basins / Deposits
	USA	**250.2**	24	*Powder River, Appalachian, Illinois Basin*
	Russia	**160.4**	15	*Kuzbass, Kansk-Achinsk, Tunguska*
	Australia	**147.4**	14	*Bowen, Sydney, Latrobe Valley*
	China	**138.8**	13	*Ordos (Shenfu-Dongsheng), Datong, Taiyuan*
	India	**101.4**	10	*Jharia, Raniganj, Talcher*
	Indonesia	**37.0**	4	*South Sumatra, East & South Kalimantan*
	Germany	**36.1**	3	*Rhenish, Lusatian*
	Ukraine	**34.4**	3	*Donetsk (Donbass)*
	Poland	**26.5**	3	*Upper Silesian, Lublin*
0	**Kazakhstan**	**25.6**	2	*Karaganda, Ekibastuz*

Energy Reliability. In the peak periods of 2024, it was coal-fired power plants that compensated for sharp demand spikes in China and India, with the total commissioning of new coal capacities there exceeding the amount of wind and solar plants launched during the year.

Extensive Resource Base. Proven global coal reserves are estimated at about 1.07 trillion tons, enough for more than 130 years of production at the current level—one of the highest security-of-supply indicators among all mineral resources [4].

Flexible Export Logistics. Low maritime freight rates allow rapid redistribution of coal supplies between regions. For example, in the summer of 2025 the cost of shipping coal by Capesize bulk carrier from Brazil to China remained at around ~$24 per ton—comparable to routes to Europe. This enables leading exporters (Australia, Indonesia, Colombia, South Africa, and the USA) to promptly redirect coal between the Atlantic and Asian markets in response to price signals.

Price Competitiveness. Coal remains cheaper than many types of fuel in terms of energy content. For instance, in May 2025 the spot price of Central Appalachian

thermal coal was about ~$3.37 per MMBtu (Million British Thermal Units), compared to ~$4.49 for fuel oil (HSFO 380, High Sulfur Fuel Oil with a viscosity of 380 cSt (centistokes)) in Rotterdam, giving coal an ~ 30% cost advantage in thermal energy [6].

Long-Term Industry Forecasts up to 2030 vary significantly depending on climate scenarios and price assumptions. In baseline trajectories, global coal production will remain in the range of ~7.3–8.0 billion tons per year, whereas achieving Net Zero targets will require an almost twofold reduction [6]. In one scenario, total coal consumption may reach ~8.1 billion tons by 2035 if current trends persist [5]. Even with demand stagnation, the industry faces several structural and technological constraints. First, there is the possibility of excess production capacity, similar to the situation of 2012–2015. Second, environmental regulation is tightening: for example, the new EU Regulation 2024/1787 obliges coal exporters to accurately measure and reduce methane leaks during mining, increasing supplier costs. Finally, accelerated phaseout of coal capacity without adaptation measures may cause socio-economic challenges—according to the IEA, by 2030 up to 2.3 million jobs in the global coal industry may be at risk [6].

On the technological front, the situation remains contradictory. On the one hand, carbon capture is developing: worldwide there are more than 50 CCUS projects, which by 2030 could collectively capture up to 430 million tons of CO_2 annually (about half at coal-fired power plants in Asia). In the USA, for example, a state guarantee of $1.56 billion was approved for the Wabash Valley Resources project (Indiana), which plans to produce "clean" ammonia and hydrogen from coal with underground storage of ~1.6 million tons of CO_2 per year—a pilot model of "coal → blue hydrogen" transformation. On the other hand, requirements to reduce the methane footprint are rising: in Australia and South Africa programs for certification of "low-methane" coal and voluntary monitoring (MRV) are being introduced in response to European standards, while the freight market is already factoring in surcharges for methane emissions during transportation [6].

Regional trends confirm the unevenness of the energy transition. For example, Uzbekistan, amid natural gas shortages and rising winter peak loads, is focusing on expanding coal use. The state-owned company "Uzbekkumir" produced a record 6.7 million tons in 2024, and in 2025 plans to reach 10 million tons by launching a new coal beneficiation plant and a lignite briquetting line to supply domestic thermal power plants and municipal boilers [7]. At the same time, the government has declared its intention to increase the share of renewable energy sources to 25% by 2030 [6]. Thus, thanks to its extensive resource base and price advantages, coal

still serves as a kind of "safety net" for global energy. However, meeting international climate goals directly depends on accelerated deployment of CCUS, strict control of methane emissions, and implementation of just transition programs for coal regions.

Coal Industry of Uzbekistan: Current State and Modernization Tasks

The largest coal deposit in Uzbekistan is the Angren lignite basin (Tashkent region), the development of which began back in 1940. Currently, the main extraction is carried out by open-pit mining at the Angren and Apartak sites. There are also significant hard coal resources in the south of the country (Shargun and Baysun deposits in the Surkhandarya region), but their development is complicated by mining and geological conditions (mountainous terrain, thin seams, need for degassing, etc.) [8]. In total, coal reserves in the republic are estimated at ~1.9–2.0 billion tons, about 75% of which are low-calorific lignites [8]. The dominance of lignites limits the export potential of the industry and underscores the critical importance of introducing beneficiation and briquetting technologies to increase the energy value of coal products.

In 2024, the national company "Uzbekcoal" produced a record 6.7 million tons of coal—~15% more than in 2023 [7]. The government aims to further increase production to 10 million tons in 2025 and up to 20 million tons during the 2030s, attracting private investment and allocating ~ $1 billion for industry modernization. Despite Angren coal being valued for its low sulfur content, the global market is shifting towards high-quality coking grades, while global demand for thermal coal is projected soon to plateau without long-term growth prospects [6].

In these conditions, the key task is technological upgrading and enhancing the environmental responsibility of the coal industry. It is necessary to reduce operating costs, introduce deep coal processing (beneficiation) and digital seam quality control, as well as prepare restructuring plans for depleted mines. Water resource scarcity in the country and overall climate vulnerability are already imposing stricter environmental requirements on mining projects. The richest and most profitable reserves are still concentrated in the Angren lignite basin and the Shargun–Baysun hard coal deposits, but their effective development will require significant investments in mine degassing and modern ventilation systems [8]. Thus, the accelerated modernization strategy should combine targeted technical re-equipment of the most promising pits, conservation or closure of unprofitable mines with private capital involvement, and deployment of comprehensive measures to reduce the carbon and water footprint of production. Without these

steps, the industry's potential economic effect may be undermined by instability, price volatility, new standards, and growing international scrutiny over methane and CO_2 emissions.

Conclusions

Coal remains a system-forming part of the fuel and energy complex, but its profitability worldwide is declining. Already in 2024, the aggregate net margin of Indonesian exporters shrank significantly due to falling prices and rising taxes, reflecting the global trend of shrinking producer profits. In the next 10–15 years, the structure of the global market will largely maintain its current parameters with limited changes: according to IEA and EIA forecasts, coal production will be about 7–8 billion tons in 2035, but the Net Zero scenario implies almost a twofold reduction [6]. Even under an inertial policy path, coal demand will gradually decline after 2030.

The profitability of coal mining in Uzbekistan must be ensured by qualitative growth rather than merely quantitative: through the development of the most productive deposits and deep processing of raw materials. Since about 75% of the country's reserves are lignites, the commissioning of modern beneficiation plants and briquetting lines is a critically important condition for improving the competitiveness of products in domestic and external markets. Priority innovation directions for the industry include improving industrial safety, coal beneficiation, and carbon capture. According to IEA estimates, without large-scale deployment of CCUS (at least 400 million tons of CO_2/year by 2030), coal-based power generation will hardly be able to meet the climate stabilization trajectory of 1.5 °C [6]. In parallel, online methane monitoring systems and ventilation automation are required for the Shargun–Baysun mines to improve safety and environmental performance [8].

Effective state policy must combine investment incentives with strict environmental standards. The government has already announced plans to attract private capital to boost production to ~ 20 million tons by the 2030s, but investors expect a predictable tax and tariff framework and guaranteed coal demand in power generation. Export prospects for Uzbek coal are constrained by the tightening of international environmental regulations: EU Regulation 2024/1787 requires importers from 2025 to provide strict MRV (Monitoring, Reporting, Verification) reporting, and from 2027 independent audits of methane emissions. Non-compliance with these requirements may limit access to priority EU export markets and increase transport surcharges.

In general, the long-term sustainability of the coal industry is determined not by production volumes, but by quality—technological modernization, environmental acceptability, and a well-thought-out investment policy. Only these factors will allow Uzbekistan's coal to remain competitive against the backdrop of stricter global climate standards and declining world demand.

LIST OF REFERENCES

1. Web resource: research.open.ac.uk
2. Web resource: resilience.org
3. Web resource: Atlantic Council
4. Energy Institute. Statistical Review of World Energy 2025.
5. Information and Analytical Center "Mineral" – Analytical Materials (2023).
6. Web resource: eia.gov/electricity (data access, 2025).
7. Web resource: gov.uz (Materials of the Ministry of Energy of Uzbekistan, 2024).
8. Khasilov, Kh., et al. "Prospects of the Coal Industry of Uzbekistan." Silk Road Transport, No. 1, 2020.