Chapter 4. The Caspian region's energy resources and the history of their production and meaning for the world energy market

Abstract *The energy industry has tremendous significance for the newly independent states. Even after almost 30 years since the acquisition of their independence, the predominant part of the budget of Azerbaijan, Turkmenistan, and Kazakhstan depends on energy exports. Therefore, most of this chapter is devoted to considering the energy industry of Azerbaijan.*
The chapter looks at the energy industry of Azerbaijan, Kazakhstan, and Turkmenistan. A significant part of it covers the oil history of Azerbaijan. The current amount of proven and expected oil and natural gas reserves, considerable oil and natural gas pipelines, oil, and natural gas production, and all three states' export potential are considered. Kazakhstan and Turkmenistan's oil- and energy resources are also considered. These issues are examined using information from different sources. This chapter primarily relies on online resources because of dynamic changes in the world energy market. Despite the existence of controversial opinions on these states' natural gas and oil reserves' capacity, this chapter is based on current information, primarily and predominantly from the US EIA, accepted as one of the most reliable energy agencies in the world.

4.1 Azerbaijan

Azerbaijan is one of the oldest energy lands in the world. Azerbaijani oil started to be extracted many centuries ago.[1] Many travelers and scholars who visited Azerbaijan noted in their memoirs the abundant oil resources in this country's territory.[2] Since the country has been always associated with its abundant hydrocarbon resources reserves, it is titled a "Land of Fire," not without reason.[3] Almost 50% of the world's oil

1 Babayev, B. (2020). Main Directions of the Non-Oil Export Sector in Azerbaijan. Journal of Economic Sciences: Theory & Practice, 77(1).

2 Alakbarli, F. Health Protection in Ancient and Medieval Azerbaijan.

3 Haiko, H., & Biletsky, V. (2019). The History of Industrial Oil Extraction in Azerbaijan (the 19th-beginning of the 20th centuries). Схід, (4), 35–40.

resources were being extracted in Azerbaijan at the end of the 19th and the beginning of the 20th century.[4]

Azerbaijani oil played an enormous role in the industry of the USSR. The SU won the war between Nazi Germany and the USSR because of Azerbaijani oil.[5] The occupation plan of Hitler Germany did not end with success because Nazi Germany could not occupy Baku. Otherwise, the victory of the SU over fascism might not have ended with a win.[6]

After the USSR's fall, oil and gas played a vital role in the Azerbaijani economy, with energy exports being the government's critical source of revenue. Since the Azerbaijani economy depends on energy exports, the country's economy needs to be diversified. The uneven development of the national economy and the strong backwardness of the non-oil sector from the oil branch has an irreversible negative effect on the entire economy's growth.

4.1.1 Oil industry history of Azerbaijan

The oil industry of Azerbaijan is 176 years old.[7] The first oil well (Bibi-Heybat) near the modern capital city of Azerbaijan Baku was drilled in Azerbaijan over ten years before the first oil field in Pennsylvania, so Azerbaijan became the oldest oil-producing country in the world in 1848.[8] However, oil had been known in Azerbaijan many centuries before the first oil well in Bibi-Heybat. The oil was used mainly for medical purposes.[9]

There are different opinions concerning the oil history eras of Azerbaijan. However, the history of the oil/energy industry of the country is generally divided into five stages:[10]

4 Minenergy.gov.az. (31 January 2020). History of Development of Oil Industry. Ministry of Energy of Azerbaijan. Retrieved April 26, 2023, https://minenergy.gov.az/en/neft/neft-senayesinin-inkisaf-tarixi

5 Salmanova, S. N., & Asadova, T. B. (2020). Azerbaijan's contribution to the Victory in the World War II, (pp. 103–106).

6 Khalilzada, J. (2019). Modernization and Social Change in Azerbaijan: Assessing the Transformation of Azerbaijan through the Theories of Modernity. New Middle Eastern Studies, 9(2).

7 Mir-Babayev, M. Y. (2002). Azerbaijan's Oil History. A Chronology Leading up to the Soviet Era. Azerbaijan International, 10(2), 34-40.

8 Zhiltsov, S. S., Zonn, I. S., & Kostianoy, A. G. (Eds.). (2016). Oil and gas pipelines in the Black-Caspian Seas Region. Springer International Publishing.

9 Vagif, B. S., & Saleh, A. F. The Ministry of Education of the Republic of Azerbaijan.

10 Narimanov, A. A., & Palaz, I. (1995). Oil history, potential converge in Azerbaijan. Oil and Gas Journal, 93(21).

The first stage of well oil production continued from 1848 until 1871. This period was before the start of the use of mechanical drilling to extract oil. Its low productivity characterized the output because of the lack of technology for oil production.

The second stage is mechanical oil extraction. This period from 1872 to 1920 lasted until the nationalization of the oil industry in the SU.[11] New energy fields in Binagadi, Ramana, Balakhany, etc., were discovered. Therefore, oil production rose significantly, leading to the development of the modern oil industry in Azerbaijan.

The third stage was from 1920 (nationalization of the oil industry) to 1950, when the Caspian deposits, known as the Neft Dashlari (the Oil Rocks), were discovered. These newly discovered oil fields spurred the development of the energy industry of Azerbaijan.[12]

The fourth stage started after 1950 (Neft Dashlari), and it continued until the singing of the first large-scale international energy agreement[13] between the Azerbaijani government and global energy enterprises after Azerbaijan's independence.[14]

The fifth stage started the signing of the big deal between Azerbaijan and international energy companies in September 1994. The agreement was called "the Contract of the Century" because of its significant meaning for the Azerbaijani Republic and the country's oil industry.[15] This energy agreement played an enormous role in developing the energy industry of Azerbaijan and the involvement of international investment in the development of the Azerbaijani energy industry.

4.1.2 "Neft Dashlari"

Oil platforms on the waters of the Caspian Sea opened a new era in Azerbaijan's oil history. The "Neft Dashlari" ("Oily Rock") oil platform was built on a tiny island in the Caspian Sea in 1949, four years after the end of WW2. High-quality oil reserves were discovered at 1100 meters below the seabed on 7 November of 1949.[16] This was the first large-scale offshore oil project in the world. The exploration of the first offshore

11 Kobrin, S. J. (1984). The nationalisation of oil production, 1918–80. In Risk and the political economy of resource development (pp. 137–164). Palgrave Macmillan, London.

12 Sultanov, L., Narimanov, N., & Samadzadeh, A. (2019). The Geological Structure and the Analysis of the Regularity of the Change in the Reservoir Properties of the Neft Dashlari Deposit. EUREKA: Physics and Engineering, (1), 55–62.

13 Ciarreta, A., & Nasirov, S. (2012). Development trends in the Azerbaijan oil and gas sector: Achievements and challenges. Energy Policy, 40, 282-292.

14 Ibrahimov, R. (2014). US-Azerbaijan Relations: A View from Baku. Rethink Paper, 17.

15 Ciarreta & Nasirov (2012).

16 Azer.com. Ibrahimov, S. (1997, Summer). Oil Rocks, Legends and Reality. Retrieved April 26, 2023, from http://web.archive.org/web/20210323104120/http://azer.com/aiweb/categories/magazine/52_folder/52_articles/52_oily.html

oil project in November 1949 meant starting the new oil era in the USSR. The newly explored oil platform was called "Black Rocks." However, it was renamed "Oil Rocks" later.[17]

The project was unique as the trestles were constructed on the water for the first time in the oil industry's history. The distance between the trestles and the central hub reached many kilometers. The trestles made it possible to create access to numerous wells, stations to collect oil resources, and pipelines.[18] The extensive use of modern technologies was made possible through the realization of this project. For instance, the multi-bore drilling method was used first in the "Oil Rocks." This project became the first offshore oil field in the history of the oil industry.[19]

The foundation of the "Neft Dashlari" oil platform had seven sunken ships. One of them was the "Zoroaster" ship, which was constructed in Sweden. In fact, it was the first oil tanker in the world. The island possessed its private factory, soccer pitch, library, bakery, laundry, cinema hall for 300 workers, bathhouse, etc. Besides, apartments for 5000 workers of the"Neft Dashlari" were constructed on the island.[20]

The "Neft Dashlari" oil platform extracted over 170 mt of crude oil and almost 15 bn. m^3 of associated natural gas by 2010. Geologists guess that there are nearly 30 mt of recoverable hydrocarbon resources in "Neft Dashlari."[21]

4.1.3 ACG

The 1970s became one of the most productive stages in the oil industry of Azerbaijan. Construction of the semi-submersible floating drilling rigs: "Shelf" and "Khazar," made a possible exploration of not only oil but also natural gas fields at a depth of up to 70 and 200 meters, respectively. Consequently, oil production went up by 50%.[22]

The Azeri-Chirag-Deepwater Gunashli field was discovered at the beginning of the 1970s. These oil fields are the largest in the Azerbaijani part of the Caspian Sea. The ACG field is located nearly 120 km to the East of Baku and at a depth of 120 meters. The operator of the project is BP. The contract was signed between 11 companies: BP, Amoco, Unocal, LUKoil, Statoil, Exxon, TPAO, Pennzoil, McDermott, Ramco, Delta Nimir, a joint venture from six countries: UK, USA, Russia, Norway, Turkey, and Saudi Arabia.[23]

17 Ibrahimov (1997, Summer).

18 Igorev, V. (2010). A Man-made island of oil treasures. Oil of Russia, 3.

19 Spiegel.de. (2012, November 14).

20 Igorev (2010).

21 Ibid.

22 Rzayeva, G. (2015). The Outlook for Azerbaijani Gas Supplies to Europe: Challenges and Perspectives.

23 BP.com. Azeri-Chirag-Deepwater Gunashli. Retrieved April 26, 2023, from https://www.bp.com/en_az/caspian/operationsprojects/acg.html

The Azerbaijani oil industry took off in the 1980s. The number of constructed floating oil rigs reached 11. Such rigs helped in the discovery of new fields. Floating oil rigs made exploring at depths from 80 to 350 m possible. It became possible with an enormous technological progress.[24]

The recoverable oil capacity of the field is estimated at 5.4 bb. The production from the energy fields started in November 1997.[25] Until now, capital estimated at $33 bn. has been put into the project, while the produced oil is estimated at 3.2 bb. The total output of the ACG fields in 2020 was averaged 477,000 barrels per day (b/d), which is almost half of the initially estimated volume.[26]

ACG consists of:[27]

- 6 production platforms: Chirag 1, Central Azeri, West Azeri, East Azeri, Deepwater Gunashli, West Chirag;
- Two processes, gas compression;
- Water injection and utilities (PCWU) platforms;
- Equipment of the latest technologies.

Oil is transported to the Sangachal terminal through subsea pipelines from the bottom of the Caspian Sea. The further development of extracted oil is refined in the Sangachal terminal, one of the world's immense oil terminals. The Sangachal possesses the capability of up to 1.2 million b/d.[28]

The agreement on developing the ACG fields was signed in September 1994 between the Azerbaijani government and international oil companies such as BP, Statoil, Exxon, etc. The deal was extended for the next 32 years on 14 September 2017. The contract was signed between the Azerbaijani President, the National Oil Company of Azerbaijan President, and the member companies' representatives. According to the signed agreement, the member companies will pay $3.6 bn. to SOCAR as a

24 Rzayeva (2015).

25 Offshore-technology.com. Azeri-Chirag-Gunashli Oilfield. Retrieved April 26, 2023, from http://web.archive.org/web/20210125213721/https://www.offshore-technology.com/projects/acg/

26 Shaban, I. (2021, February 05). Oil Production from ACG Block Decreased by 10.3% in 2020. Retrieved April 26, 2023, from http://web.archive.org/web/20210216011731/http://caspianbarrel.org/en/2021/02/oil-production-from-acg-block-decreased-by-10-3-in-2020/

27 BP.com. Azeri-Chirag-Deepwater Gunashli, https://www.bp.com/en_az/caspian/operationsprojects/acg.html

28 Ramazanov, M., Ahmadov, I., Hasanova, U., di Palma, L. U. C. A., & Chianese, A. N. G. E. L. O. (2018). Environmental problems of Absheron peninsula and Caspian Sea causedby oil and gas production. Dimensional systems, 2, 55.

bonus. In addition, SOCAR's share will rise from 11.65% to 25%. The capital invested in the project's development for the next 32 years is estimated at $40 bn.[29]

According to the new singed agreement, the member companies' shares are listed as follows:[30]

- BP – 30.37%;
- SOCAR – 25.00%;
- Chevron – 9.57%;
- INPEX – 9.31%;
- Statoil – 7.27%;
- ExxonMobil – 6.79%;
- TP – 5.73%;
- ITOCHU – 3.65%;
- ONGC Videsh Limited (OVL) – 2.31%.

The amendment will extend the agreement up to 2049 and has been approved by Azerbaijani Parliament. The operator of the first agreement, BP, will also stay as the project's primary operator after its extension.[31]

4.1.4 Energy industry after the acquisition of independence

The years after the collapse of the SU were marked by turmoil in the post-Soviet space. Additionally, the Armenian army occupied Nagorno-Karabakh and some adjacent territories, which "de-jure" belong to the Azerbaijani Republic. Due to this political instability in Azerbaijan, two governments fell in the first years of the 1990s.

The Azerbaijani oil industry was paralyzed because of some negative factors like the lack of modern technology for the exploration of the new oil fields, the undeveloped internal energy market, the breakdown of relations with other countries of the former SU, an absence of appropriate investment into the recovery of the failed energy industry, etc. Oil production fell dramatically.[32] The signing of new energy contracts with international energy companies was considered the most appropriate strategy to overcome these political and economic challenges.

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29 Worldoil.com. (September 14, 2017). Azerbaijan, co-venturers sign amended PSA for Azeri, Chirag and deepwater Gunashli. Retrieved April 06, 2021, from http://web.archive.org/web/20190212075658/https://www.worldoil.com/news/2017/9/14/azerbaijan-co-venturers-sign-amended-psa-for-azeri-chirag-and-deepwater-gunashli

30 Statoil.com. (2017, September 14). 25 more years in the ACG field. Retrieved April 26, 2023, from http://web.archive.org/web/20181225235056/https://www.euro-petrole.com/statoil-25-more-years-in-the-acg-field-n-i-15425

31 Ibid.

32 Ciarreta & Nasirov (2012).

The first stage of extracting the Chirag field's oil resources started in 1997, while the Azeri and Guneshli oil fields began giving their first fruits in 2005 and 2008, respectively. In 2010, the peak of oil extraction in Azerbaijan was reached with 1 million barrels per day (b/d) oil production from these energy fields.[33]

The Baku-Supsa and BTC oil pipeline construction, was completed in 1999 and 2006, respectively, and played a significant role in developing the oil sector. The Baku–Supsa is an 830 km long pipeline known as the Western Route Export Pipeline and Western Early Oil pipeline. The pipe exports the oil from the ACG fields (Sangachal Terminal) to Georgia's Supsa port. BP is the operator of the pipeline.[34]

BTC, built by the BTC CO Company, is Azerbaijan's most critical oil pipeline. BTC exports the oil extracted from the primary energy fields ACG and condensates from the SD field of Azerbaijan (Sangachal terminal) to Georgia and Turkey. Additionally, BTC exports the crude oil of Turkmenistan, which started in 2013. Furthermore, according to some favorable prognoses, Kazakhstan's crude oil can also be carried via BTC in the future. The entire oil pipeline length is 1768km: Azerbaijan-443km, Georgia-249km, and Turkey-1067km.

4.1.5 Oil production

The volume of oil extraction between 2004 and 2014 rose by almost 700.000 b/d. Thus, if Azerbaijan produced 300.000 b/d in 2004, this indicator became more than 1 b/d in 2010 when the oil extraction from gigantic ACG oil fields have already reached their peak level.[35]

Therefore, since oil production had already reached its highest point, the output has declined consistently. For instance, crude oil output dropped to 628 thousand barrels per day (BBL/D/1K) in March 2023, while this indicator was 644 BBL/D/1K in February 2023 (see Figure 1). Considering the oil production volume in the different years, it is evident that oil production decreases slowly.[36]

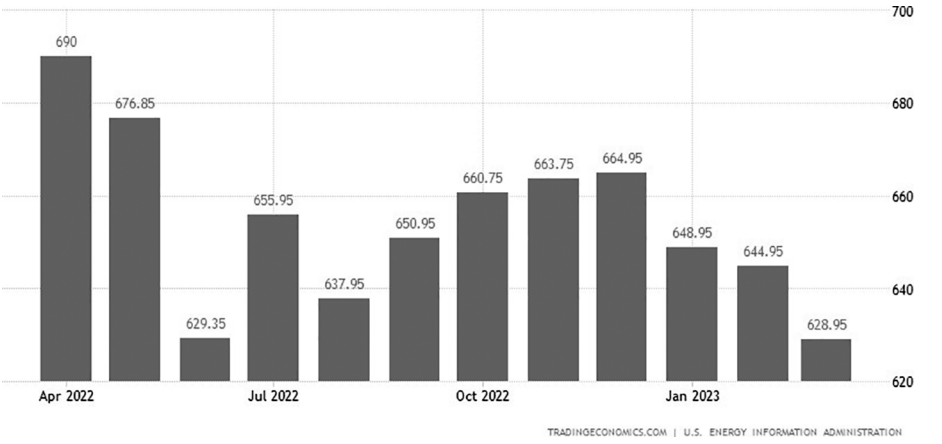
33 BP.com. Azeri-Chirag-Deepwater Gunashli. Retrieved April 26, 2023, from https://www.bp.com/en_az/azerbaijan/home/who-we-are/operationsprojects/acg2.html

34 BP.com. Western Route Export Pipeline (WREP). Retrieved April 26, 2023, from http://www.bp.com/en_ge/bp-georgia/about-bp/bp-in-georgia/western-route-export-pipeline--wrep-.html

35 Indexmundi.com. Azerbaijan Crude Oil Production by Year. Retrieved April 26, 2023, from https://www.indexmundi.com/energy/?country=az&product=oil&graph=production

36 Tradingeconomics.com. Azerbaijan Crude Oil Production. Retrieved April 26, 2021, from http://web.archive.org/web/20210202074603/https://tradingeconomics.com/azerbaijan/crude-oil-production

Figure 1: Azerbaijan crude oil production[37]



Due to Trading Economics's statistical information, crude oil production peaked in June 2009 (1072 BBL/D/1K), while the lowest point was in February 1997 (168 BBL/D/1K).[38] According to the total proved oil reserves statistics[39] of different sources,[40] for the end of 2023, the proven oil reserves of Azerbaijan are calculated as 7 bb.[41]

ACG is the largest oil field in Azerbaijan, so the oil fields' production equals almost 75% of Azerbaijan's entire oil production.[42] Azerbaijan produced 24,100 barrels per day in the first quarter of 2023.[43] Based on the EIA's projections, Azerbaijan was expected to have an average daily oil production ranging from 640,000 to 670,000 barrels in 2023. The production trend throughout the year in 2022 was as follows: It started at 670,000 b/din the first quarter, then gradually decreased to 650,000 barrels in the second quarter, followed by a further decrease to 640,000 barrels b/din the third quarter. However, in the fourth quarter, there was a slight rebound, and oil production increased to 650,000 barrelsb/d.[44]

37 https://www.tradingeconomics.com

38 Tradingeconomics.com. (2021, April 26, 2023).

39 https://www.worldometers.info

40 https://www.iea.org

41 Wisevoter.com. (September, 2023). Oil Reserves by Country. Retrieved March 6, 2024, from https://www.reuters.com/article/azerbaijan-gas/azerbaijans-gas-exports-to-turkey-to-reach-10-2-bcm-in-2023-ifx-cites-minister-idUKR4N3AW02G/.

42 Ibid.

43 BP.com. (April 02, 2023). Azeri-Chirag-Deepwater Gunashli. Retrieved April 26, 2023, from https://www.bp.com/en_az/azerbaijan/home/who-we-are/operationsprojects/acg2.html

44 Azernws.az. (January 13, 2023). Azerbaijan to produce over 600,000 barrels of oil per day in 2023 – EIA forecasts. Retrieved April 26, 2023, from https://www.azernews.az/oil_and_gas/204934.html

The expected production volume from the ACG was estimated at 1 b/d for the first phase of the production-sharing agreement. However, peak production, at 823,100 b/d, was reached in 2010. This volume dropped to 477,000 b/d in 2020.[45] The development of the Chirag Oil Project started in January 2014. The expected production capacity of the platform was 183,000 b/d.[46]

A significant part of the oil extracted from the Caspian Sea's Azerbaijani sector is medium-light and sweet crude oils. Azerbaijan is predominantly a crude oil and condensate seller, but the country supplies a limited amount of refined petroleum products to some countries like Russia, Greece, and Bulgaria.[47]

The lion's share of the extracted oil is exported via BTC and sold as a BTC blend (36.8° API gravity, 0.15% sulfur). The relatively limited amount is transported through the Baku-Supsa pipeline as Azeri light (35.2° API gravity, 0.14% sulfur).[48]

The Azerbaijani oil is exported mainly through three oil export pipelines (Figure 2), while a very insignificant part of the extracted oil is shipped by rail. The BTC pipeline exports account for almost 80% of Azerbaijan's entire oil export[49] and it plays a unique role not only in exporting a significant share of Azerbaijani oil to the world energy market[50] but neutralizing the Russian monopoly at least in part.[51]

BTC exported over 1 million b/d (mbd) of crude oil in July 2010, which is an absolute record in its history. However, the pipeline was initially constructed with its maximal export capacity of 1.2 mbd.[52] According to BP, from the first day of oil transport via BTC till the end of the first quarter of 2020, the pipeline transported 3.41 bb or 455 mt of crude oil.[53] The pipeline predominantly transports oil extracted from ACG and condensate from SD fields. However, some crude oil volumes and condensate from Kazakhstan and Turkmenistan are also exported via this pipeline.[54]

45 EIA.gov. (Janurary 2019).

46 Ibid.

47 Ibid.

48 Ibid.

49 Yesevi, C. G., & Tiftikcigil, B. Y. (2015). Turkey-Azerbaijan energy relations: A political and economic analysis. International Journal of Energy Economics and Policy, 5(1), 27.

50 Ciarreta & Nasirov (2012).

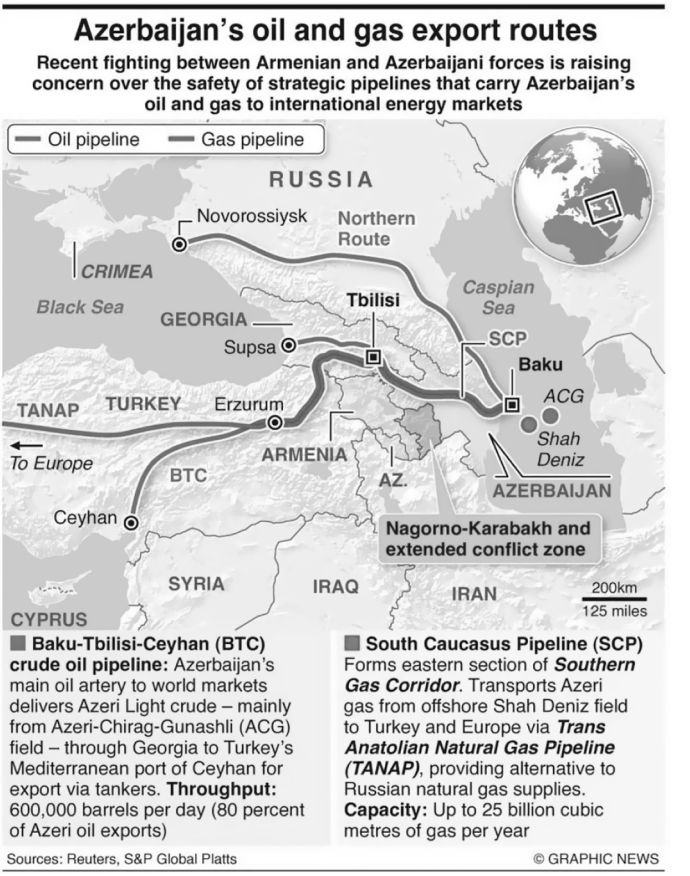
51 Petersen, A., & Barysch, K. (2011). Russia, China and the geopolitics of energy in Central Asia. Centre for European Reform.

52 EIA.gov. (Janurary 2019).

53 BP.com. (April 02, 2020). Baku-Tbilisi-Ceyhan Pipeline. Retrieved April 26, 2023, from http://web.archive.org/web/20201127034830/https://www.bp.com/en_az/azerbaijan/home/whoweare/operationsprojects/pipelines/btc.html

54 Ibid.

Figure 2: Azerbaijan's oil and gas export routes[55]



4.1.6 Azerbaijan's oil dependence

The main factors that stimulated the fast development of the country's GPD in the first years of its independence were the existence of the tremendous onshore and offshore oil and natural gas resources and significant energy contracts with transnational energy corporations.[56] Therefore, with the development of the energy fields,

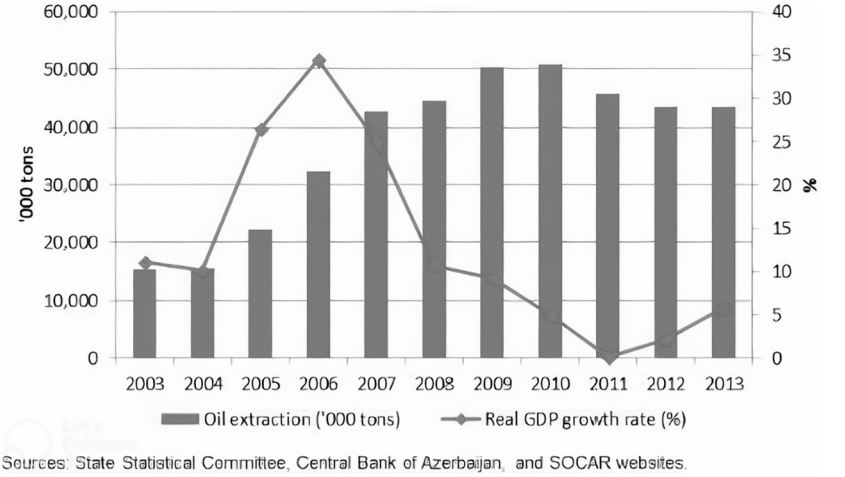
55 https://www.spglobal.com

56 Hasanov, F. (2013). Dutch disease and the Azerbaijan economy. Communist and Post-Communist Studies, 46(4), 463–480.

the Azerbaijani economy became one of the world's fast-developing economies that brought relative prosperity to the newly independent country.[57]

The high prices of oil resources in the world energy market in the 1990s and 2000s were another critical factor that led to the rise of state income. Thus, the increase in oil prices in the world energy market was accompanied by the entrance of "petrodollars" to the country's state budget and the speedy development of the energy industry. To illustrate, if the price of the Brent oil mark was, on average, $16/b before the singing of the "Contract of the Century," 1 barrel of Brent oil cost already $111.63 in 2012, which was its highest point in history.[58] Therefore, the economy of the country started growing significantly in the 2000s[59] (see Figure 3).

Figure 3: Oil production and gross domestic product growth rates, 2000–2013[60]



Sources: State Statistical Committee, Central Bank of Azerbaijan, and SOCAR websites.

The GDP of the country from 1994 to 2016 averaged $24.87. The highest point of the GDP with $75.24 was in 2014, when the world energy market's oil prices reached their highest mark in history. The energy contracts signed with the international energy companies did not immediately bring significant income to the Azerbaijani

57 Humbatova, S. I., Gasimov, R. K., Gadim, N., & Hajiyev, O. (2019). The impact of oil factor on Azerbaijan economy. International Journal of Energy Economics and Policy, 9(4), 381.

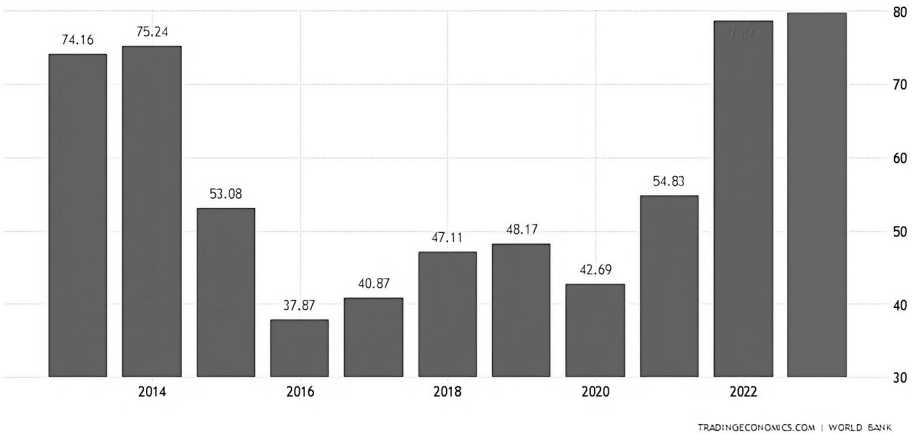
58 Statista.com. (2020, March 9). Average annual Brent crude oil price from 1976 to 2017. Retrieved April 26, 2023, from http://web.archive.org/web/20210328020852/https://www.statista.com/statistics/262860/uk-brent-crude-oil-price-changes-since-1976/

59 Chubrik, A., & Walewski, M. (2010). Oil money vs. economic crisis: The case of Azerbaijan. CASE Network E-Briefs, (6), 1.

60 State Statistical Committee, "Central Bank of Azerbaijan and SOCAR."

budget, so the lowest point of the GDP was in 1995 at $3.05.[61] According to the figure of the Trading Economics agency (see Figure 4), the volume of GDP for 2022 was $78.72.[62] It demonstrates the crucial role of the energy sector in the Azerbaijani economy.

Figure 4: Azerbaijan GDP[63]



According to the State Statistical Committee of the Republic of Azerbaijan on GDP per capita in Azerbaijan, the Azerbaijani GDP per capita per year rose from $98.30 in 1991, right after the fall of the SU, to $8000 in 2014. The years 2014–2015 were when the oil price was the highest. Consequently, the enormous growth of the GDP became possible thanks to the financial profit that Azerbaijan received from the export of oil resources.[64]

However, despite enormous income from the energy sector, other non-energy areas did not reach the same rapid development level as the energy sector. Moreover, "oil money" was not appropriately invested in developing non-energy industries. Instead,"oil money" was used to organize some international sports tournaments, cultural events, music festivals, etc.[65]

61 Ceicdata.com. Azerbaijan GDP per Capita. April 26, 2023, from http://web.archive.org/web/20210127065025/https://www.ceicdata.com/en/indicator/azerbaijan/gdp-percapita

62 Tradingeconomics.com. Azerbaijan GDP, 1990-2017. Retrieved April 06, 2021, from http://web.archive.org/web/20210309160109/https://tradingeconomics.com/azerbaijan/gdp

63 https://www.tradingeconomics.com

64 Ceicdata.com. Azerbaijan GDP per Capita. April 26, 2023, from http://web.archive.org/web/20210127065025/https://www.ceicdata.com/en/indicator/azerbaijan/gdp-percapita

65 Organization of Eurovision Song Contest in 2012, the first European Games in 2015, Formula 1 Azerbaijan Grand Prix, and the Islamic Solidarity Games in 2017 are some of them.

Azerbaijan is not the only state of the Caspian Region suffering from oil or natural gas export dependence, but it is an enormous problem for all regional states.[66] Therefore, even though all these countries' energy sector contributes significantly to the state budget of the states, the non-oil sector remains either completely undeveloped or weakly developed.[67]

$33 bn. was invested into developing the most significant energy project in the country, ACG oil fields, and extracted 3.2 bb of oil since the signing of the "Contract of the Century." The average production capacity declined to 24,100 b/d by the first quarter of 2023.[68] As reported by the agency Report.az, the SOFAZ has accumulated a total revenue of $158.658 billion since the ACG field began its operations in 2001.[69]

The decline in oil production is not the only factor that negatively influences the country's national budget. Moreover, Azerbaijan does not possess any new energy fields except for the newly explored natural gas fields.[70] Therefore, some international experts predict a further decline in the future. For instance, the figure published by Carnegie Endowment for International Peace shows energy production declining significantly in the following years (see Figure 5).

Due to the statistics of the SOFAZ, oil incomes dropped from 12.3 bn. manats in 2014 to 7.4 bn. manats in 2015 that means the profits were reduced by around 40%.[71] The statistical information illustrates how the budget income of Azerbaijan depends on the oil price in the world energy market. Therefore, it is relatively easy to predict that the oil incomes of SOF will decline further because of current oil prices in the world energy market and the country's decline in oil production. Some local[72] and international[73] energy and economy experts predicted that Azerbaijan might have severe economic troubles because of its undeveloped non-oil sector.[74] For in-

66 Czech, K. (2018). Oil dependence of post-Soviet countries in the Caspian Sea Region: the case of Azerbaijan and Kazakhstan. Acta Scientiarum Polonorum. Oeconomia, 17(3), 5-12.

67 Köse, N., & Ünal, E. (2020). The impact of oil price shocks on stock exchanges in Caspian Basin countries. Energy, 190, 116383.

68 BP.com. (April 02, 2023). Azeri-Chirag-Deepwater Gunashli. Retrieved April 26, 2023, from ht tps://www.bp.com/en_az/azerbaijan/home/who-we-are/operationsprojects/acg2.html

69 Report.az. (june 3, 2022). sofaz more than doubles its revenues from acg. retrieved april 26, 2023, from http://web.archive.org/web/20220608185741/https://report.az/en/energy/sofaz-more-than-doubles-its-revenues-from-acg1/

70 Apa.az. (July 13, 2017). Azerbaijan gets 9% decline in oil production. Retrieved April 26, 2021, from http://en.apa.az/azerbaijan_energy_and_industry/azerbaijan-gets-9-decline-in-oil-production.html

71 EIA.gov. (Janurary 2019).

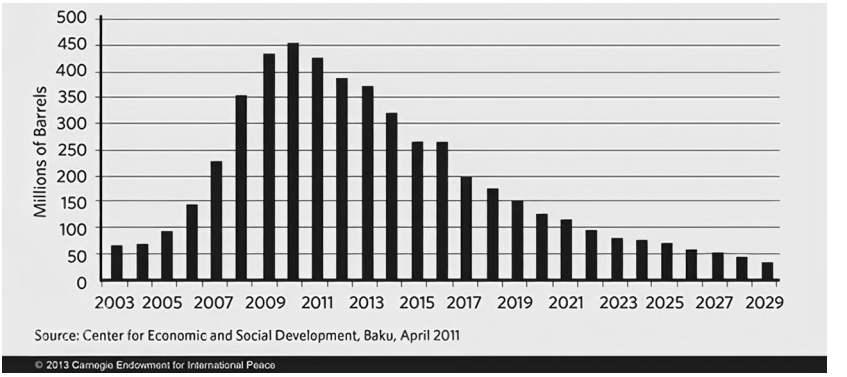
72 Humbatova et.al. (2019).

73 Ciarreta & Nasirov (2012).

74 Le Borgne, M. E., Aturupane, M. C., Gvenetadze, M. K., Hobdari, M. N., Wakeman-Linn, M. J., & Danninger, M. S. (2004). Managing Oil Wealth: The Case of Azerbaijan. International Monetary Fund.

stance, Azerbaijan's oil sector is analyzed in the book"Managing Oil Wealth: The Case of Azerbaijan" in detail.[75]

Figure 5: Oil production forecasts in Azerbaijan [76]



This work gives some practical advice concerning the management of the Azerbaijani economy during the so-called post-oil period. Consequently, the paper discusses issues like the countries' common problems with abundant natural resources and the importance of establishing long and short-term strategies in the oil sector for the country's prosperity. This book's fundamental argument is the crucial importance of budget establishment policy due to the oil production decline in Azerbaijan.[77]

The Azerbaijani President approved a decree on 27 September 2004 concerning the long-term strategy for managing the oil and gas revenues.[78] Nevertheless, Azerbaijan began transferring "oil money" from the Azerbaijani Oil Fund to the budget starting from 2008 that contradicts the long-term strategy of establishing energy revenues.[79]

The figure for the budget revenues, spending, and deficit shown below clearly demonstrates that the gap in Azerbaijan's budget is increasing consistently against

75 Ibid.

76 https://www.carnegieendowment.org

77 Ibid.

78 Ibadoghlu, G., Alasgarov, K., & Bayramov, G. (2013). Oil and gas revenue management in Azerbaijan. Policy Paper on Revenue Management in Azerbaijan, November.

79 Resourcegovernance.org. (July 13, 2017). State Oil Fund of the Republic of Azerbaijan. Retrieved September 26, 2023, from http://web.archive.org/web/20201101044538/https://resourcegovernance.org/sites/default/files/NRF_Azerbaijan_ September2013.pdf

the background of the budget revenues and spending starting from 2013 (see Figure 6).

It is evident that if oil and gas resources are not managed well in the long-term period,[80] the Azerbaijani economy will have some extremely negative consequences. For instance, it could lead to the entire liquidation of the SOF budget or the appearance of a permanent budget deficit. Considering these two consequences, the Azerbaijani government has to avoid transferring from SOF to the country's budget.[81]

Nevertheless, the Azerbaijani government claims that diversification of the economy[82] and the development of the non-oil sector is one of the crucial priorities of the Azerbaijani government.[83] Ilham Aliyev, the president of Azerbaijan, has said that the state is concerned about the economy's diversification very much, so it adopted the development concept "Azerbaijan-2020 Outlook for the Future" in 2014. According to the concept, the petrochemical industry, renewable energy sources, the national economy's diversification are still some of the most critical priorities for the government alongside the modernization of the energy sector. However, the Azerbaijani state's transition policy to the so-called post-oil era has not been realized yet.[84]

Concerning the development of the non-energy sector, some regulations have been adopted. Nevertheless, Azerbaijan does not have a significant export of non-oil products.[85] The high income from oil export helped Azerbaijan to overcome the economic crisis in the world economy in 2009. However, considering the crucial factor that the Azerbaijani economy cannot permanently exist purely on the oil industry, so the Azerbaijani government has to develop the non-energy sector as soon as possible because the oil production will further decline.[86]

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80 Aslanli, K. (2015). Fiscal sustainability and the state oil fund in Azerbaijan. Journal of Eurasian Studies, 6(2), 114–121.

81 Ibadoghlu, G. (2019). Azerbaijan: A Rentier State. Available at SSRN 3489621.

82 Ahmadov, I. (2016). Azerbaijan's New Macroeconomic Reality: How to Adapt to Low Oil Prices.

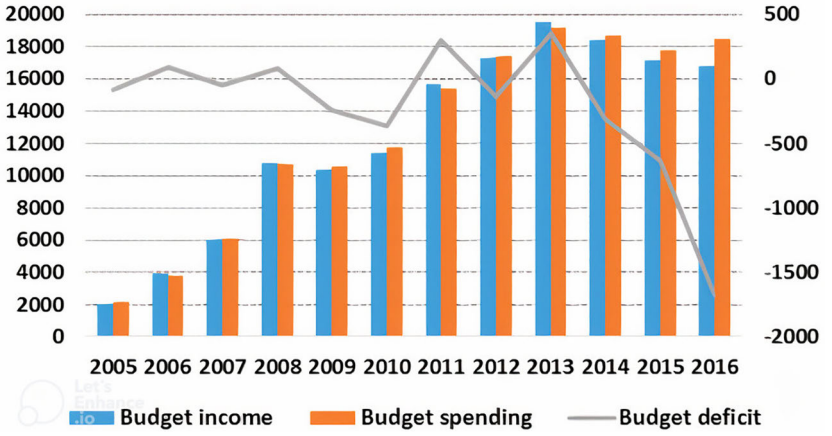
83 Babayev, B. (2019). Studying The Case of The UAE in Economic Diversification and Non-Oil Export Growth: Public Policy Lessons for Azerbaijan. Journal of Economic Sciences: Theory & Practice, 76(2).

84 Nadjafova, Z. (2019). The main structure and directions of diversification of the economy of Azerbaijan.

85 Vidadili, N., Suleymanov, E., Bulut, C., & Mahmudlu, C. (2017). Transition to renewable energy and sustainable energy development in Azerbaijan. Renewable and Sustainable Energy Reviews, 80, 1153–1161

86 Mahmudova, I. M. (2019). STRUCTURAL ANALYSIS OF NON-OIL SECTOR FIELDS IN THE REGIONS OF THE REPUBLIC OF AZERBAIJAN. Economic and Social Development: Book of Proceedings,
435–443.

Figure 6: Budget revenues, spending, and deficit in Azerbaijan (bln. AZN)[87]



4.1.7 Natural gas

It is difficult to find up-to-date information from verified international sources about the actual oil and gas reserves of the Caspian states. The available information is generally 2–3 years old. However, since oil and natural gas reserves are not subject to fast change, relatively old information from verified sources can be used. For instance, Azerbaijan has 2.5 tcm of natural gas based on the information provided by BP in 2021.[88] More than 90% of Azerbaijan's total natural gas production is extracted from offshore natural gas fields in the Azerbaijani part of the Caspian Sea.[89] The natural gas is located in a more diverse area in comparison to the oil reserves of the country, while the central part of the natural gas resources is extracted in the offshore fields of the Caspian Sea and partly in the Absheron Peninsula. Almost all main natural gas fields were discovered during the last few years, namely, after independence. For instance, some remarkable natural gas fields like "SD" and "Umid" were discovered in 1999 and 2010, respectively.

According to the European Institutional Investor Company (CEIC), which is the agency of global economic data, indicators, charts, and forecasts, in December 2022,

87 https://www.socialwatch.org

88 IEA.org. (21 September). Retrieved March 5, Azerbaijan energy profile Energy security, from https://www.iea.org/reports/azerbaijan-energy-profile/energy-security

89 Karatayev, M., & Hall, S. (2020). Establishing and comparing energy security trends in resource-rich exporting nations (Russia and the Caspian Sea region). Resources Policy, 68, 101746.

Azerbaijan's natural gas consumption was reported at 1.200 Cub ft/Day bn, marking an increase compared to the previous year's consumption of 1.193 Cub f/d bn.[90]

The consumption data for Azerbaijan's natural gas is updated annually and has been recorded from December 1985 to 2022, comprising a total of 37 observations. Over this period, the average daily consumption of natural gas stood at 0.913 Cub ft/Day bn. The highest consumption level was reached in 1990, reaching a record high of 1.492 Cub ft/Day bn, while the lowest consumption occurred in 1998, with a record low of 0.493 Cub ft/Day bn.[91] Natural gas is the most consummated energy product in Azerbaijan, according to US EIA.[92]

SOCAR is the state energy company responsible for the processing, transport, distribution, and other processes concerning the oil sector of Azerbaijan. The company is also the leading energy entrepreneur in Azerbaijan, transporting natural gas to importing countries like Georgia, Turkey, Albania, Greece, and Italy. The Tariff Council of Azerbaijan balances the prices of these services.[93]

An essential role in natural gas development played agreements with Western oil companies after 1991. For instance, Azerbaijan's national oil company signed a deal worth $425 million with the US Trade and Development Agency (USTDA) in October 1999. The USTDA agreement stipulated financial support to Azerbaijan for exploration. It estimated the consumption needs, production, and possible export capacity of the country through this study.[94]

Another vital energy contract for the Azerbaijani natural gas sector was signed between Azerigaz and energy companies Statoil and Royal Dutch/Shell in 1996.[95] The companies agreed to support Azerbaijan in developing its natural gas sector and exporting natural gas.[96] Azerbaijan would export natural gas. However, Azerbaijan had to develop its natural gas infrastructure and solve the problem of natural gas flaring. It was predicted that if Azerbaijan could achieve an appropriate development level in its natural gas sector, it would be able to produce up to 1 tcf of gas[97] by the end of the 00th and become a natural gas exporter for its neighbor countries.[98]

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90 CEIC.com. (28 July,2023). Retrieved April 26, 2023, from http://web.archive.org/web/20210301004436/https://www.ceicdata.com/en/indicator/azerbaijan/natural-gas-consumption

91 Ibid.

92 EIA.gov. (Janurary 2019).

93 Ibid.

94 IBP USA. (19 April 2018). Azerbaijan Business and Investment Opportunities Yearbook Volume 1 Strategic, Practical İnformation and Opportunities.

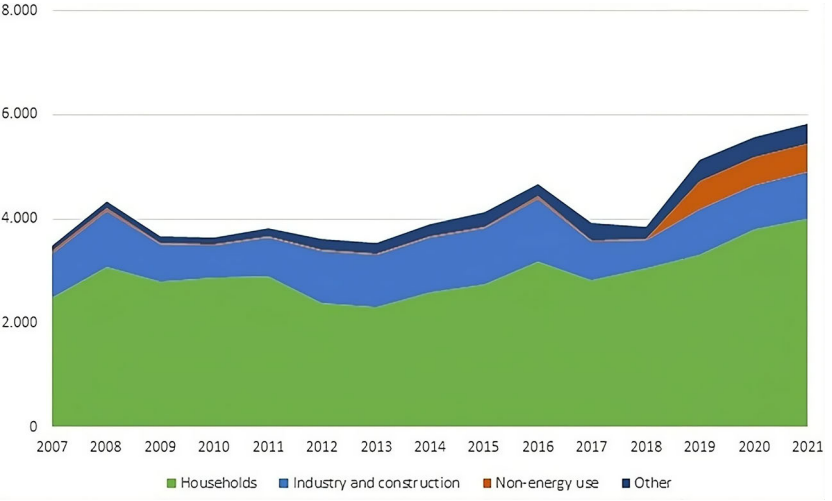
95 Shatskaya, Z., Melnyk., & Olshanska, O. Bussiness Structures of Azerbaijan: Experience on Functioning and Development Prospects. İqtisadi və Siyasi Elmlər Jurnalı, 224.

96 Joseph, I. B. (1998). Caspian Gas Exports: Stranded Reserves in a Unique Predicament.

97 IBP USA (19 April 2018).

98 Gelb, B. A. (2005, March). Caspian oil and gas: production and prospects. LIBRARY OF CONGRESS WASHINGTON DC CONGRESSIONAL RESEARCH SERVICE.

Figure 7: Azerbaijan natural gas consumption by sector[99]



Azerbaijan could not meet even its domestic natural gas demand before discovering the SD natural gas field, and the largest natural gas field of the Azerbaijani natural gas sector, the Bahar field, could only meet 50% of the entire Azerbaijani gas demand.[100] Besides it, the output dropped significantly at the end of the 1990s because of a lack of modern drilling technology to explore the new natural gas fields.[101]

The Nakhichevan gas field's proven potential is estimated at almost 300 bn. cubic feet (bcf) in the 1990s.[102] Consequently, there were only two natural gas fields: Guneshli and SD, which could have increased Azerbaijan's natural gas potential radically. The production from the SD should have been realized in 2004.[103] However, the production had to be postponed for some time because of technical problems.[104]

The proven natural gas reserves balance of Azerbaijan changed significantly with starting the production from the SD field in 2006. For instance, according to BP

99 https://www.researchgate.net

100 Rzayeva (2015).

101 Griffths, A. E., Begliarbekov, V. R., Shakbazov, M. A., & Sultanov, P. (2001). Increasing production from old, onshore oil fields, Azerbaijan–a case study. Petroleum Geoscience, 7(1), 65–73.

102 Trend.az. (March 10, 2010). RWE: Development of perspective offshore structure Nakhchivan in Azerbaijan to contribute to project Nabucco project. Retrieved April 26, 2023, from https://en.trend.az/business/energy/1651488.html

103 Pirani, S. (2016). Azerbaijan's gas supply squeeze and the consequences for the Southern Corridor.

104 Abdullayev, G. (2004). Current Status of Natural Gas Sector. In Security of Natural Gas Supply through Transit Countries (pp. 47–60). Springer, Dordrecht.

statistics, Azerbaijan's proven gas resources are 2.5 tcm for 2021 after discovering the field.[105]

Due to the prices that oil and natural gas command on the international market, the Azerbaijani government considers natural gas export a significant profit source, which would help Azerbaijan have a stable positive budget account. However, the country's modest natural gas resources are insufficient to replace oil, which has been the most significant and so-called "locomotive branch" of the Azerbaijani economy for many years.

4.1.8 Perspective natural gas fields

The Azerbaijani government spent almost $3.5 bn. to explore the new natural gas fields. Thanks to the significant investments, some remarkable natural gas fields like Babek, Absheron, Nakhchivan, Zafar, Mashal, Karabakh, Ashrafi, and Dan Ulduzu were discovered.[106] The exploration of new energy fields made Azerbaijan a new natural gas exporter, so the significant investment by Azerbaijan and different energy companies in this sector significantly increased productivity.

There are only three crucial natural gas sources: SD 1 and SD 2 and Umid fields. The SD field, which was explored in 1999, is the largest natural gas field in Azerbaijan. However, natural gas production from this field started only eight years later, in 2007.[107] If the first stage of the field's capacity was initially estimated within 9 bcm/a, according to BP, Stage 2 should have reached 16 bcm/a of gas production due to the estimations.[108]

If, before the starting of the production from the SD 1 and SD 2 fields, Azerbaijan was a net natural gas importer and had to meet its demand through Russian imports, while the output from these fields made it possible for Azerbaijan to transport natural gas not only to its neighbor countries but also to some European countries as well.[109]

Alongside SD 1 and 2 Stages, one of the potential energy fields among new gas fields is the Umid field, the second-largest natural gas field in Azerbaijan. It is the first natural gas project independently developed by the country. According to the Oil and Gas Journal published in 2010, this field possessed 1.2 tcm of gas capacity.[110]

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105 EIA.gov. (Janurary 2019).

106 Vision.az. (2010, November/December). Oil and Gas Prospects. The Umid Fulfils Hopes. Retrieved April 26, 2023, from http://web.archive.org/web/20200808012030/http://www.visions.az/en/news/225/00400ff7/

107 Baran, Z. (2007). EU energy security: time to end Russian leverage. Washington Quarterly, 30(4), 131–144.

108 Macit, F. (2014). Caspian energy outlook. Caspian Strategy Institute.

109 Pirani, S. (2018). Let's not exaggerate–Southern Gas Corridor prospects to 2030

110 Vision.az. (2010, November/December)

The Umid field was discovered in the South of the Caspian Sea and at a depth of 170 meters. The first exploration in the area was in 1953. Further investigation was done in 1972. Additionally, nine new wells were drilled from 1977 to 1992, but then exploration stopped. The construction of Umid Co Ltd in 2009 made it possible to continue the development of the field.[111]

According to the former Vice-President of SOCAR, Khoshbakht Yusif-Zadeh, the renewal of the exploration in this field confirmed that this energy field is rich with natural gas resources. Consequently, the area possesses 200 bcm of gas and 30–40 mt of condensate.[112] SOCAR possesses 80% of the field's total shares, while the Nobel Oil Exploration & Production Company has 20%.

The Absheron field is another essential natural gas field, explored in 2011. The Absheron field was discovered in the Caspian Sea, and it is located 100 km southeast of Baku. The entire square of the natural gas field is 270 km^2.[113]

SOCAR has 40%, while a French energy company, Total, possesses 60% of the Absheron field shares. The agreement between SOCAR and Total for developing the natural gas field was signed on 27 February 2009. The first exploration was done from the Heydar Aliyev drilling rig and was operated by the Danish Maersk Drilling Company.

4.1.9 Azerbaijan as a significant natural gas exporter for the neighboring countries

Azerbaijan exports its natural gas to Europe through the SGC for the first time in the country's history. Nine energy companies from Italy, Greece, and Bulgaria agreed to buy the Azerbaijani natural gas extracted from the SD 2 field, so the Azerbaijani government hopes to get considerable revenue from this project.[114]

Azerbaijan started exporting its first natural gas resources in 2007. The lion's share of the exported natural gas is transported via Georgia, transit for the significant oil and natural gas pipelines of Azerbaijan like BTC oil and BTE natural gas pipelines. Therefore, Azerbaijani natural gas will be transported through Georgia and Turkey to Europe via the SCP. The pipeline runs parallel to the BTC oil pipeline.[115]

The volume of natural gas exported from Azerbaijan to Georgia is 800 million cubic meters (mcm), while Georgia's total natural gas demand is nearly 2.5

111 Ibid.

112 Ibid.

113 IEA.org. (21 September).

114 Trend.az. (September 12, 2011). SOCAR names volume of Absheron field's gas reserves. Retrieved April 26, 2023, from https://en.trend.az/business/energy/1930101.html

115 BP.com. (2013, September 19). Shah Deniz major sales agreements with European gas purchasers, concluded. Retrieved April 26, 2023, from https://en.trend.az/business/energy/1930101.html

bcm/a. Since Georgia is a leading transit country for Azerbaijan's oil and natural gas resources, Georgia receives Azerbaijani gas, not for a market price but relatively cheaper.[116] The volume of the natural gas exported to Georgia reached up to 1.6. bcm/a by 2020 with the startup of the SD 2 project.[117] According to information on Georgia's natural gas balance, there are plans to import 3.217 bcm in 2024, with 3.017 bcm of that expected to come from Azerbaijan, as stated in a report by Azernews.[118]

Turkey is another vital transit land for the export of Azerbaijani resources. There is an agreement between Azerbaijan and Turkey.[119] Due to this contract, Azerbaijan exports to Turkey up to 6.6 bcm/a of natural gas via the BTE pipeline.[120] According to Turkey's Energy Market Regulatory Authority (EPDK), Azerbaijan shipped to Turkey about 3.94 bcm between January and July of 2017. Azerbaijan increased the volume of natural gas exported to Turkey due to the export statistics of 2020. Therefore, the export volume reached 2.7 bcm/a in the first quarter of 2020.[121] Furthemore, according to Azerbaijan's energy minister Parviz Shahbazov, natural gas exports to Turkey have hit 7.4 bcm in 2023, with projections to reach 10.2 bcm by 2024, as reported by the Interfax news agency.[122]

The SGC project is a massive natural gas project comprising of four projects.[123] The first project is the development of the second stage of the SD field. Meanwhile, the natural gas reserves of this field are estimated at more than 1 tcm.[124] The expansion of the SCG pipeline between Azerbaijan and Georgia is the second part of

116 EIA.gov. (Janurary 2019).

117 Omonbude, E. (2016). Cross-border oil and gas pipelines and the role of the transit country: economics, challenges and solutions. Springer.

118 Azernews.com. (January 9, 2024) Retrieved February 26, 2024, from https://web.archive.org/web/20240109051604/https://www.azernews.az/oil_and_gas/220067.html

119 Reuters.com. (September 9, 2017). Georgia says Azerbaijan to suspend Shah Deniz gas exports for a month. Retrieved April 26, 2023, from https://www.reuters.com/article/us-azerbaijan-shahdeniz-suspension/georgia-says-azerbaijan-to-suspend-shah-deniz-gas-exports-for-a-month-idUSKBN190128

120 Bilgin, M. (2010). Turkey's Energy Strategy: What Difference Does it Make to Become an Energy Transit Corridor, Hub or Center? Revista UNISCI, (23), 113-128.

121 Rzayeva, G. (2014). Natural Gas in the Turkish Domestic Energy Market–Policies and Challenges.

122 Reuters.com. (September 29, 2024). Retrieved February 26, 2024, from https://www.reuters.com/article/azerbaijan-gas/azerbaijans-gas-exports-to-turkey-to-reach-10-2-bcm-in-2023-ifx-cites-minister-idUKR4N3AW02G/

123 Euractiv.com. (August 24, 2020). Azerbaijani gas in the Turkish market, perspectives for partnership. Retrieved April 26, 2021, from http://web.archive.org/web/20210120203648/https://www.euractiv.com/section/energy/opinion/azerbaijani-gas-in-turkish-market-perspectives-for-partnership/

124 Hasanov, F. J., Mahmudlu, C., Deb, K., Abilov, S., & Hasanov, O. (2020). The role of Azeri natural gas in meeting European Union energy security needs. Energy Strategy Reviews, 28, 100464.

the project, while the TANAP project is the third part of the project.[125] The expansion comprises the area between Turkish-Georgian and Turkish-Greek borders. The fourth part of the project consists of the TAP project.[126]

The memorandum of understanding for TAP was signed not only by the states mentioned above but also by Montenegro, Bosnia and Herzegovina. Croatia also took part in the signing of this memorandum.[127] The entire volume of natural gas exported through TANAP and further through TAP will reach 16 bcm/a. The whole length of the pipelines is 3500 km.[128]

The Regional President of BP for Azerbaijan, Georgia, and Turkey-Gordon Birrell, called the export from the SD field to Europe as one of the biggest energy deals in the history of the oil and gas industry:[129]

> "The Shah Deniz consortium is proud to be involved in the conclusion of one of the biggest gas deals in the history of the oil and gas industry. The deep cooperation that has led to the signing of these gas sales agreements sets the foundation for many years of partnership. The strong demand for Shah Deniz gas gives us confidence in the long-term development of Azerbaijan's gas resources."

Azerbaijan transported a modest volume of natural gas to Russia via the Hajiqabul-Mozdok pipeline from 2007 to 2011. However, it currently exports no natural gas to the Russian market. Azerbaijan also exported a small volume to Iran. In its turn, Iran supplied the same quantity of natural gas to Azerbaijan's Nakhchivan Autonomous Republic (NAR), located between Iran and Turkey, while NAR has no direct connection to Baku because of Nagorno-Karabakh's occupation by Armenian troops. For this reason, NAR is utterly dependent on Iran's export.[130]

125 Tagliapietra, S. (2014). Turkey as a regional natural gas hub: Myth or reality? An analysis of the regional gas market outlook, beyond the mainstream rhetoric.

126 Oxford Analytica. Pipeline to Italy will change Balkan energy market. Emerald Expert Briefings, (oxan-db).

127 Aras, B. (2014). Turkish-Azerbaijani energy relations.

128 Gurbanov, I. (2013). Between taP and the Nabucco: Who is the 'Winner'? Azerbaijan or Russia?. Bilgesam– Wise Man Center for Strategic Studies.

129 Bp.com. (September 19, 2013). Shah Deniz major sales agreements with European gas purchasers concluded.

130 EIA.gov. (Janurary 2019).

4.2 Kazakhstan

Kazakhstan is the second most prosperous oil country in the Caspian Region. The country's natural gas sector is relatively weakly developed because of insignificant natural gas resources in Kazakhstan, while the oil sector dominates the country's economy. The production of oil in Kazakhstan started more than 100 years ago, in 1911.

4.2.1 Oil sector

In March 2023, Kazakhstan's crude oil production slightly declined to 1902.63 BBL/D/1K compared to 1911.84 BBL/D/1K in February 2023, according to statistics of Trading Economics for 2023[131] (see Figure 8). From its independence in 1991 until 2017, the 60% of total investment in Kazakhstan was invested directly into its energy sector.[132] It is an important indicator showing how crucial the oil sector is to the economy of the country.[133]

The real "oil boom" in Kazakhstan emerged in the 1960s and 1970s when Kazakhstan's oil industry produced almost 500,000 b/d. Hence, the country became the largest oil-producing republic in the former USSR. The oil production potential of Kazakhstan is still enormous. For instance, the production reached a remarkable output of 1.000.000 b/d still in 2003.[134] However, Kazakhstan's petroleum and other liquids production has been stable for the last 13–14 years. Moreover, this number is bound to increase, given the large energy fields.

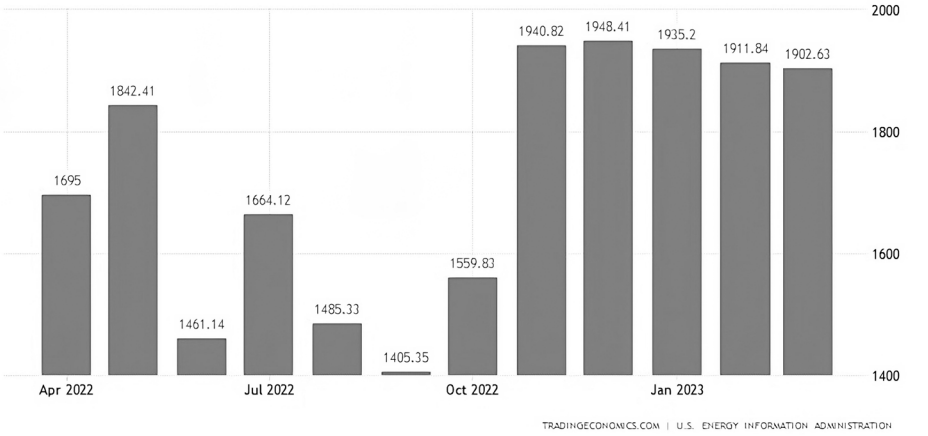
131 Tradingeconomics.com. (March 23, 2023). Trading Economics, Crude Oil Production in Kazakhstan decreased to 1902.63 BBL/D/1K in March from 1911.84 BBL/D/1K in February of 2023. Retrieved April 26, 2023, http://web.archive.org/web/20230427081924/https://tradingeconomics.com/kazakhstan/crude-oil-production

132 International Trade Administration Export Solutions. Retrieved April 26, 2023, from http://web.archive.org/web/20210406181204/https://www.trade.gov/export-solutions

133 Khalitova, M. M., Praliev, G. S., Panzabekova, A. Z., Andreeva, Z. M., & Dzhubaliyeva, Z. A. (2014). Financial instruments of state regulation industrial and innovative development of Kazakhstan economy. Life Sci J, 11(10s), 369–378.

134 Khalitova, M. M., Praliev, G. S., Panzabekova, A. Z., Andreeva, Z. M., & Dzhubaliyeva, Z. A. (2014). Financial instruments ofstate regulation industrial and innovative development of Kazakhstan economy. Life Sci J, 11(10s), 369–378.

Figure 8: Kazakhstan Crude Oil Production between April 2022-March 2023[135]



Until 2020, Kazakhstan has discovered 172 oil fields.[136] All these reserves are located in six provinces and 15 main oil fields. However, there are some difficulties in developing these energy fields.[137] OGJ reports that Kazakhstan possesses 30 bb proven oil reserves and the second-largest endowment in Eurasia, ceding only Russia. In addition, Kazakhstan is in the 12th position on the list of the wealthiest oil countries in the world. However, between May and July in 2023, the oil production was low, and August was the record low. (See Figure 9).

In 1970, the largest Karachaganak and Tengiz fields and other relatively small oil fields were discovered. However, developing these energy fields properly was impossible due to the lack of modern technology. The situation changed after involving some international oil companies in Kazakhstan's energy industry after the acquisition of its independence.[138]

Kazakhstan's State Oil Company is KazMunaiGaz (KMG). The company has been functioning since 2002 and possesses shares in the Karachaganak (10%), the Kashagan (16.88%), and the Tengiz (20%) oil fields. The company's interests in other oil and gas projects are estimated to be from 33% to 100%.[139] The state-owned oil and

135 https://www.tradingeconomics.com

136 International Trade Administration Export Solutions. Retrieved April 26, 2023, from http://web.archive.org/web/20210406181204/https://www.trade.gov/export-solutions

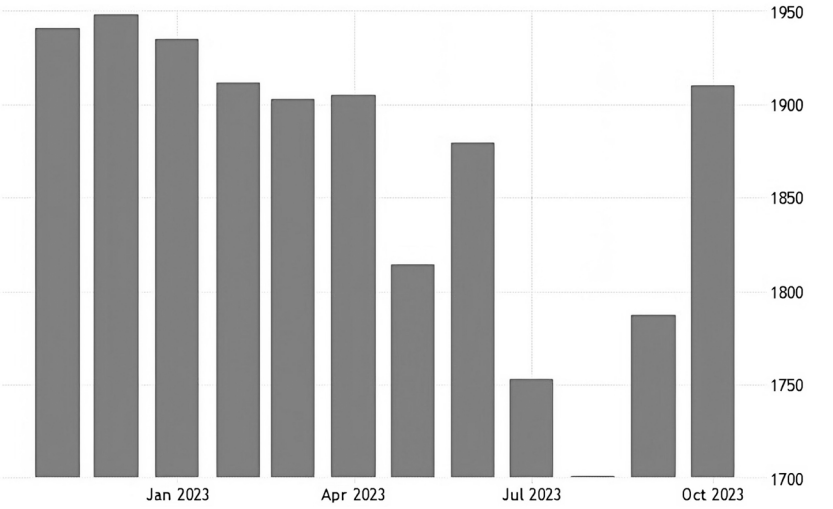
137 Eia.gov. (January 7, 2019). Country Analysis Brief: Kazakhstan. Retrieved April 26, 2023, from https://www.eia.gov/beta/international/analysis_includes/countries_long/kazakhstan/kazakhstan.pdf

138 Eia.gov. (January 7, 2019).

139 Ibid.

gas company, KMG, operates the main oil areas.[140] In its turn, Chevron is the primary private oil producer in Kazakhstan and possesses significant shares in two of the three largest oil fields of Kazakhstan: Tengiz (50%) and Karachaganak (18%). Additionally, Chevron remains the most significant private energy company in the Caspian Pipeline Consortium (CPC). The CPC pipeline deals with the export of crude oil from TCO and Karachaganak.[141]

Figure 9: Kazakhstan's oil production between October 2022-October 2023[142]



KazTransOil (KTO) is the state oil transporter of Kazakhstan. The leading pipeline system operator, KTO, is a subsidiary of KMG. The entire length of the pipelines operated by KTO reaches 3400 miles.[143] Even though the oil industry is an essential sector of Kazakhstan, it still suffers from the weak developed pipeline system.[144] Kazakhstan still exports its oil and natural gas resources through pipelines that date back to Soviet times. The main crude oil export pipelines are CPC, Kazakhstan-China, and Uzen-Atyrau-Samara. The economy of Kazakhstan, like all

140 Kaiser & Pulsipher (2007).

141 Eia.gov. (January 7, 2019).

142 https://www.tradingeconomics.com

143 Syzdykov, M., & Ozkan, E. (2019, September). Industry-university collaboration to develop sustainable petroleum engineering program and meet the industry needs in Kazakhstan. In SPE Annual Technical Conference and Exhibition. Society of Petroleum Engineers.

144 Kaiser & Pulsipher (2007).

other countries of the Caspian Sea,[145] is highly dependent on the export of oil resources.[146] Consequently, the fall in oil prices negatively hit the production of oil in Kazakhstan.[147] The Kazakh government had to cut oil production after the drastic reduction of oil prices in the world energy market. The expansion and development of the Kashagan, Tengiz, and Karachaganak oil fields are directly connected with the oil revenue from the export of oil resources,[148] Kazakhstan might have some difficulties with the realization of their expansion unless oil prices get stable.[149]

4.2.2 Oil reserves and prospective oil fields

Kazakhstan's total proven oil resources are estimated at around 30 bb.[150] However, it is expected that the country's oil export potential can notably rise by discovering new oil fields. According to energy experts, offshore areas of Kazakhstan may possess oil resources up to 60–100 bb. The Kashagan field may have up to 35–50 bb of crude oil reserves by itself.[151]

The oil production of Kazakhstan rose significantly from 2004 to 2014. The country produced 59.5 mt of oil in 2004, while the oil output reached 81.8 mt by 2014, shortly before an extreme decline of the oil prices in the world energy market.[152]

62% of Kazakhstan's territory consists of oil and natural gas zones. Fifteen oil fields of the country: Tengiz, Kashagan, Karachaganak, Uzen, Zhetybai, Zhanazhol, Kalamkas, Kenkiyak, Karazhanbas, Kumkol, North Buzachi, Alibekmola, Eastern Prorva, Kenbai, and Korolevskoye contain over 90% of the country's oil reserves. Oil reserves have been discovered in six regions of Kazakhstan, but the western part of

145 Temizel, C., Canbaz, C. H., Palabiyik, Y., Moreno, R., Najy, A. K., Xie, J. & Mukanov, A. (2018, October). An Economical and Technical Analysis of Oil and Gas Resources of Central Asia Under Demand and Supply Dynamics of World Hydrocarbon Production. In SPE Annual Caspian Technical Conference and Exhibition. Society of Petroleum Engineers

146 Pomfret, R. (2005). Kazakhstan's economy since independence: Does the oil boom offer a second chance for sustainable development? Europe-Asia Studies, 57(6), 859-876.

147 Palazuelos, E., & Fernández, R. (2012). Kazakhstan: Oil endowment and oil empowerment. Communist and Post-Communist Studies, 45(1-2), 27-37.

148 Nurseiit, N. A., & Charman, K. (2018). Selection of the optimal way of development for the oil dependent economy of Kazakhstan. Eurasian Journal of Economics and Finance, 6(1), 25–34.

149 Dikkaya, M., & Doyar, B. V. (2017). Causality among oil prices, GDP and exchange rate: evidence from Azerbaijan and Kazakhstan. Bilig, (83), 79–98.

150 International Trade Administration Export Solutions, http://web.archive.org/web/20210406181204/https://www.trade.gov/export-solutions

151 Ibid.

152 Oilprice.com. (July 24, 2016). Kazakhstan moves towards becoming a top 10 oil producer. Retrieved April 26, 2023, from http://web.archive.org/web/20210406183124/https://oilprice.com/energy/crude-oil/kazakhstan-moves-towards-becoming-a-top-10-oil-producer.html

the country is the wealthiest energy province, and it has almost 70% of the entire energy resources of Kazakhstan.[153]

One of the largest oil fields in Kazakhstan is the Tengiz field. The development of the energy reservoir is still going on. It is expected that the expansion will allow an increase in oil production for an extra 260,000 bpd.[678] In July 2016, it was announced that some oil companies, including Chevron, had invested a sizeable capital of $36.8 bn. for realizing development in the Tengiz field.[154]

The wealthiest energy province of Kazakhstan is the Atyrau province. There are 75 fields in the area. The entire amount of reserves is estimated at 930 mt. The Tengiz oil field alone contains 781.1 mt of recoverable resources, while other energy fields possess almost 150 mt of recoverable energy stocks. Over 50% of 150 mt of recoverable resources are interestingly located in two energy fields. The Korolevskoe field contains 55.1 mt oil reserves. Furthermore, there are also 30.9 mt of oil stocks in the Kenbai energy field.[155]

There are many active oil wells in Kazakhstan. Kashagan oil field is one of them. The output was renewed in October 2016 after years of delay. The area produced 31.3 mt of crude oil just between January and April 2020.[156] The Karachaganak oil field is one of the largest energy fields in the West Kazakhstan region. The enormous energy field contains 320 mt of liquid energy reserves and more than 450 bcm of gas stocks.[157]

4.2.3 Production

The country's proven oil resources are estimated between 30–35 bb, while it is believed that the potential oil reserves of Kazakhstan might be three times more than it is calculated. The country possesses 3% of the world's proven recoverable oil resources.[158]

153 Kmgep.kz. Oil and gas sector. (September 2017). Retrieved April 026, 2023, from http://kmgep.kz/eng/about_kazakhstan/oil_and_gas_sector/

154 Kazakhstan – Oil and Gas. (january 7, 2019). retrieved april 26, 2023, from http://web.archive.org/web/20210406184125/https://www.export.gov/apex/article2?id=kazakhstan-oil-and-gas

155 Oilprice.com. (July 24, 2016). Kazakhstan moves towards becoming a top 10 oil producer.

156 Kmgep.kz. Oil and gas sector. (September 2017).

157 Caspiannews.com. (May 30, 2020). Kazakhstan plans to build gas plant at giant Kashagan field. Retrieved April 26, 2023, from http://web.archive.org/web/20210406185149/https://caspiannews.com/news-detail/kazakhstan-plans-to-build-gas-plant-at-giant-kashagan-field-2020-5-30-17/

158 Iclg.com. (May 30, 2020). Oil & Gas Laws and Regulations 2021. Retrieved 26, 2023, from http://web.archive.org/web/20210406185440/https://iclg.com/practice-areas/oil-and-gas-laws-and-regulations/Kazakhstan

There are also some other undiscovered energy offshore fields in Kazakhstan, according to the forecasts of the energy experts.[159] Given that the country has undiscovered energy stocks alongside the proven energy reserves, Kazakhstan's energy production might rise to 17 bt by discovering the new energy fields.[160]

However, the country's energy output declined to 1.65 mbd in 2016 because of tough challenges for the country's energy sector, such as the decline of the prices for crude oil and new energy market conditions. Meanwhile, Kazakhstan's Oil and Gas Ministry announced the expected increase of oil production in the country by 10000 b/d in 2022.[161]

Nevertheless, because of the extreme decline of the oil prices in the world energy market, an agreement between OPEC and non-OPEC countries: Azerbaijan, Bahrain, Bolivia, Brunei, Equatorial Guinea, Kazakhstan, Malaysia, Mexico, Oman, Sudan, and South Sudan about the cutting of oil output in 2016 was signed. Since 2014 oil prices have fallen. Nevertheless, Kazakhstan did not keep its promise to cut its oil production to 20.000 b/d, according to "Diplomat" political magazine.[162]

Kazakhstan's oil future mainly depends on three oil fields: Karachaganak, Kashagan, and Tengiz (See Table 1). The volume from these oil fields produced will equal 60% of Kazakhstan's total oil production if full capacity at these three oil fields is reached.[689] The development in the largest oil fields of the country, Tengiz, and Karachanaganak, which contain almost 50% of the entire oil stocks of Kazakhstan,[690] has been delayed for some years due to some factors.

The expansion at the Tengiz field was started in July 2016, while the Kashagan oil field's development was renewed in October 2016 after many years of delay.[163] The TCO Company has renewed the Tengiz oil field. Initially, it was estimated that the oil production from this field could rise to 260,000 b/d between 2022–2024.[164] The production of oil from the large Kashagan oil field was restarted in the fourth quarter of 2016.[165]

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159 Karnkowski, P. H., & Smabaeva, R. K. (2015, June). Burial and Thermal History of the South Torgay Basin, Kazakhstan. In 77th EAGE Conference and Exhibition 2015 (Vol. 2015, No. 1, pp. 1-5). European Association of Geoscientists & Engineers.

160 Andarova, R. K. (2012). Oil and Gas Sector as The Prepotent Factor of Economic Growth in The Republic of Kazakhstan. Education and Science Without Borders, 4(6), 11.

161 Astanatimes.com. (January 6, 2021). Kazakhstan to increase oil production under OPEC agreement. Retrieved April 26, 2023, from http://web.archive.org/web/20210406185440/https://iclg.com/practice-areas/oil-and-gas-laws-and-regulations/Kazakhstan

162 Thediplomat.com. (April 14, 2017). Kazakhstan breaks oil production cut promise. Retrieved April 26, 2023, from http://web.archive.org/web/20210406194907/https://thediplomat.com/2017/04/kazakhstan-breaks-oil-production-cut-promise/

163 Eia.gov. (January 7, 2019).

164 Ibid.

165 Ibid.

Table 1: Kazakhstan major oil and gas fields[166]

Field name	Companies	Start year	Liquids production	Natural gas production
Tengiz (& Korolev)	Chevron, ExxonMobil, KazMunaiGaz, LukArco (Lukoil and BP)	1991	570,000 thousand bbl/d total liquids production in 2016 Expansion project to add 260,000 b/d of crude production beginning in 2022	274 Bcf drymarketed gas production in 2013
Karachaganak	BG, Eni, Chevron, Lukoil, KazMunaiGaz	1984	206,000 b/d total liquids production in 2016 An expansion project is under consideration, but potential production volumes are uncertain	About 300 Bcf wet marketed gas production in 2016
Kashagan	KazMunaiGaz, Eni, ExxonMobil, Shell, Total, China National Petroleum Corporation, Inpex	2016	370,000 b/d liquids processing capacity with current development	Over 100 Bcf gas production capacity

Source: U.S. Energy Information Administration based on data from TengizChevroil, Chevron, Karachaganak Petroleum Operating (KPO), and Eni

According to Trading Economics, Kazakhstan's crude oil output between 1994 and 2020 averaged 1113.53 BBL/D/1K. The highest production was in February 2020, with a volume of 1976BBL/D/1K, while the lowest 407 BBL/D/1K was observed in November 1995.

The production of crude oil in Kazakhstan was estimated as 1787 BBL/D/1K in September 2023. Even though oil production in the world suffered enormously starting in February 2020 because of the pandemic, Kazakhstan's oil production did not decrease very much during this period. However, as the figure clearly illustrates, production before the pandemic in the beginning of 2020 was relatively higher than the production by the end of the same year.[167]

Nevertheless, according to the Energy Minster of the country, the oil production has a good potential to rise to the level of 130,000 bpd in the near future and the oil production in Kazakhstan will achieve its natural production capacity.[168] Since Kazakhstan is undoubtedly rich in hydrocarbons, the rise of this country's production is a realistic scenario, especially taking into account gigantic energy fields, such as Kashagan, Tengiz, and Karachaganak.

4.2.4 Export

Kazakhstan has announced its decision to extend its additional voluntary cut of 82 thousand b/d for the second quarter of 2024, aligning with certain OPEC+ participating countries. This extension will maintain Kazakhstan's production at

166 https://www.eia.gov

167 Tradingeconomics.com. (December 1, 2020). Kazakhstan Crude Oil Production. Retrieved April 26, 2023, from http://web.archive.org/web/20210406195542/https://tradingeconomics.com/kazakhstan/crude-oil-production

168 Astanatimes.com. (April 3, 2021). Kazakhstan will continue to increase oil production under OPEC+ agreement. Retrieved April 26, 2023, from http://web.archive.org/web/20210406215119/https://astanatimes.com/2021/04/kazakhstan-will-continue-to-increase-oil-production-under-opec-agreement/

1,468 mb/d until the conclusion of June 2024. Following this period, Kazakhstan intends to gradually restore these additional cut volumes, contingent upon market conditions, with the aim of bolstering market stability.[169] As a rule, the lion's crude oil share is shipped to the European oil markets (see Figure 10).[170]

Suppose plans to build a new "Silk Road" are successful. In that case, the export of Kazakhstan's oil to Europe can be realized without the payment of additional export fees to Russia for the passage of oil through the RF's territory. In its turn, Europe will also profit from this project significantly. The realization of the project would play a vital role in the diversification of the energy sources for Europe.[171]

Even though crude oil export of Kazakhstan by destinations statistics provided by EIA belongs to 2017, the statistics of oil export destinations are almost the same with identical percentage proportions. Consequently, it can acknowledge the oil export destinations for Kazakhstan's oil. For instance, according to provided statistics, China is the largest energy consumer in the world energy market, and Beijing is one of Astana's most remarkable energy partners, which ships nearly 5% of its crude oil to China through the pipeline route.[172] Kazakhstan exports its natural resources to China via the Sino-Kazakhstan and the China-Central Asia gas pipelines.[173]

Kazakhstan exports crude oil from Western Kazakhstan to the Dushanzi refinery of China, located in the Xinjiang Province of China, through the Kazakhstan-China pipeline. The length of the Kazakh-China pipeline is 2798 km, while its diameter reaches 813 mm. The volume of exported crude oil via this pipeline was initially defined as 10 mt/a reached still in January of 2011.[174]

169 Gov.kz. (March 3, 2024). Kazakhstan will extend an additional voluntary production cut of 82 thousand barrels per day into the second quarter of 2024, Retrieved March 12, 2024, from https://www.gov.kz/memleket/entities/energo/press/news/details/718873?lang=en

170 Eia.gov. (January 7, 2019).

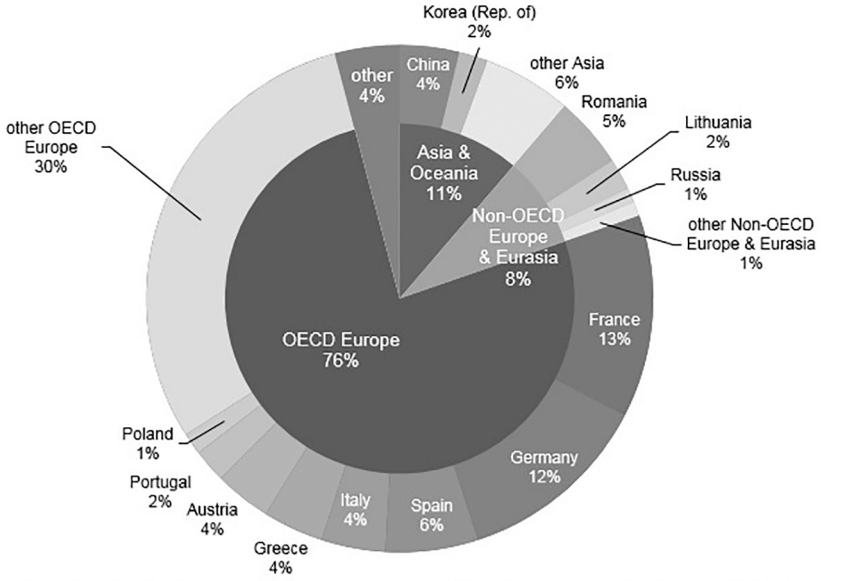
171 Kassenova, N. (2017). China's Silk Road and Kazakhstan's Bright Path: Linking Dreams of Prosperity. Asia Policy, 24(1), 110–116.

172 Eia.gov. (January 7, 2019).

173 Xuanli Liao, J. (2019). China's energy diplomacy towards Central Asia and the implications on its "belt and road initiative". The Pacific Review, 1–33.

174 Hydrocarbons-technology.com. (April 3, 2017). Kazakhstan-China crude oil pipeline. Retrieved April 26, 2023, from http://web.archive.org/web/20210406220005/https://www.hydrocarbons-technology.com/projects/kazakhstan-china-crude-oil-pipeline/

Figure 10: Kazakhstan crude oil exports by destination[175]



The Chinese CNPC and KMG built the pipeline in collaboration.[176] The entire expenditure for constructing the Kazakhstan-China pipeline reached almost $3bn. The building of the pipeline was initially planned in three segments and two phases.[177]

The project was inked in 1997, while the first section of the project finished in 2003 includes the area from Aktobe to Atyrau. The crude oil was extracted from the oil fields in Aktobe. The pipeline building had areas from Atasu to Alashankou.[178] The construction began in September 2004 and finished in December of 2005.[179] Therefore, the building of the Kenkiyak–Kumkol part of the pipeline started in December 2007 and finished in July of 2009.[180]

175 https://www.eia.gov

176 Rakhmetova, K. Kazakhstan-China Oil Pipeline Project. Energy Charter, http://www.energycharter.org/fileadmin/DocumentsMedia/Presentations/CBP-KZ-CN.pdf 7, 100.

177 https://www.hydrocarbons-technology.com, (April 3, 2017).

178 Gulomova, L. (2001). The prospects and perils of the Kazakhstan-China pipeline route. Caspian Brief, (19), 3.

179 Rabinowitz, P. D., Yusifov, M. Z., Arnoldi, J., & Hakim, E. (2004). Geology, oil and gas potential, pipelines, and the geopolitics of the Caspian Sea Region. Ocean Development & International Law, 35(1), 19-40.

180 https://www.hydrocarbons-technology.com, (April 3, 2017).

The country also exports a modest amount of natural gas to China. The trade agreement was signed between Kazakhstan and China in Beijing in October 2017. The agreement stipulates that Kazakhstan should export to China 5 bcm/a natural gas due to this agreement. Two energy companies KazTransGas (KTG) and CNPC, took part in the singing of the contract. It is expected that the profit from the export of natural gas will be nearly $1 bn. The gas is extracted in western Kazakhstan and transported to China through the Khorgos border point, the leading trade border between China and Kazakhstan.[181] According to Petro China West Pipeline Company, it exported more than 10.88 mt of crude oil still in 2019.[182]

The oil reserves of Kazakhstan are additionally transported through the Caspian Sea (see Map 9). Moreover, Kazakhstan ships a small volume of its crude oil through the railway. Consequently, oil resources are transported from the Aktau or Atyrau ports across the Caspian Sea to BTC or Baku-Novorossiysk for further export, primarily to Europe.[183]

Kazakhstan also delivered crude oil to Iran, namely to Iran's port Neka in the past. The exported oil is refined in Tehran and Tabriz, and the refined oil was later consumed in the North of Iran. In its turn, Iran exported the same volume of crude oil from the Persian Gulf to Kazakhstan. A so-called "swap arrangement" was canceled because of sanctions against Iran established by the international community. Some meetings between Iran and Kazakhstan have been taking place since 2013 to restore the arrangement. However, there have not been any positive results yet.[184]

Due to the agreement between the OPEC and non-OPEC countries, Astana agreed to cut its oil production until April 2018. Therefore, according to the Kazakh First Deputy Prime Minister and Minister of Finance, in 2020, the established oil price in budget planning was $20 p/b considering the actual low oil prices in the energy market.[185]

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181 Thestatesman.com. (October 4, 2017). Kazakhstan to start exporting gas to China on October 15. Retrieved April 26, 2023, from http://web.archive.org/web/20210406222202/https://www.thestatesman.com/world/kazakhstan-start-exporting-gas-china-october-15-1502504786.html

182 Hellenicshippingnews.com. (January 10, 2019). China-Kazakhstan oil pipeline transports 10.88 mln tonnes in 2019. Retrieved April 26, 2023, from http://web.archive.org/web/20210406221655/https://www.hellenicshippingnews.com/china-kazakhstan-oil-pipeline-transports-10-88-mln-tonnes-in-2019/

183 Eia.gov. (January 7, 2019).

184 Eia.gov. (January 7, 2019).

185 Astanatimes.com. (May 14, 2020). Oil price plunge may bring Kazakh GDP down 2.7 percent. Retrieved April 26, 2023, from http://web.archive.org/web/20210406223120/https://astanatimes.com/2020/05/oil-price-plunge-may-bring-kazakh-gdp-down-2-7-percent/

Kazakhstan's oil export products are light and sweet crude oil, while the most exported oil is the CPC Blend that is a somewhat very light, sweet crude oil. Almost 60% of the CPC blend oil is extracted from the Tengiz field.[186]

Map 9: The major crude oil pipelines of Kazakhstan[187]

4.2.5 Natural gas production

In contrast to its substantial oil reserves, Kazakhstan does not have significant natural gas reserves like Russia, Turkmenistan, and Iran. According to the Ministry of Energy of Kazakhstan, the proven natural gas capacity of the country for 2023 is 3 tcm.[188] Due to the Ministry of Energy of Kazakhstan, the country comes 22nd in the list of the largest natural gas countries globally, and it is the third natural gas richest country in the post-Soviet region.[189]

The natural gas sector in Kazakhstan is in the stage of its development. The gas sector is more modest in comparison to its gigantic oil sector. Nevertheless, it has started showing significant growth since 2017. For instance, if the produced natural gas volume was 19.0 bcm in 2015, this indicator reached 19.9 bcm and increased by 4.5% within two years.[190]

186 Eia.gov. (January 7, 2019).

187 https://www.eia.gov

188 Carnegieendowment.org. (March 13, 2024). Is Putin about to get his gas union with Kazakhstan and Uzbekistan? Retrieved March 12, 2024, from https://carnegieendowment.org/politika/89256

189 Parkhomchik, L. (2016). Natural gas industry of Kazakhstan: Key features and future prospects.

190 Thediplomat.com. (June 15, 2017). Energy in Central Asia: Who has what? Retrieved April 26, 2023, from http://web.archive.org/web/20210406222602/https://thediplomat.com/2017/06/energy-in-central-asia-who-has-what/

Consequently, the gas output continuously increases from year to year. In its turn, the US EIA reports the rise of natural gas output in Kazakhstan has doubled from 2005 to 2015. Therefore, if the production volume was estimated at 0.8 tcf in 2005, 1.5 tcf was extracted in 2015.[191] The lion's share of Kazakh natural gas is transported to Russia[192] through the pipeline, and a relatively modest amount is exported to China.[193]

The Karachaganak and Tengiz fields are not only the largest oil fields of Kazakhstan, but these energy fields also contain a significant volume of natural gas.[194] The lion's share of Kazakhstan's natural gas resources is also extracted from these two energy fields.[195]

The main share of the extracted natural gas is reinjected into oil fields to increase oil production.[196] As the central part of the extracted natural gas from Tengiz and Kashagan is high in sulfur, for this reason, the gas production entails an appropriate approach, and output is relatively expensive.[197] Since production from the Kashagan energy field was delayed because of some technical problems, natural gas extraction declined significantly. However, the output from this field was renewed in October 2016.[198] It is believed that the gas production capacity of the energy field might grow up to 100 bcf/a. The produced volume will be used for the country's domestic consumption.[199]

30% of the natural gas is produced for domestic consumption. The following 30% is used for export, while another 30% is serviced to increase crude oil production by reinstalling natural gas with reservoir pressure in the fields. Kazakhstan's Energy Minister predicted the stagnation and even a decrease in natural gas production

191 Eia.gov. (January 7, 2019).

192 Zhang, Q., Li, Z., Wang, G., & Li, H. (2016). Study on the impacts of natural gas supply cost on gas flow and infrastructure deployment in China. Applied Energy, 162, 1385–1398.

193 Kassenova (2017).

194 Ibid.

195 Badykova, N. (2015). Karachaganak and Kazakhstan's oil policy. Karachaganak and Kazakhstan's Oil Policy.

196 Ybray, D., Galiyeva, G., & Ibragimov, F. (2011, September). Raw Gas Injection Principles and Challenges in Kashagan Field. In Atyrau 2011-First EAGE Caspian Region Workshop (pp. cp-260). European Association of Geoscientists & Engineers.

197 Abou-Sayed, A. S., Zaki, K., & Summers, C. (2004, January). Management of Sour Gas by Underground Injection-Assessment, Challenges and Recommendations. In SPE International Conference on Health, Safety, and Environment in Oil and Gas Exploration and Production. Society of Petroleum Engineers.

198 Meidan, M. (2016). China's loans for oil: asset or liability?.

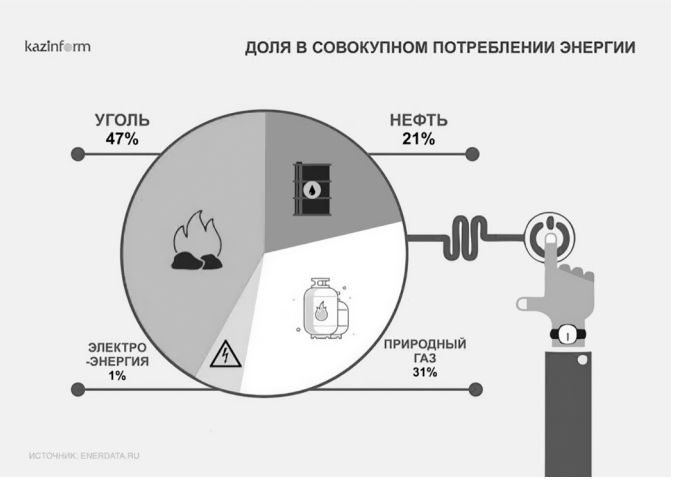
199 Eia.gov. (January 7, 2019).

starting from 2025.[200] However, the Kazakh government announced in 2019 that the country did not expect a significant decrease in natural gas production.[201]

Kazakhstan received almost €294 million from the European Bank for Reconstruction and Development (EBRD) for two domestic projects to increase natural gas production in the country. The Kazakh government took some steps to decrease coal consumption in the country by developing the natural gas sector because its output is relatively cleaner than coal production.[202]

Kazakhstan got another €52 million from EBRD to realize an important project for natural gas infrastructure. KazTransGas-Aimak did the project to expand and upgrade the distribution network of natural gas in many regions of Kazakhstan.[203] Coal accounts for the highest energy consumption in Kazakhstan, at 47%. Natural gas is second, with 31%, followed by oil and electroenergy, with 21% and 1%, respectively (See Figure 11).

Figure 11: Share of natural gas usage in energy consumption.[204]



200 Ibid.

201 Pirani, S. (2019). Central Asian Gas: prospects for the 2020s.

202 Erbd.com. (May 26, 2016). EBRD finances natural gas storage and distribution in Kazakhstan. Retrieved April 26, 2023, from http://web.archive.org/web/20210406224237/https://www.ebrd.com/news/2016/ebrd-finances-natural-gas-storage-and-distribution-in-kazakhstan.html

203 Erbd.com. (May 26, 2016).

204 https://www.inform.kz

4.2.6 Natural gas pipelines

There are two main domestic natural gas networks in Kazakhstan. One of these networks functions in the west of the country and serves the production fields, while another system is located in the south of Kazakhstan.[205] The main domestic pipeline is the Bukhara-Tashkent-Bishkek-Almaty (BTBA) pipeline that delivers natural gas for domestic consumption to the south of the country (see Map 10).[206]

There were no internal natural gas pipelines to transport gas from the natural gas-rich west of Kazakhstan's country and industrial regions. Therefore, the Kazakh government had to import natural gas from Uzbekistan through the BTBA pipeline to supply the south of the country with natural gas. The pipe's operator is the state natural gas company of the country KTG that is a subsidiary of KMG.[207]

The Kazakh government accomplished constructing the Beineu-Bozoy gas pipeline (311 km long in 2022, which belongs to the Beineu-Shymkent gas pipeline system. The Beineu-Shymkent pipeline has a length of 1477 km. The pipeline supplies gas from the west to the south of the country. It is the most significant natural gas pipeline in the country's energy history, and its role is enormous in providing natural gas to the south of Kazakhstan.[208]

From the west of the country, natural gas extracted is transported via the Beineu-Bozoi-Shymkent (BBS) pipeline to the southeast of Kazakhstan, where it connects with the Kazakhstan-China pipeline that is a Lot 1 of the substantial Turkmenistan-Uzbekistan-Kazakhstan-China trunk pipeline. The entire length of the pipe is 7500 km.[209]

The Central Asia Centre (CAC) pipeline transports natural gas from West Kazakhstan to Russia and further to the west. In its turn, the Turkmenistan–China natural gas pipeline crosses the south of the country and transports natural gas to China.[210] Both pipes transport the gas through Turkmenistan and Uzbekistan, and both of them are the pipelines for the regional Caspian export infrastructure.[211]

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205 Karatayev, M., & Clarke, M. L. (2016). A review of current energy systems and green energy potential in Kazakhstan. Renewable and Sustainable Energy Reviews, 55, 491-504.

206 Eia.gov. (January 7, 2019).

207 Sahib, H. M. B. A Concise Interpretive Analysis of Us–Kazakhstan Relations.

208 Kaztransgaz.kz. (May 26, 2020). Gas pipeline system of Kazakhstan is recognized as the best in the Central Asia. Retrieved April 26, 2023, from http://web.archive.org/save/https://www.kaztransgas.kz/index.php/en/press-center/press-releases/978-gas-pipeline-system-of-kazakhstan-is-recognized-as-the-best-in-the-central-asia

209 Pirani (2019).

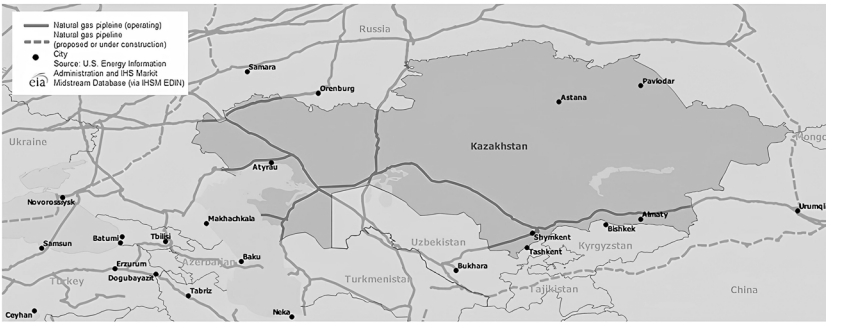
210 Yenikeyeff, S. M. (2011). Energy Interests of the 'Great Powers' in Central Asia: Cooperation or Conflict? The International Spectator, 46(3), 61-78.

211 Kolb, R. W. (2014). The natural gas revolution and Central Asia. In Perspectives on energy risk (pp. 71-87). Springer, Berlin, Heidelberg.

Besides, CAC transports natural gas to the West of Kazakhstan used for domestic consumption within the country.[212] The pipeline connects with CNPC's Second West-East Pipeline in the northwest of China, located in the Xinjiang province on the border with Kazakhstan.[213]

The most crucial reason for Kazakhstan's modest natural gas consumption is a very weak-developed natural gas infrastructure. Only 15 energy fields in Kazakhstan were connected to Gas-supply Unique System (GUS). Consequently, there were no gas pipelines in the four provinces of Kazakhstan at all. According to the Ministry of Energy of Kazakhstan's report for 2015, only 43% of Kazakhstan's population had access to natural gas.[214]

Map 10: The major natural gas pipelines of Kazakhstan[215]



Four provinces of Kazakhstan-Kyzylorda, Southern Kazakhstan, Zhambyl, and Almaty had a problem with the undeveloped natural gas infrastructure and no access to the natural gas system. Therefore, the south of the country met its natural gas demand by importing natural gas from Turkmenistan and Uzbekistan. However, the situation changed after the last stage of the newly constructed BBS was finished.[216] The construction of the last phase of the pipeline made it possible to provide natural gas to the south of the country. The constructed BBS reduced the blue fuel dependency of the country from Turkmenistan, and Uzbekistan exported natural gas.[217]

The construction of the pipeline solved the natural gas problem in the south of the country. The pipeline made it possible to connect the natural gas fields with the

212 Eia.gov. (January 7, 2019).
213 Chen & Fazilov (2018).
214 Eia.gov. (January 7, 2019).
215 https://www.eia.gov
216 Ibid.
217 Ibid.

natural gas infrastructure located in the northwest. Moreover, the completion of the construction allowed the transporting of natural gas from Kazakhstan to China.[218] The compressor stations on the third line of the Kazakhstan-China pipeline were constructed to export blue fuel to China. It is expected to ship almost 30 bcm/a gas from Turkmenistan, Uzbekistan, and Kazakhstan.[219]

Kazakhstan signed a contract with Russia to import about 5000 metric tons of liquefied natural gas (LNG) from Russia in 2017.[220] According to the signed agreement, Russia exports the contracted volume of natural gas to Astana and the north of the country.

4.3 Turkmenistan

Turkmenistan is extremely rich in natural gas. It is believed that the Pliocene and Miocene complexes in the southwestern part of Turkmenistan contain a significant amount of energy stocks. There are 300 potential oil and gas fields in the country ready for deep drilling, according to the chair of the state corporation, Turkmengeology, Shahim Abdrakhmanov.[221]

4.3.1 Oil sector

In contrast to its tremendous natural gas reserves, Turkmenistan also possesses modest oil reserves. Since Turkmenistan is a closed country ruled by an authoritarian regime, it is difficult to find verified information on its oil and gas reserves. Nevertheless, according to BP Statistical Review of World Energy 2020, the country's proven oil resources for 2020 were estimated at 600 million barrels (mb).[222] Furthermore, as of the last update in January 2022, according to the Oil and Gas Journal, Turkmenistan has proven oil reserves estimated at around 600 mb.[223]

218 Eurasianet.org. (March 24, 2021). Can Central Asian gas exporters rely on China? Retrieved April 26, 2023, from http://web.archive.org/web/20210406015323/https://eurasianet.org/analysis-can-central-asian-gas-exporters-rely-on-china

219 Parkhomchik (2015).

220 Eia.gov. (January 7, 2019).

221 Azernews.az. (November 6, 2017). New promising oil and gas structures discovered in Turkmenistan. Retrieved April 26, 2023, from http://web.archive.org/web/20210406225214/https://www.azernews.az/region/121747.html

222 Trade.gov. (October 15, 2020). Turkmenistan – Country Commercial Guide. Retrieved April 27, 2023, from http://web.archive.org/web/20210116165644/https://www.trade.gov/country-commercial-guides/turkmenistan-oil-gas

223 EIA.gov. (2022, January 22). U.S. Energy Information Administration – EIA – independent statistics and analysis. Retrieved March 26, 2024, from https://www.eia.gov/international/overview/country/TKM

Turkmennebit is the national oil company of Turkmenistan and extracts the lion's share of the country's oil.

A weakly developed infrastructure characterizes the oil sector of Turkmenistan. International oil companies are not interested in actively developing the country's oil sector because of the need for sufficient oil pipelines in Turkmenistan. Another issue that stands in the way of the growth of the oil sector in Turkmenistan is the Turkmenistan government's uncooperative attitude towards international energy companies.[224]

However, a few international companies are involved in the energy sector of the country. For instance, companies like CNCP (China), Dragon Oil (Dubai), Eni (Italy), and Petronas (Malaysia) are involved in Turkmenistan's energy sector. The Italian oil and natural gas company Eni is one of Turkmenistan's two largest energy companies. An agreement was signed between Eni and the Turkmen government in 2014. According to this deal, the PSA with regard to the Nebit Dag area was extended until 2032.[225]

The country's main oil fields are the Koturdepe, the Nebitdag, and the Chekelen fields located near the Caspian Sea. Chekelen field became the first oil of Turkmenistan explored in 1909. Other significant oil fields explored in Turkmenistan are the Nebitdag, the Kumdag, and the Koturdepe fields in 1930, 1948, and 1959.[226]

Turkmenistan possesses two oil refineries. One of them is located in Turkmenbashy, while another refinery is in Seydi, in the Lebap province of Turkmenistan. The Turkmenbashy refinery can refine up to 7.5 mt of oil annually. Moreover, this refinery produces unleaded gasoline, petroleum coke, road bitumen, laundry detergent, diesel, and lube oil. The refinery products are shipped primarily to Russia, China, Iran, Afghanistan, Turkey, Pakistan, Tajikistan, and Japan.[227] $900 million has been invested to increase the refining capacity in the country.[228]

There is also a modest domestic crude oil pipeline in Turkmenistan. Crude oil extracted from the onshore oil fields of Turkmenistan is transported via this pipeline to the Turkmenbashi refinery and Turkmenistan ports located in the Caspian Sea.[229] There are no international oil pipelines in the country. Nevertheless, the pipe, which

224 Hays, J. Oil and energy in Turkmenistan. (April 2016). Retrieved April 27, 2023, from htt p://factsanddetails.com/central-asia/turkmenistan/sub8_7d/entry-4836.html

225 Hays (April 2016).

226 Ibid.

227 Export.gov. (July 21, 2019). Turkmenistan – Oil and natural gas refining. Retrieved April 27, 2023, from http://web.archive.org/web/20210407083054/https://www.export.gov/apex/article2?id=Turkmenistan-Oil-and-Natural-Gas-Refining

228 Ibid.

229 Olcott, M. B. (2004). International Gas Trade in Central Asia: Turkmenistan, Iran, Russia and Afghanistan.

lies between the Seidi refinery in Turkmenistan and the Shymkent refinery in Kazakhstan and passes through Uzbekistan, is an exception.[230]

Turkmenistan was participating in a "swap oil deal" with its neighboring countries. The "oil swap" agreement with Iran was one of them. According to the deal, Turkmenistan transported oil via tankers to Iranian refineries and even further to other customers. The shipped oil was consumed in the northern part of Iran and Tehran. Turkmenistan exported its oil reserves to the growing Asian energy market via Iran thanks to the swap oil arrangement between the two countries.[231] However, the economic sanctions against Iran made a "swap deal" between Turkmenistan and Iran impossible. Another positive side of the swap deal was that the countries could realize the swamp deal without having pipelines for the export of Turkmen oil resources. There was almost a similar swap oil deal with Russia.[232]

The volume of consumed oil is not so high, as in other countries of the Caspian Sea, because of its relatively small Turkmenistan population. The country consumes 60% of its production volume.[233] According to CEIC, Turkmenistan consumed 150.000 b/d in Dec 2021, while the country's oil consumption for December 2022 was by 154.000 b/d. The oil consumption from December 1985 to 2022 averaged to 105.500b/d. The highest point of oil consumption with 154.000 b/d in Turkmenistan was in 2019, while the lowest was in 1995 with 54.80 b/d.[234]

148.819BBL/D/1K of crude oil was produced in Turkmenistan in 2018, while the production of crude oil was at 162.575 BBL/D/1Kin 2019.[235] The crude oil production reached its peak in 2015 and decreased slightly in the next four years. However, 2020 was one of the most productive years for Turkmenistan's oil production (see Figure 12).[236]

The Turkmen government is interested in exporting its oil production through the BTC pipeline despite its modest oil reserves. According to the head of the Marketing and Economic Operations Department at SOCAR, Adnan Ahmadzade, an

230 Atai, F., & Azizi, H. (2012). The Energy Factor in Iran–Turkmenistan Relations. Iranian Studies, 45(6), 745–758.

231 Ibid.

232 Barylski, R. V. (1995). Russia, the West, and the Caspian Energy Hub. The Middle East Journal, 217–232.

233 USA International Business Publications. (2011). Turkmenistan Privatization Programs and Regulations Handbook: Strategic Information and Developments.

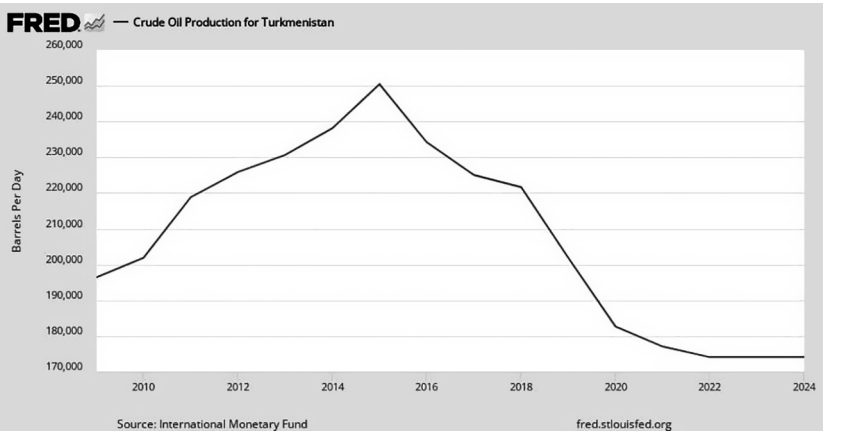
234 Export.gov. (July 21, 2019). Turkmenistan – Oil and natural gas refining. Retrieved April 27, 2023, from http://web.archive.org/web/20210407083054/https://www.export.gov/apex/article2?id=Turkmenistan-Oil-and-Natural-Gas-Refining

235 Tradingeconomics.com. (December 30, 2020). Turkmenistan Crude Oil Production 1994–2020 Data. Retrieved April 27, 2023, from http://web.archive.org/web/20201113062740/https://tradingeconomics.com/turkmenistan/crude-oil-production

236 Ibid.

agreement between Azerbaijani and Turkmen governments was signed. Turkmen oil will be exported via the BTC pipelines due to the deal. The volume of oil is estimated at nearly 3–4 mt that equal 100% of oil export potential for Turkmenistan.[237]

Figure 12: Turkmenistan crude oil production[238]



4.3.2 Natural gas

Turkmenistan is the richest natural gas country in Central Asia and is the fifth most natural gas abundant state in the world. According to Statista, the natural gas reserves are estimated at 13950 bcm for 2023.[239]

The largest natural gas field in Turkmenistan is the Galkynysh field. It is the world's second largest gas field and is crucial to the gas sector of Turkmenistan. It started commercial production in the natural gas field in September 2013.[240] It is expected that the field will produce about 3.3 Tcf/a when all three phases are ready for production.[241]

237 APA.az. (October, 2017). Turkmenistan to resume oil transportation via BTC, Kazakhstan holding negotiations. Retrieved April 27, 2023, from http://web.archive.org/web/20171104223022/http://en.apa.az/azerbaijan_energy_and_industry/turkmenistan-to-resume-oil-transportation-via-btc-kazakhstan-holding-negotiations.html

238 https://www.imf.org

239 Statista.com. (2023, January 24). Leading countries by proved natural gas reserves worldwide in 1960 and 2022. Retrieved March 07, 2024, from https://www.statista.com/statistics/265329/countries-with-the-largest-natural-gas-reserves/

240 Ibid.

241 Aydin, U. Southern Gas Corridor: The Importance of Turkmen Natural Gas1.

Even though Turkmenistan, in 2015, exported more natural gas than other countries of the Caspian Sea, Turkmenistan is still going to increase its oil production mainly through this field.[242]

Turkmenistan also possesses some other significant natural gas fields besides Galkynysh. For instance, there are the Garakel and Bagli fields located close to the Galkynysh reservoir. Generally, the natural gas richest regions of Turkmenistan are located in the southeast and south of the country and in Turkmenistan's part of the Caspian Sea.[243]

A natural gas export through pipelines is the only way to export Turkmen gas because of its landlocked geographical position. Consequently, there are three significant natural gas export routes in Turkmenistan. If a natural gas export to Russia is realized through Central Asia – Center (CAS), while via Central Asia – China Pipeline (CACP) is shipped natural gas to China. In their turns, Korpedzhe-Kurt Kui (KKK) and Dauletabad-Sarakhs-Khangiran (DSKP) pipelines deliver natural gas to Iran.[244]

A pipeline for exporting natural gas from the second-largest natural gas field in the world to the West, for increasing the volume of transported natural gas to China, and probably for exporting gas to Pakistan and India in the future was finished in December 2015. Thus, the East-West pipeline was constructed to create a connection between the Galkynysh and other eastern energy fields of Turkmenistan. The pipeline cost $2.5 bn. The length of the pipe connecting the Galkynysh field and the East of the country is 773 km, with an export capacity of 30 bcm/a. The pipeline makes it possible to export gas to Azerbaijan and, further on, to Europe.[245]

Taking into account its tremendous natural gas reserves, Turkmenistan might be a significant natural gas source[246] not only for the growing Asian natural gas market[247] but also for European countries as well, so the EU states could decrease their

242 Vepayev, A., & Deniz, O. (2020). Production and Consumption Trends of Natural Gas of Turkmenistan the Years from 2009 to 2019. Journal of Scientific Perspectives, 4(4), 237–244.

243 Eia.gov. (July 2016). Turkmenistan. Retrieved April 27, 2023, from http://web.archive.org/web/20210318055301if_/https://www.eia.gov/international/analysis/country/tkm

244 Azernews.az. (June 1, 2017). Turkmenistan seeks to supply more gas to China in 2017. Retrieved April 27, 2023, from http://web.archive.org/web/20180825144551/https://www.azernews.az/region/114065.html

245 Reuters.com. (December 23, 2015). Turkmenistan boosts gas export capacity with East-West link. Retrieved April 27, 2023, from http://web.archive.org/web/20210309204105if_/https://www.reuters.com/article/turkmenistan-pipeline/turkmenistan-boosts-gas-export-capacity-with-east-west-link-idusl8n14c0gt20151223

246 Jakóbowski, J., & Marszewski, M. (2018). Crisis in Turkmenistan A test for China's policy in the region. OSW Commentary, 31.

247 Stronski, P. (2017). Turkmenistan at twenty-five: The high price of authoritarianism. Carniege Endowment for International Peace.

natural gas dependency on Russia[248] significantly through transporting gas from Turkmenistan.[249]

The TAPI natural gas project is a potential grand project to export natural gas from Turkmenistan to Afghanistan, Pakistan, and India.[250] However, even though the TAPI natural gas project has been discussed for many years, this project exists only on paper because of financial and security barriers.[251]

Iran and TAPI projects are alternative routes to export Turkmenistan's gas. However, it is unlikely that any of these routes will be used soon. It means that Turkmenistan's dependence on China will increase further as the only available significant export source.[252] In May 2023, Turkmenistan exported 2.73 bcm of natural gas to China, marking a 5% increase compared to the same period in the previous year. This information was obtained from the customs of the People's Republic of China, as reported by the Interfax news agency.[253]

Despite the growing natural gas demand of Europe and Turkmenistan's need to export its natural gas resources, it is unlikely that the Trans Caspian Pipeline (TCP) project will be built soon. The main obstacle is Russia's unwillingness.[254] Russia sees Turkmenistan's natural gas potential export to Europe as a significant challenge to the Kremlin's energy interests in Europe, while the natural gas export to Afghanistan, Pakistan, and India does not have any significant impact on Russian energy interests.[255]

248 Aminjonov, F. (2018). Central Asian gas exports dependency: Swapping Russian patronage for Chinese. The RUSI Journal, 163(2), 66-77.

249 Lee, Y. (2017). Interdependence, issue importance, and the 2009 Russia-Ukraine gas conflict. Energy Policy, 102, 199–209.

250 Anceschi, L. (2017). Turkmenistan and the virtual politics of Eurasian energy: The case of the TAPI pipeline project. Central Asian Survey, 36(4), 409–429.

251 Rejepova, T. (2013). Turkmenistan and Afghanistan sign agreement over TAPI gas pipeline. The Central Asia-Caucasus Analyst, 7

252 Zhao, Y., Liu, X., Wang, S., & Ge, Y. (2019). Energy relations between China and the countries along the Belt and Road: An analysis of the distribution of energy resources and interdependence relationships. Renewable and Sustainable Energy Reviews, 107, 133–144.

253 Orient.tm. (2023, July 21). Turkmenistan increased natural gas supplies to China by 5%. Retrieved March 08, 2024, from https://orient.tm/en/old/post/57377/turkmenistan-increased-natural-gas-supplies-china-5-may

254 Shlapentokh, D. (2017). Turkmenistan's Gas Export Dilemma. Central Asian Caucasus Analyst.

255 Naturalgasworld.com. (December 16, 2015). Turkmenistan: The diversification of gas export. Retrieved April 27, 2023, from http://web.archive.org/web/20210122104840/https://www.naturalgasworld.com/turkmenistan-the-diversification-of-gas-export-market-27160

4.3.3 China as the primary natural gas importer for Turkmenistan

Energy relations with China are essential for Turkmenistan. An agreement was signed between the Turkmen and Chinese governments in June 2007 to construct a pipeline exporting natural gas from Turkmenistan to China. Expanding the existing pipeline running via Russia and Kazakhstan was possible. However, the president of Turkmenistan did not sign an agreement concerning the expansion of the pipe.[256]

Turkmen natural gas is supplied through CACP to China, crossing the neighboring countries, Uzbekistan and Kazakhstan. The pipeline includes four lines. The export capacity of the pipeline is estimated at 25 bcm/a. The pipeline started to function in May 2014. The export volume to China should have reached 85 bcm/a according to the multilateral agreement signed between China and Central Asian countries. Therefore, it is expected that Turkmenistan will meet 65 bcm of the project's total export volume by 2020.[257] However, Turkmenistan exported only 30 bcm in 2019. The pandemic situation in the world also influenced the export of natural gas to China negatively.[258]

The operation of the CACP started in 2009. The natural gas export to China was only 4 bcm/a in 2010, while the export volume reached about 30 bcm/a by 2015. As a result, China's imported natural gas average price declined significantly, so the average price for blue fuel dropped from $160 to $100.[259] One of the crucial reasons for the decline is that China does not have any concurrency in importing Turkmen gas.

Moreover, as China is the only largest natural gas importer, and there are no other consumers, creating the CACP's prospective D line does not seem realistic.[260] Additionally, another proposed gigantic natural gas project, TAPI, will not be realized soon because of its numerous challenges.[261] Consequently, even though Turkmenistan possesses sizeable natural gas reserves, the country is unlikely to become one of the world's leading natural gas exporters.

In case the proposed D pipeline is realized, an export of nearly 30 bcm/y of natural gas from Turkmenistan to West China through Uzbekistan, Tajikistan, and

256 Shlapentokh, D. (2017).

257 Naturalgasworld.com. (December 16, 2015).

258 Fpri.org. (2020, June 16).

259 Engp.ro. (August 14, 2017). Turkmenistan's gas hurdles: No end in sight. Retrieved April 27, 2023, from http://web.archive.org/web/20201024111129/https://www.enpg.ro/turkmenistans-gas-hurdles-no-end-in-sight/

260 Da Silva, V. B. (2021). Broken Dreams in Ashkabad: An Overview of Turkmenistan's Post-Independence Political Contradictions and the Challenges of Central Asian Migrants in Russia. Eurasian Research Journal, 3(1), 63-79.

261 Pradhan, S. K. (2020). Pipelines: Challenges Many, Progress Slow. In India's Quest for Energy Through Oil and Natural Gas (pp. 151-174). Springer, Singapore.

Kyrgyzstan to China[262] would have made it one of the most significant natural gas projects in the world.[263] However, China and Uzbekistan postponed the discussions on the construction of the pipeline. Lines A, B, and C transport natural gas from Turkmenistan to China. The D line is supposed to cross the other Central Asian states, Tajikistan and Kyrgyzstan, before reaching China's territory.[264]

There are some disagreements between Kyrgyzstan, Tajikistan, and China's energy companies concerning the project's route. According to the deal, the participating Central Asian countries should not get any natural gas. However, they would profit financially from the project. In its turn, Uzbekistan's part of the D line's construction is also delayed because of the disagreement between Uzbekistan's state energy corporation and CNPC.[265]

China also backs Turkmenistan in developing appropriate energy infrastructure in the country. Thus, the natural gas is shipped to China by the Turkmen government to pay off loans.[266] Turkmenistan became one of the two largest natural gas supplier countries for China by 2021 (see Figure 13).

Back in 2013, BMI Research looked at the role that Turkmenistan could play as a major gas supplier for China, forecasting that the exported volume will reach 283 bcm/a by 2020.[267] The forecasts did not come true. Considering the current situation of the country's natural gas sector, Turkmenistan has to look for some alternative export sources.[268] Otherwise, an export dependency of Turkmenistan from China will grow enormously.[269]

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262 Vakulchuk, R., & Overland, I. (2019). China's Belt and Road Initiative through the lens of Central Asia. In Regional Connection under the Belt and Road Initiative. Taylor & Francis.

263 Batsaikhan, U., & Dabrowski, M. (2017). Central Asia—twenty-five years after the breakup of the USSR. Russian Journal of Economics, 3(3), 296–320.

264 Rferl.org. (March 06, 2017). The end of the (gas pipe-)line for Turkmenistan. Retrieved April 27, 2023, from http://web.archive.org/web/20210321133733/https://www.rferl.org/a/turkmenistan-gas-pipeline-china-berdymukhammedov-iran-russia/28353522.html

265 Rferl.org. (March 06, 2017).

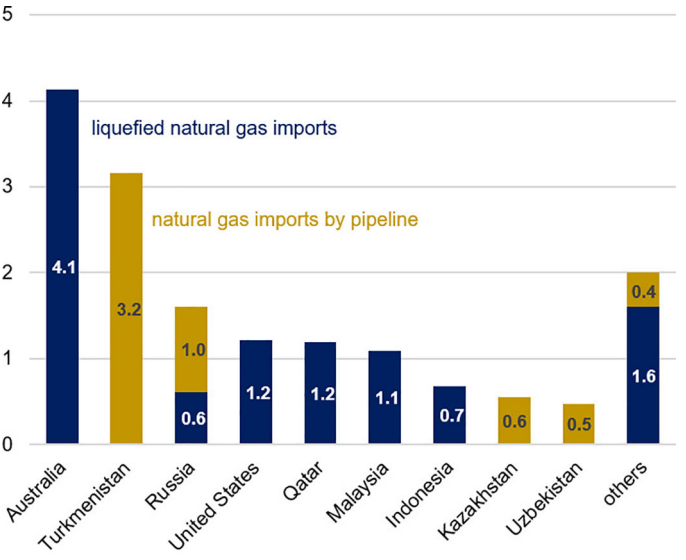
266 Jakóbowski et al. (2018).

267 Naturalgasworld.com. (December 16, 2015).

268 Bohr, A. (2016). Turkmenistan: Power, politics and petro-authoritarianism. Chatham House, Royal Institute of International Affairs.

269 Aminjonov (2018).

Figure 13: China's natural gas import by source, 2021[270]



eia Sources: Graph created by the U.S. Energy Information Administration, based on data from China's General Administration of Customs and Global Trade Tracker

4.3.4 Natural gas export to Russia

Despite an increase in gas production in Turkmenistan since 2015, according to International Information Group, the export volume of natural gas in Turkmenistan was 40bcm in 2023, while the natural gas output was about 80 bcm.[271] The main reason for the decline in the export volume was Russia's refusal to import Turkmenistan's gas. Russia was the largest natural gas importer of Turkmenistan's gas until the pipeline explosion in 2010. Consequently, nearly 90% of the entire natural gas production was imported by Moscow for further export to the European natural gas market.[272]

A bilateral agreement between the countries was signed in 2003 for 25 years. According to this deal, Russia would have bought and reexported Turkmen's natural

270 https://www.eia.gov

271 Interfax.com. (2023, October 26). Turkmenistan will maintain gas output in 2023 at over 80 bcm, while exports will top 40 bcm. Retrieved March 8, 2024https://interfax.com/newsroom/top-stories/95847/

272 Vasánczki, L. Z. (2011). Gas exports in Turkmenistan.

gas. The imported natural gas from Turkmenistan should have transported through the CAC pipeline that crossed Uzbekistan and Kazakhstan.[273]

Moreover, Gazprom was the primary operator of natural gas transport. Gazprom's import strategy was built to purchase Turkmen natural gas at meager prices and sell it to other countries for an extremely high price. However, because of disagreements between the Russian and Turkmen governments, Gazprom stopped buying Turkmen gas in 2016.[274]

The natural gas partnership between Russia and Turkmenistan started declining gradually. For instance, if Turkmenistan exported 40 bcm/a natural gas to Russia in 2008, this indicator fell to 4 bcm in 2015. Consequently, the Kremlin stopped the transport of blue fuel from Turkmenistan in 2016. According to Gazprom, Russia was not keen to renew its natural gas import from Turkmenistan anytime soon.[275] However, there is an excellent possibility to export Turkmenistan's natural gas to Eastern Europe through Russia if the energy cooperation between the Russian and the Turkmen governments is renewed.[276] Since Turkmenistan's economy strongly depends on natural gas exports, its economy suffered from this situation.[277]

Russia has signed agreements with other Central Asian countries: Kazakhstan and Uzbekistan, for buying natural gas from these countries at $140 per 1000 m^3. Simultaneously, according to Gazprom, Russia refused to import Turkmen gas because of the Turkmen government's high price demand, as Turkmenistan insisted on $240 per 1000$m^3$.[278]

However, after the break, the Gazprom concluded a new agreement with the Turkmen government. According to the agreement, Gazprom would buy 5.5 bcm of natural gas every year. The contract was signed for five years.[279] Even though the amount of exported natural gas is not so significant and far away from the export capacity of 2008, especially taking into account the tremendous natural gas potential

273 Esen, V., & Oral, B. (2016). Natural gas reserve/production ratio in Russia, Iran, Qatar and Turkmenistan: A political and economic perspective. Energy Policy, 93, 101–109.

274 Sullivan, C. J. (2016). Halk, Watan, Berdymukhammedov! Political Transition and Regime Continuity in Turkmenistan. Region, 35–51.

275 Atlanticcouncil.org. Iran, Turkey key to Turkmenistan realizing its energy potential. (September 6, 2017). Retrieved April 27, 2023, from http://web.archive.org/web/20201021233820/https://www.atlanticcouncil.org/blogs/new-atlanticist/iran-turkey-key-to-turkmenistan-realizing-its-energy-potential/

276 Gurbanov, I. (2018). Caspian Convention and Perspective of Turkmenistan's Gas Export to Europe. Caucasus International, 8(2), 159-179.

277 Pirani, S. (2012). Central Asian and Caspian gas production and the constraints on export. Oxford Institute for Energy Studies.

278 Rferl.org. (March 06, 2017).

279 Reuters.com. (July 3, 2019). Gazprom signs five-year natural gas contract with Turkmenistan. Retrieved April 27, 2023, from http://web.archive.org/web/20190704044540/https://www.reuters.com/article/us-russia-gazprom-turkmenistan-deal-iduskcn1ty1x5

of Turkmenistan, the new agreement with Russia can somehow help Turkmenistan to decrease its dependence on China.

4.3.5 Turkmenistan as a potential natural gas supplier for Europe?

Turkmenistan needs new energy partners for exporting its natural gas resources, while the EU is very interested in transporting Turkmen gas through the TCP[280] to link it with the SGC to diversify its natural gas sources and decrease its natural gas dependency on Russia and China.[281] It is expected that the SGC is able to export in between 45 to 90 bcm/a, which would have met about 10–15% of the total natural gas consumption of the EU. There is already an agreement between the EC's Vice-President Šefčovič and Turkmenistan's President Berdimukhamedov. Azerbaijan, Turkey, and other member countries of the project also agreed to participate in the extension of the TCP. Therefore, the Memorandum of Understanding on Cooperation between the EU and Turkmenistan due to the energy partnership was signed in 2008 and includes some crucial points such as an exchange of information on energy policies, transit routes diversification, energy efficiency, etc.[282]

As Turkmenistan is a landlocked country, it is not able to export its natural gas reserves directly. Instead, there are some proposals to ship Turkmen natural gas to Europe via other countries. For instance, Turkmenistan can transport its natural gas through the existing pipeline via Azerbaijan, Georgia, and Turkey to Europe via the TCP.[283] Consequently, Turkmen natural gas might be exported to Azerbaijan via the TCP undersea pipeline with further shipment to Europe.[284]

In case the project is realized, then the TCP would bypass the two crucial natural gas competitors of Turkmenistan: Russia and Iran.[285] Avoiding the territories of these states would be a critical advantage for Turkmenistan. Therefore, Iran and Russia are not interested in realizing this grandiose project, which would have been a significant energy deal for Turkmenistan, the Caspian Region, and Europe.[286]

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280 Konarzewska, N. (2016). Turkmenistan advances westward natural gas export. The Central Asia-Caucasus Analyst, 19.

281 Ibrayeva, A. (2018). Importance of the Caspian countries for the European Union energy security.

282 Eeas.europa.eu. (November 17, 2020). EU-Turkmenistan relations. Retrieved April 27, 2023, from http://web.archive.org/web/20201228170041/https://eeas.europa.eu/headquarters/headquarters-homepage_en/4077/EU-Turkmenistan%20relations

283 Ibrayeva (2018).

284 EIA.gov. (July 2016). Turkmenistan. Retrieved April 27, 2023, from http://web.archive.org/web/20210318055301if_/https://www.eia.gov/international/analysis/country/tkm

285 Marketos, T. (2009). Eastern Caspian Sea energy geopolitics: a litmus test for the US-Russia-China struggle for the geostrategic control of Eurasia. Caucasian Review of International Affairs, 3(1), 2.

286 Ibrayeva (2018).

Taking into account its vast demand, Turkey also is very interested in importing natural gas from Turkmenistan. The TANAP pipeline creates an excellent opportunity for Turkmenistan to export its natural gas through Azerbaijan to Turkey. Additionally, Turkey and Turkmenistan's governments signed a memorandum of understanding on exporting natural gas by Turkmenistan in 2014.[287] However, the diversification of natural gas export sources for Turkmenistan has not been achieved until now, so China and Russia remain two primary export sources.

4.3.6 Economic difficulties of the country against the background of the gas sector

It is not surprising that the decline of energy prices in the world energy market has a highly negative impact on the economy of Turkmenistan.[288] Turkmenistan is affected by a radical reduction of natural gas prices in the world natural gas market. Russia's stoppage of the import of Turkmen gas in 2016 and Ashgabat's cancellation of exporting gas to Iran because of Iran's debt is one reason for Turkmenistan's difficult economic situation.[289]

The Turkmen government canceled the free natural gas, water, and electro energy that Turkmenistan citizens enjoyed, signed by former president Saparmurat Niyazov in 1993. While earlier, every citizen of Turkmenistan could get natural gas up to 50 m^3 for free. The new limit was imposed in 2015.[290] Citizens had to pay for natural gas, water, and energy by the end of 2015.[291] The president argued that people could afford to pay for such services.

According to the newly signed agreement between Gazprom and the Turkmen government, the export of natural gas to China and partly to Russia seems the only way to overcome this difficult economic period for Turkmenistan. However, even if natural gas export to China increased to 30bcm/a still by 2019, Turkmenistan exported only 2.73 bcm of natural gas to China in 2023.[292]

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287 https://www.atlanticcouncil.org (2017, September 6).

288 Skalamera, M. (2020). The 2020 oil price dive in a carbon-constrained era: strategies for energy exporters in central Asia. International Affairs, 96(6), 1623-1642.

289 Konarzewska (2016).

290 Cis-legislation.com. Presidential Decree of Turkmenistan. Retrieved April 27, 2023, from http://web.archive.org/web/20200813195640/https://cis-legislation.com/document.fwx?rgn=15323

291 Apnews.com. (February 4, 2020). Turkmenistan to build a $1.5-billion city amid spending cuts. Retrieved April 27, 2023, from http://web.archive.org/web/20201022215607/https://apnews.com/article/8d52a8a7d652ae6aff27d56e12e338a9

292 Orient.tm. (2023, July 21). Turkmenistan increased natural gas supplies to China by 5%. Retrieved March 08, 2024, from https://orient.tm/en/old/post/57377/turkmenistan-increased-natural-gas-supplies-china-5-may