INTERNATIONAL JOURNAL OF ECONOMIC AND ADMINISTRATIVE ACADEMIC RESEARCH

Available online, ISSN: 2757-959X | www.ijerdergisi.com | Economic and Administrative Academic Research

COAL MINING AND FUTURE OF ENERGY IN AFGHANISTAN

Jamaluddin JAMAL[a], Shiraqa KHATAMI[b*]

**Corresponding Author*

ARTICLEINFO

Research Article

Received : 17/07/2021
Accepted : 02/09/2021

Keywords:
Coal, Coal mining, Energy, Afghanistan.

ABSTRACT

This research was a review of Afghanistan's coal mining and its actual and potential uses. The research done on coal mines in Afghanistan to determine its quantity and quality is at a very basic level. The results obtained from this research show that in recent years, the process of coal mining in Afghanistan has increased due to the increase in exports and domestic use. Selling coal for less than half the world price of extracting and using this resource does not create the necessary economic benefit for the country's economy, and this resource is rapidly eroding. Another finding of this review article about the alternative uses of coal. Specifically, coal has proven to be a valuable resource in various industries such as iron smelting, electricity generation, and cement production. These alternative uses have yielded significant economic benefits, contributing to the overall development, self-sufficiency, and sustainable economic development of the country. According to the results of this review article, the lack of developing a strategy for the extraction of coal mines, the lack of investment for the construction of infrastructures, non-professional extraction, and lack of treatment centers, the reduction of export tariffs, illegal extraction and coal smuggling are among most important problems in coal mining industry.

AFGANİSTAN'DA KÖMÜR MADENCİLİĞİ VE ENERJİNİN GELECEĞİ

MAKALE BİLGİSİ

Araştırma Makalesi

Geliş :17/01/2023
Kabul : 19/03/2023

Anahtar Kelimeler:
Kömür, Kömür madenciliği, Enerji, Afganistan.

ÖZ

Bu araştırma, Afganistan'daki kömür madenciliği ve onun fiili ve potansiyel kullanımlarının bir incelemesidir. Afganistan'daki kömür madenlerinin nicelik ve niteliğini belirlemek için yapılan araştırmalar çok temel düzeydedir. Bu araştırmadan elde edilen sonuçlar, son yıllarda ihracatın ve yerli kullanımın artması nedeniyle Afganistan'da kömür madenciliği sürecinin arttığını göstermektedir. Kömürün dünya fiyatının yarısından daha ucuza satılması ve bu kaynağın kullanılması ülke ekonomisi için gerekli ekonomik faydayı yaratmamakta ve bu kaynak hızla erozyona uğramaktadır. Kömürün alternatif kullanımlarıyla ilgili bu derleme makalenin bir başka bulgusu, özellikle kömürün demir eritme, elektrik üretimi ve çimento üretimi gibi çeşitli endüstrilerde değerli bir kaynak olduğu kanıtlanmıştır. Bu alternatif kullanımlar, ülkenin genel kalkınmasına, kendi kendine yeterliliğine ve sürdürülebilir ekonomik kalkınmasına katkıda bulunarak önemli ekonomik faydalar sağlamıştır. Bu inceleme makalesinin sonuçlarına göre, kömür madenlerinin çıkarılması için bir strateji geliştirilmemesi, altyapı inşaatı için yatırım yapılmaması, profesyonel olmayan çıkarma ve arıtma merkezlerinin olmaması, ihracat tarifelerinin düşürülmesi, yasadışı madencilik ve kömür kaçakçılığı, kömür madenciliği sektörünün en önemli sorunları arasında yer almaktadır.

[a] jamal_j@auca.kg [b] Khatami_Eco@basu.edu.af

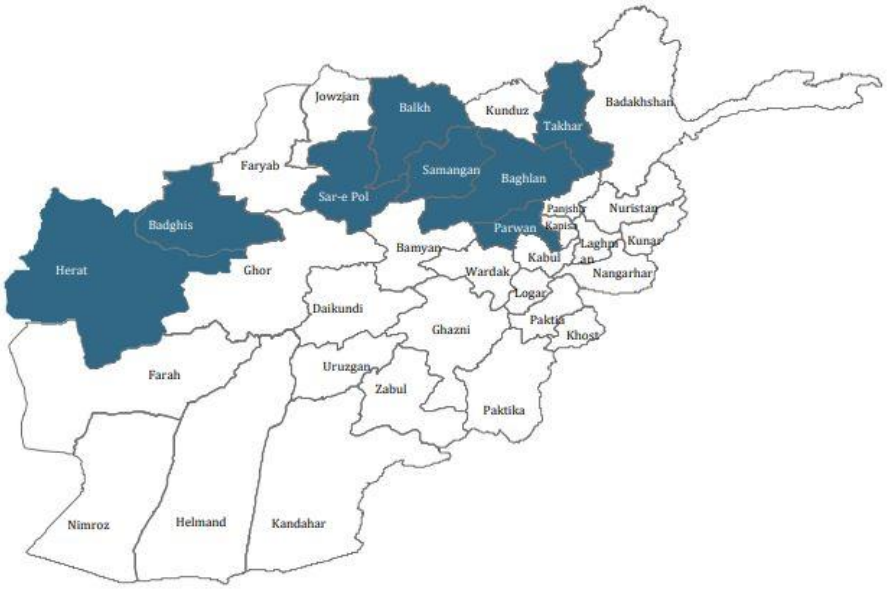
1. INTRODUCTION

Afghanistan is rich in natural resources, including coal, which has been mined in the country for centuries. Coal mining has played a significant role in the country's economy and energy supply, but it has also had negative environmental and social impacts. With increasing demand for energy and the need to reduce reliance on fossil fuels, Afghanistan is exploring renewable energy options, such as wind and solar power. This literature review examines the current state of coal mining in Afghanistan and the potential for renewable energy to shape the country's energy future.

Coal is the second-largest natural resource in Afghanistan after copper. The country has an estimated 1.3 billion metric tons of coal reserves, with most of it located in the Northern provinces (World Bank, 2017). Coal has been mined in Afghanistan for centuries, but large-scale mining began in the 1950s during the Soviet occupation. The Afghan government has granted mining licenses to both domestic and foreign companies, but the industry has been plagued by corruption, lack of infrastructure, and security concerns. Coal mining has also had significant environmental and social impacts, including air and water pollution, deforestation, and the displacement of local communities (Singh and Ponzio, 2013).

In addition, coal is currently produced in more than a hundred countries in the world and 40% of the world's electricity production is provided by this mineral. Although currently fossil fuels such as oil and gas are considered clean fuels, and for this reason, coal has lost its primary importance in recent years, but the depletion and eventual depletion of oil and natural gas reserves seems It seems that in the not too distant future, coal will regain its primary importance and will play the biggest role in supplying energy to the society. In addition, with the invention of the phenomenon of reverse technology, coal will not be a fuel anymore, but it will be a valuable resource for the production of raw materials for the production of clean fuel and various chemicals (Jafar. et al 2014).

In terms of geological situation, Afghanistan has obtained a position between two tectonic plates (India and Eurasia) and is one of the few countries that is rich in various mineral resources in all provinces. Based on the geological studies, two large coal mining areas have been established in the east-southeast and northeast-southwest sections, the first area of which has not been systematically studied. The north-east-southwest coal zone extends in the form of a belt, starting from Badakhshan province and passing through the provinces of Takhar, Kunduz, Baghlan, Samangan, Balkh, Sarpul, Bamyan Daikendi, Jawzjan and Badghis to the Sabzak mine in Herat province. It should be mentioned that until now, as a result of the geological research conducted by the Ministry of Mines and Petroleum, more than 113 mines and coal mineral deposits have been confirmed, including 18 mineral fields with total reserves of more than 847 million tons. It is one of the most important discoveries of this ministry (Raza et al., 2016).



Source: US Geological Survey of Minerals

The most famous coal mines include Shabashak, Dehne Tor, Lilav Qara Naver, Western and Eastern Gramak, Sertor, Rashak and Qoubi, Sar Asiyab, Gole Chakark and Sabzak Kotel in Samangan province, Ashpashte and Klich in Bamyan, Gazstan, Bezghur and He mentioned salt water in Takhar, Taleh and Barfak and Nahrin in Baghlan, a wooden mosque in Sabzak, Herat, and Balkhab reservoir in Sarpol province (Chelgani, 2013).

For many years, no comprehensive research has been done to determine the exact quantity and quality of coal in Afghanistan. In the last twenty years, due to the lack of expert personnel, investment and lack of access to contemporary technology, not much attention has been paid to Afghanistan's coal mines. Most coal mining in Afghanistan has been very old or unprofessional so far (Noorani, 2015).

After the rule of the Taliban in 2021, although they have not been recognized by any country, they started extracting and exporting the country's mines to secure their financial resources, including the most important ban on coal mines, which extraction and export it has increased unprecedentedly to Pakistan. According to published reports, the export price of Afghanistan's coal to Pakistan is half of the price of coal in the world market (Langar, 2022).

In this review article, the central inquiry pertains to the impact of coal mining in Afghanistan on the future of energy. Specifically, the study aims to address two primary questions: firstly, what are the current applications of coal in Afghanistan? and secondly, what are the potential future uses of this resource in the country?

2. IMPORTANCE OF ENERGY SOURCES

Due to the exhaustion of most of the energy resources, providing the necessary energy resources for the growing population of the world and especially the needs of economic and industrial development is known as the main issue for the progress of the countries. The cooling

and heating of homes and businesses in most countries is highly dependent on non-renewable resources and fossil fuels. Limitation of fossil resources, increase in population and energy demand are issues that most countries in the world are facing. Diverse sources of energy are the national wealth of any country and should be used in a way that creates the basis for sustainable development.

Protecting energy resources means preserving this wealth for future generations. At present, most of the countries in the world have realized the role and importance of different energy sources in meeting the current and future needs (Rostami et al, 2017).

They make extensive investments and research in the direction of policy making, strategy and basic and basic infrastructure programs. Energy sources include fossil energies (oil, gas and coal) and new energies (solar energy, wind energy, wave energy, tidal energy of oceans and seas, geothermal energy, biogas and biomass energy...). Fossil fuels are destroyed after consumption and cannot be renewed. In fact, the speed of formation of these fuels is much lower than the speed of their consumption. These fuels include oil, gas, coal, and charcoal (Malik, 2011).

To achieve sustainable development, it is necessary to have continuous and stable sources of energy supply. Afghanistan is a developing country and has an urgent and serious need for reliable energy sources for economic growth. Currently, in terms of energy, this country is highly dependent on neighboring countries and the region, and it pays a lot of money to provide the minimum energy needed by a small part of the society. While the energy resources of this country are sold to other countries at half the price (Safi, 2019).

Coal mines are one of the non-renewable sources of energy, the rapid process of erosion of these resources is harmful for the country in many ways. First of all, mines as a national wealth need to be used optimally. Unprofessional extraction and selling it at half the world market price does not create the necessary economic value. Secondly, the increase in exports with a low price leads to an increase in the price in the domestic market, which is why domestic consumers are forced to pay in advance for the use of these resources, which is not justified from an economic point of view. Thirdly, unprofessional mining increases the waste and also increases the risk of life for the workers in the mines. Fourth, the use of basic tools for extraction and the low selling price in the foreign market has reduced the wages of workers. In recent years, the trend of using coal for home heating has increased in the country's cities, especially large cities, and most people use coal as a source of home heating in winters (Rasouli, 2022). Unprofessional extraction and the lack of coal purification facilities in the country, after extraction, coal enters the domestic market without any purification steps and is consumed, which has caused an unprecedented increase in pollution in the country's major cities. According to the Ministry of Health, some 3,000 deaths per year in Kabul are attributable to the toxic air quality: in a sample of 200 hospital patients, 80% had elevated levels of lead (indicative of leaded gasoline) (Defne et al., 2016).

2.1. Alternative use of coal

Afghanistan needs investment and development in different sectors. Coal as a valuable source of energy production, besides being used for home heating in winter, coal can be used for other economic uses such as electricity generation, use in iron smelting industries, cement factories and other sectors.

2.2. Using coal to generate electricity

According to ministry of petroleum reports (2018), Da Afghanistan Breshna Company had 3.1 million customers, which shows that only about 34% of the country's population has access to electricity and it is provided through water sources and imported electricity. Afghanistan imports 1453 megawatts of electricity, equivalent to 77%, from neighboring countries. To ensure the security and sustainability of electricity, Afghanistan needs to diversify its energy supply. Abundant reserves of coal and the ever-increasing demand for energy have made this material one of the privileged sources for energy production and diversification of its supply. Afghanistan produces only 23% of its total domestic electricity demand, while it is possible to produce more electricity, due to the abundance, wide distribution and cheapness of coal, this source has been able to provide 40% of the world's electricity, for Afghanistan to be able to provide cheap electricity, it must exploit its natural resources, which include coal, natural gas, and oil (Petroleum, 2018).

According to the Energy Management Assistance Program, the establishment of a coal-fired power plant with a capacity of 50 MW has cost $136 million, $84 million, and $146 million in the United States of America, India, and Romania, respectively. The difference in costs was due to the difference in the wages of construction work, operation, engineering, etc. These power plants have 30 to 40 years of economic life. In 2011, for the last time in the world, a coal-fired power plant was built in the Philippines in a period of three years. It should be noted that since 2011, no more of these power plants have been installed in the world (Petroleum, 2018).

2.3. Coal consumption in iron and cement industries:

Iron: According to International Energy Agency (IEA) statistics 74% of the world's total iron production is produced from the energy obtained from coal-burning power plants. There are 8 iron production factories in Afghanistan, but none of these factories use coal as the main source of energy. Has started to use coal as the main source of energy but has not started yet. There are two types of furnaces for iron production (1) (explosive (making steel from metal-containing rock)) and (2) (electrical furnaces (making iron from melting metals). It should be mentioned that the main energy source of blast furnaces is coal (Malistani, 2020).

Cement: At the point of economic prosperity, Afghanistan consumed about 7 million metric tons of cement annually, although now the total demand of the cement industry has decreased to about 2 million metric tons, but the urbanization trends indicate the imminent growth of the demand for cement in Afghanistan. To have a strong and stable cement sector, we can use coal as an incentive to invest in the cement sector, to produce one metric ton of cement, about 200 kilograms of coal is needed (Mitchell and Antony, 2008).

3. CONCLUSION

According to the preliminary studies conducted, it shows that Afghanistan has large reserves of coal. The lack of attention of the government in the field of investment in the infrastructure for and creating a policy for the extraction and use of coal has dimmed the role of this energy source in the economic development of the country. Due to the increase in the domestic use and exports of coal, the extraction of coal mines has increased in recent years, and most of

these extractions have been unprofessional and some of them illegal. The excessive increase in coal exports and its sale to Pakistan at half the world market price has accelerated the erosion of this resource. Also, domestic use of unrefined coal, especially in big cities, has caused severe air pollution and has created social costs.

Coal can have many uses, according to Afghanistan's facilities and requirements, 77% of the required electricity is imported from neighboring countries, with a detailed economic analysis, and we can produce electricity through coal. The energy required for the production of cement, which Afghanistan has a history of operating in this industry, can be supplied through coal. The use of coal for iron smelting in iron smelting factories is one of the potential uses of coal in the country.

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