Afghanistan's Untapped Energy: The Coal Reserves That Could Power a Nation

By Eng. Ghulam M. Feda
Founder & President, Afghan Education for a Better Tomorrow (AEBT)
Board Member, Society of Afghan Engineers (SAE)

Abstract

Afghanistan possesses significant coal reserves formed during the Jurassic geological era, representing one of the most promising yet underdeveloped resources for energy generation and economic development. With approximately 73 million tons of proven coal reserves and more than 400 million tons of potential deposits, the nation has the geological capacity to meet a large portion of its domestic energy demand. This article examines the distribution of Afghanistan's major coal basins—Dara-i-Suf, Karkar, Ashpushta, and Sabzak—and evaluates their potential for thermal electricity generation. It also explores the economic, environmental, and technological aspects of sustainable coal development in Afghanistan.

1. Introduction

Energy access and sustainability remain critical challenges in Afghanistan's post-conflict reconstruction era. Less than 35 percent of the population has reliable access to electricity, while industrial productivity continues to depend on imported power from neighboring countries. Afghanistan's abundant coal deposits—originating from the Jurassic period (approximately 180 million years ago)—represent a viable domestic energy solution. Over millions of years, dense forests in ancient sedimentary basins were compressed under geological pressure, forming the coal seams that now extend across the nation's northern and western provinces. Reports by the U.S. Geological Survey (USGS) and the Afghanistan Geological Survey (AGS) estimate 73 million tons of proven coal reserves and an additional 400 million tons of potential resources. These are distributed primarily across Samangan, Baghlan, Bamyan, and Herat, forming Afghanistan's principal coal belt.

2. Geological Distribution of Major Coal Basins

Afghanistan's coal-bearing regions are diverse and geologically interconnected, each providing distinct potential for development and power generation.

2.1 Dara-i-Suf (Samangan Province)

The Dara-i-Suf coal zone hosts numerous small and medium-scale operations that supply coal for local industries and households. It remains one of Afghanistan's most productive and accessible mining regions.

2.2 Karkar and Dudkash (Baghlan Province)

These long-established mines have supplied industrial and domestic markets for decades. Their high-quality coal seams offer potential for mechanized extraction and power generation projects, pending modernization of mining infrastructure.

2.3 Ashpushta and Kilij (Bamyan Province, Kahmard District)

The Ashpushta coalfield represents one of the largest deposits in central Afghanistan, estimated to contain 30 million tons of recoverable coal. The medium-grade coal is suitable for thermal power generation, and plans have been proposed to establish a 400 MW coal-fired power plant in the Kahmard area to serve Bamyan and surrounding provinces. In earlier proposals, part of Ashpushta's coal was designated to supply the Aynak Copper Project in Logar, showing its strategic industrial value.

2.4 Sabzak (Herat Province)

Herat's Sabzak coalfield is the dominant deposit in western Afghanistan, supplying both local industries and exports to Pakistan. Its proximity to transport corridors and western infrastructure provides logistical advantages for energy projects.

3. Energy Generation Potential

Utilization of Afghanistan's coal for electricity generation could transform its energy landscape. Estimates suggest that processing 50 million tons of domestic coal in high-efficiency thermal plants could generate between 150 and 180 terawatt-hours (TWh) of electricity, equivalent to 5,000–6,000 MW of continuous capacity for several years. This capacity would be sufficient to electrify Afghanistan's major cities—Kabul, Herat, Mazar-e-Sharif, Kandahar, and Jalalabad—and power key industries such as construction, mining, and manufacturing.

4. Economic and Strategic Impact

The strategic utilization of coal resources could generate broad economic and social benefits, including energy independence, employment generation, industrial diversification, and revenue enhancement. Properly managed, this sector could contribute substantially to GDP growth and regional stability.

5. Environmental and Technological Considerations

Coal mining and combustion pose environmental challenges that require proactive management. Afghanistan must adopt clean-coal technologies such as High-Efficiency, Low-Emission (HELE) systems, Carbon Capture and Storage (CCS), mine reclamation, and emission monitoring. Integrating renewable energy sources—solar, wind, and hydro—alongside coal will ensure a balanced and sustainable energy mix.

6. Geological Context: The Jurassic Era

Afghanistan's coal originated during the Jurassic period, 150–180 million years ago, when the region's humid, forested landscape accumulated organic matter that transformed into coal under geological pressure. These ancient formations now fuel modern economic ambitions.
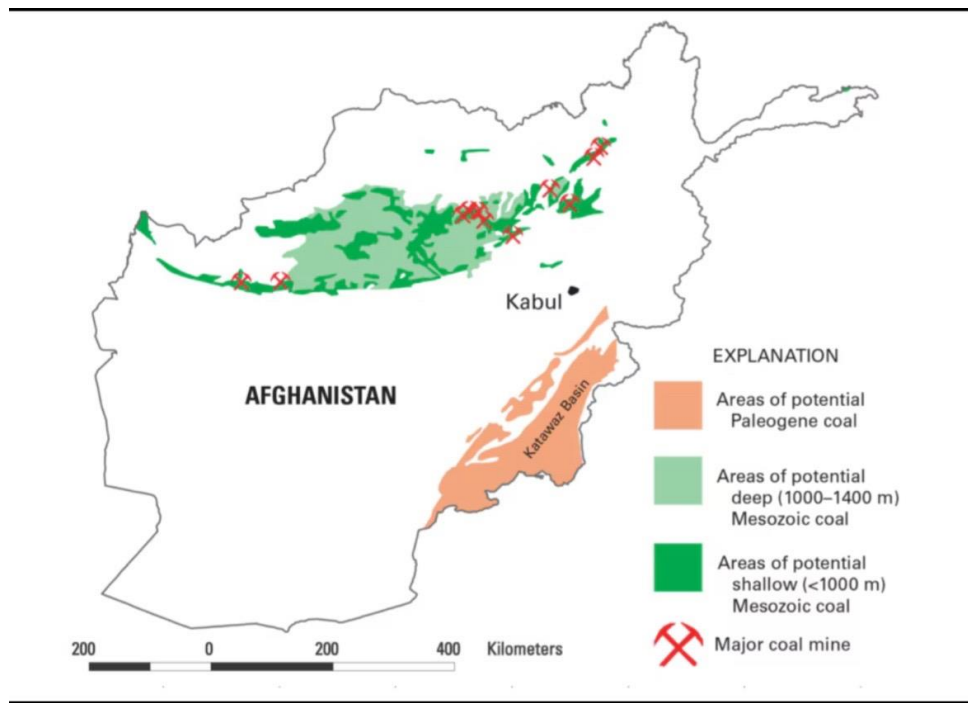
7. Conclusion

Afghanistan's coal reserves—especially those in Ashpushta (Bamyan), Dara-i-Suf (Samangan), and Sabzak (Herat)—offer immense potential for energy generation and industrial growth. With transparent governance, international cooperation, and adoption of modern clean technologies, these resources can drive sustainable energy development and national progress.

References

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Figure 1. Geological distribution of Afghanistan's coal basins.

Source: U.S. Geological Survey (USGS), Coal in Afghanistan, Fact Sheet 2005–3073.