COMMODITIES MARKET DEVELOPMENT PROJECT
FOR ASTANA INTERNATIONAL FINANCIAL CENTRE:
COPPER, NATURAL GAS, WHEAT

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Executive Summary

The Capstone team conducted research on three types of commodities, copper, natural gas and wheat. Specifically, the team examined the outlook, barriers, and opportunities of those commodities and provided recommendations to assist AIFC with an analysis of the market.

Copper

Copper is one of the most important commodities traded internationally. Copper is also the oldest metal, which was used by ancient civilizations; today, it is still an essential element to modern life, as well as national and societal development. To analyze the copper market, this report includes summary information about copper production, reserves, consumption, and trade, as well as information about Kazakhstan’s infrastructure related to copper transportation.

Related to the copper production, the International Copper Study Group (2016) shows that it has grown by 3.2% annually since 1900, and this trend will remain positive since copper is used in many sectors and in various equipment, machineries and other appliances. Up until 2016, Kazakhstan has been one of the most important producers around the world; it is the world's 12th-largest copper mine producer, 14th-largest copper smelter producer, and 18th in the world among refined copper producers.

There is a positive trend for global consumption which will keep growing in years to come. For instance, in the case of refined copper, consumption has grown by a compound annual growth rate of 3.4% per year from 1900 until 2015. China is the largest consumer of copper in the world.

It seems that there is a negative trend in the production of refined copper which may indicate Kazakhstan is no longer adding value to its products. Regarding the copper trade, Kazakhstan’s copper exports are highly concentrated. For instance, the top export destinations of copper ores concentrates were China (67%) and the Russian Federation (22%). These two countries represent almost 90% of all exports in 2015.

Kazakhstan’s copper products are delivered to its consumers by railways mainly.
**Recommendations**

- The Kazakhstan government should promote new mining explorations to increase and/or maintain its level of copper reserves. That is very important to attract new participants in the market, or increase the investment in facilities by the current participants. There is a critical need to open new copper deposits.

- The Kazakhstan government should improve access to official information in English that is useful for foreign investors. It is quite hard to get information in detail from official sources because most of them are in Kazakh. This information is relevant and necessary to make decisions.

- The Kazakhstan government should export *refined copper* rather than mined copper. Based on the Table 3.2 that shows the production of mineral commodities, it seems that Kazakhstan is no longer adding value to its copper production. Thus, it is important to evaluate possible measures to change this negative trend.

**Natural Gas**

The economic importance of natural gas is increasing in the world. This is despite the fact that “[g]as has low energy content per unit volume, even when substantially compressed, compared to oil and coal” (Ericson, 2012) and so far it takes a third position (21% portion) of the global primary energy, after oil and coal (International Energy Agency, n.d.). However, the world is seeking a cleaner source of energy and natural gas can be a good substitute for oil and coal because it releases less carbon dioxide into the atmosphere. Thus, IEA states that in the next few decades the consumption of gas will continue to increase and most likely will displace coal consumption (“Resources2013.pdf,” n.d.). Additionally, according to IEA, natural gas as well as renewable energy sources have a large potential to meet energy demand growth until 2040 (“World Energy Outlook 2016,” n.d.).

Natural gas plays an important role in Kazakhstan, especially in the oil sector because of the reinjection process. According to National Energy Report (2015) (hereafter the Report), the major portion of natural gas in Kazakhstan is produced with oil (associated) and the large volume of it is re-injected to maximize oil production. Thus, the commercial volumes of natural gas to date have a secondary significance. Specifically, the report states that nearly 40% of the
associated gas is re-injected and only approximately 60% of gas is available to market to consumers. The natural gas sector, as an independent energy source, is an opportunity for the country’s economic growth. For example, Kazenergy states that the natural gas sector of Kazakhstan has significant potential for further development, which could allow Kazakhstan to become one of the top leading regional producers of natural gas in the future. However, to realize this potential, large amount of investments is needed to build necessary pipeline infrastructure.

Regarding the forecast of natural gas, the team found a pessimistic mid-term prediction for Kazakhstan’s gas export potential until 2025. There are four main reasons for this outlook: high competition in the region, high demand for gas within Kazakhstan, high fixed costs for pipeline infrastructure, and geopolitical issues. However, Kazakhstan has an ideal geographic location at the heart of Eurasia, which provides a great potential to serve as an intermediary for natural gas. This means natural gas from Uzbekistan and Turkmenistan can flow to Russia and China through Kazakhstan; Kazakhstan can profit off this exchange by charging fees.

**Recommendations**

- Provide natural gas for all 14 administrative regions.
- Explore more conventional and unconventional gas.
- Actively consume the associated gas (such as in the transportation sector, petrochemical industry, electric power generation, and with domestic consumption).

**Wheat**

Kazakhstan is one of the major wheat producers in the world, along with other cereals, crops mostly grown in the northern regions of the country. The climate in the north are very favorable to cultivate cereal crops. However, in recent years, the production of wheat in Kazakhstan has decreased and will continue to decrease because of the Crop Diversification Policy. Our research shows that there are several barriers to the Kazakhstan wheat trade. Firstly, even though Kazakhstan is the 8th-largest wheat exporting country, Kazakhstan exports most of its wheat to neighboring countries such as Russia, Tajikistan and Uzbekistan. Russia is the largest importer of Kazakhstan’s wheat but Russia imports wheat from Kazakhstan and resells it to other countries because Russia controls the main exporting channel of Kazakhstan wheat and squeezes the profits. Secondly, transportation is expensive for the wheat trade as Kazakhstan is a
landlocked country in Central Asia because most of the wheat is transported by rail which is more expensive than sea transportation. Thirdly, the lack of advanced technology and regulation make the agriculture industry in Kazakhstan less competitive.

**Recommendations**

- Increase exports to emerging markets such as China, India and Iran. China could be the largest partner for the wheat trade because China and Kazakhstan have reached an agreement that allows Kazakhstan to deliver its commodities to Southeast Asia through Chinese territory. Furthermore, the One Belt One Road Initiative encourages more Chinese companies to fund and build roads, railway, bridges and tunnels across Central Asia, which helps to reduce transportation cost of wheat trade.

- Kazakhstan should improve productivity by introducing more advanced technologies. For example, we recommend the application of modern high-performance agricultural machinery and efficient management of farming in order to increase grain yield.

- The Kazakhstan tariff rate needs to be adjusted to protect the economic interests of the country. This is because tariffs remain one of the most important instruments of state regulation of foreign trade, which allows tariffs to protect the interests of national producers from foreign competition.
## SWOT Analysis of Copper, Natural Gas and Wheat Commodities

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
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<tbody>
<tr>
<td>• Geographic location, close to emerging markets</td>
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<tr>
<td>• Large mineral and land resources</td>
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<td>• Cheap labor force</td>
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<td>• Well-developed railway system</td>
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<td>• Landlocked country</td>
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<td>• Political uncertainty</td>
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<td>• Low level of advanced technologies</td>
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<td>• Low foreign investment</td>
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<td>• Export concentration</td>
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<tr>
<td>• Crop diversification strategy (wheat)</td>
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<tr>
<td>• Regional competition (wheat and gas)</td>
<td></td>
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<tr>
<td>• Limited domestic gas pipeline system</td>
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<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
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<td>• Development of infrastructure</td>
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<tr>
<td>• Membership in WTO: expand markets</td>
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<tr>
<td>• Positive perspective on price (copper)</td>
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<tr>
<td>• Global warming (wheat)</td>
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<tr>
<td>• Increasing global demand (copper and wheat)</td>
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<tr>
<td>• Active exploration (gas)</td>
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<td>• Membership in WTO: high competition</td>
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<tr>
<td>• Price volatility</td>
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<tr>
<td>• Climate change</td>
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<td>• Growing regulatory uncertainty</td>
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<td>• Social and environmental risks</td>
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<td>• Negative Chinese economic perspectives</td>
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<td>• Geopolitical issues</td>
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1. Methodology and Data Collection

Methodology

The methodology of the project has been carried out using a multi-dimensional approach which included data collection, interviews and a validation process.

The project considered both primary and secondary sources for data collection, using qualitative and quantitative data related to the level of reserves, production, trade, price and policies. Our research included the following three commodities: wheat, natural gas and copper.

The data collection from the primary sources included interviews, mostly online, with Kazakhstani experts in each of the commodities, as well as specialists in trade and investment in northern Central Asia and Eastern Europe areas. The participants of the interviews were selected using connections from Cornell University and from Kazakhstan. To gather a broad perspective of the situation of these commodities, the specialists came from both private and public sector, as well as from consulting firms that might provide an independent opinion. Specifically, the following experts were interviewed:

- Gligor Tashkovich - A Former Minister for Foreign Investment in the Republic of Macedonia from 2006-2008. Mr. Tashkovich earned his B.A. in 1987 from Cornell University’s College of Arts & Sciences and his M.B.A. in 1991 from Cornell’s Johnson Graduate School of Management.
- Iliyas Sagatuly - an expert of the Ministry of Energy of the Republic of Kazakhstan
- Leila Kulbayeva – an independent analyst in copper sector, a Head of Research at Tengri Capital (formerly known as Visor Capital).
- Nurzhan Mukhamedzhanov – a Chief Manager in the National Joint Stock Company (Food Contract Corporation).
- Khairulla Aben – an independent expert of the State Committee for Reserves of the Republic of Kazakhstan.

Secondary sources included statistical data and reports published and/or produced by international and national entities, as well as information that main producers published on websites including, but not limited to, the websites of the main commercial producers of each
commodity, national authorities of Kazakhstan, and international organization such as the World Bank and the United Nations.

Because data came from various sources, we triangulated them to increase validity. This triangulation includes the validation of data through cross-referencing from the following sources: i) international and national information, ii) data that involved parts, such as those that main companies publish in their websites, and iii) the interviews with specialists mentioned previously.

**Data Collection**

The data collection was divided into three components: statistical data, reports and academic/experts’ resources, from international and domestic perspectives. By integrating data from these sources, we believe our findings are more complete, accurate and reliable.

In order to gather first-hand statistical data, four online data sources were selected: the Agency of Statistics of the Republic of Kazakhstan, UN Comtrade, Statista, and CEIC Data.

In terms of trade flow, we chose to use UN Comtrade as our statistics database because it is a repository of official international trade statistics and relevant analytical tables. As for market research and industry studies, we use Statista, which is the leading statistics database covering over 18,000 sources on over 60,000 topics. Moreover, we use CEIC Data to discover normalized data to accurately compare economic indicators, such as GDP, CPI, FDI, imports, exports and population in different countries.

We were also referred to some specific organizations with relevance to our three specific commodities. For example, United States Department of Agriculture (USDA) provides a collection of links on current agricultural updates and the International Energy Agency (IEA) serves as an information source on statistics about the international natural gas market.

One of our team members comes from Kazakhstan which allowed our team to analyze statistical data directly from local agencies such as the Agency of Statistics and the Ministry of Energy.

Besides statistical data, we collected information from various research reports, such as the United States Geological Survey, the Observatory of Economic Complexity and the Kazakhstan Grain and Feed Update. By reading these reports, we were able to gain some insight
which helped us accomplish our project. In addition, through these reports, we were able to find useful descriptive studies, background information, and research approaches.

Figure 1: Structure of Data Collection

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Reports</th>
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<tr>
<td><strong>International</strong></td>
<td><strong>Domestic</strong></td>
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<td>• UN Comtrade</td>
<td>• Agency of Kazakhstan on</td>
</tr>
<tr>
<td>• Statista</td>
<td>Statistics</td>
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<tr>
<td>• CEIC Data</td>
<td>• Ministry of Energy of</td>
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<td></td>
<td>Republic of Kazakhstan</td>
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<td>• The International</td>
<td>• Kazenergy</td>
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<td>Copper Study Group</td>
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<td>• United States</td>
<td>• Kazmunaigaz</td>
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<td>Department of Agriculture (USDA)</td>
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<td>• Food and</td>
<td>• Kaztransgas</td>
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<td>Organization (FAO)</td>
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<td><strong>International</strong></td>
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<td>• The Observatory of</td>
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<td>Economic Complexity</td>
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<td>• 2014 Minerals Yearbook</td>
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<td>• World Copper Fatchbook 2016</td>
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<td>• Mineral Commodity Summary2014</td>
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<td><strong>Domestic</strong></td>
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<td>• Grain and Feed Update</td>
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<td>• United States Geological</td>
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<td>Survey</td>
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<td>• Kazakhstan Mining 2015</td>
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<td>• Kazakhstan Country Report</td>
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<td>2016</td>
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</tbody>
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2. Copper

Overview

*Definition and Types of Copper*

Before proceeding further, it useful to define copper as a commodity. Copper is a malleable and ductile metallic element that is an excellent conductor of heat and electricity as well as being corrosion resistant and antimicrobial. Copper can be found in sulfide deposits (chalcopyrite, bornite, chalcocite, covellite), in carbonate deposits (azurite and malachite), in silicate deposits (chrysocolla and dioptase) and aspire "native" copper (International Copper Study Group, 2016).

Another special characteristic of copper is that, unlike other commodities, it is not consumed. Copper can be recycled repeatedly without any loss of performance, that is why an important portion of copper proportion comes from copper scraps. According to International Copper Study Group (2016), key stakeholders (i.e. policy-makers, scrap collectors, copper
producers and recyclers) must all focus on ensuring that yesterday’s metal is recycled and re-used.

Related to the type of copper, Table 3.1 includes definition of main important types of copper products that will be analyzed in this report. These definitions\(^1\) were developed by International Copper Study Group (ICSG)\(^2\) to improve the understanding of production and trading of copper around the World. ICSG has divided the main definition of copper in two groupings: i) copper, copper alloys and intermediate products of copper metallurgy and ii) copper semi fabricates, castings, powder, flakes and other products of the first processing stage.

**The Role of Copper in the World & Commodity Potential**

Copper is one of the most important commodities traded internationally. Copper is also the oldest metal, which was used by ancient civilizations; today, it is still an essential element to modern life, as well as national and societal development. The copper sector is one of the most important contributors in the economy for a large number of countries (developed and developing); the sector creates jobs, promotes investment in infrastructure, as well as contributes to government revenues through taxes.

Because of its conductivity and unique properties (malleable, ductile, recyclable, corrosion resistant, and antimicrobial), it is used in many industries, such as construction/infrastructure (plumbing, electrical wiring, heating, appliances), energy (renewal energy such as wind turbines and solar panels), electronic and technology (hybrid cars, computers, cellphones) and other applications (coins, saucepan). Therefore, copper demand will increase since the population is growing and product innovation and economic development are also continuing.

Copper has a few substitute products that can affect its future demand. For instance, Brininstool (2015) states that the main copper substitutes are: i) aluminum that substitutes for copper in power cable, electrical equipment, automobile radiators, and cooling and refrigeration tube; ii) titanium and steel which are used in heat exchangers; iii) optical fiber substitutes for

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\(^2\) The International Copper Study Group (ICSG) was formally established as an autonomous inter-governmental organization on 23 January 1992, following a series of Ad Hoc meetings sponsored by the United Nations (UNCTAD) in 1986 and 1987.
copper in telecommunications applications; and iv) plastics that substitute for copper in water pipe, drain pipe, and plumbing fixtures. However, based on available information, copper demand will still increase. In addition, the International Copper Study Group (2016) states that the world copper mine production has grown by 3.2% per annum since 1900. Therefore, this commodity has a lot of potential in the future because both demand and supply have showed a positive trend over time.

Glencore (2017), one of the largest copper producers in the world, states that the short-term demand prospects appear positive for the copper market, since the economic and political conditions in China should ensure continued positive fundamentals. Additionally, the current and planned infrastructure programs in Japan and North America should start to increase consumption.

In sum, according to the International Copper Study Group (2016), there are good reasons to believe that copper will continue to be a vital and positive contributor to society well into the future.
Table 3.1: Definitions and Descriptions of Copper Based Products

<table>
<thead>
<tr>
<th>DEFINITIONS AND DESCRIPTIONS OF COPPER BASED PRODUCTS USED BY THE INTERNATIONAL COPPER STUDY GROUP (ICSG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper Mattes and Cement Copper:</td>
</tr>
<tr>
<td>Copper Matte - It is obtained by fusion of roasted copper sulphide concentrates or ores to separate the copper sulphide from the gangue and other metals which form a slag that floats on the surface of the melt. The matte consists essentially of copper and iron sulphides and is generally in the form of black or brown granules (obtained by pouring the molten matte into water) or crude mass, with a dull, metallic appearance. However, the majority of matte is never solidified but transferred by ladle while molten to a converting furnace. Most matte never enters the market place.</td>
</tr>
<tr>
<td>Cement Copper (precipitated copper) - It is a product obtained by precipitation (cementation), i.e., by adding iron to the aqueous solution resulting from the leaching of certain ores or waste. It is a finely devised black powder containing oxides and insoluble impurities. Cement copper is often added to the charge which goes to a converting furnace to produce copper matte.</td>
</tr>
<tr>
<td>Harmonised System (HS) Code. - Copper matte and cement copper are covered each by one code of the Harmonised System (HS):</td>
</tr>
<tr>
<td>HS 7401.10 Copper mattes and HS 7401.20 Cement copper</td>
</tr>
<tr>
<td>Unrefined Copper: Black copper, blister copper and copper anodes for electrolytic refining:</td>
</tr>
<tr>
<td>Black copper. - It consists of an impure form of copper produced by smelting oxidised copper ores or impure scrap. The copper content varies widely, usually in the range of approximately 60 or 85 % by weight.</td>
</tr>
<tr>
<td>Blister copper. - It consists of an impure form of copper produced by blowing air through molten copper matte. During the conversion process, sulphur, iron and other impurities are oxidised. The copper content is normally about 98 % by weight. It is the product of a converting furnace.</td>
</tr>
<tr>
<td>Copper anodes for electrolytic refining: Copper partly refined by complete fusion is cast into anodes for further refining by electrolysis. These anodes are usually in the form of slabs cast with two lugs for suspending them in the electrolytic tank. It is produced from blister copper by reduction with natural gas or wood to remove oxygen and other impurities in an anode furnace.</td>
</tr>
<tr>
<td>Harmonised System (HS) Code. - Unrefined copper is covered by one HS code:</td>
</tr>
<tr>
<td>HS 7402.00 Unrefined copper; Copper anodes for electrolytic refining.</td>
</tr>
<tr>
<td>Refined Copper:</td>
</tr>
<tr>
<td>Metal containing at least 99.85 % by weight of copper; or metal containing at least 97.5 % by weight of copper, provided that the content by weight of any other element does not exceed the limit specified in the table A-1 in Appendix C.</td>
</tr>
<tr>
<td>Refined copper is obtained by electrolytic refining, electrolytic extraction, chemical refining or fire refining.</td>
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<tr>
<td>Other refined copper is normally produced by alloying refined copper with one or more other elements up to the maximum content limits mentioned previously.</td>
</tr>
<tr>
<td>Refined copper is cast into ingots or ingot-bars for remelting (e.g. for alloying purposes) or into wire bars, slabs for rolling, billets and similar forms for rolling, extruding, drawing or forging into plates, sheets, strips, wire, tubes and other semifabrics. Ingots are also produced by remelting copper waste and scrap. Electrolytic or electrowon copper is melted to produce other refinery shapes.</td>
</tr>
<tr>
<td>Harmonised System (HS) Code. - Refined copper is covered by four HS codes: HS 7403.11 Cathodes, HS 7403.12 Wire Bars, HS 7403.13 Billets, HS 7403.19 Other.</td>
</tr>
<tr>
<td>Copper Alloys, unwrought:</td>
</tr>
<tr>
<td>Copper alloys. - They are metallic substances other than unrefined copper in which copper predominates by weight over each of the elements.</td>
</tr>
<tr>
<td>Harmonised System (HS) Code. - Copper alloys are covered by four HS codes: HS 7403.21 Copper-zinc base alloys (brasses), HS 7403.22 Copper-tin base alloys (bronzes), HS 7403.23 Copper-nickel</td>
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</tbody>
</table>
base alloys (cupro-nickel), or copper-nickel-zinc base alloys (nickel silvers), HS 7403.29 Other copper alloys.

<table>
<thead>
<tr>
<th>Master Alloys of Copper:</th>
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<tbody>
<tr>
<td>Alloys containing with other elements more than 10 % by weight of copper, not usefully malleable and commonly used as additive in the manufacture of other alloys or as de-oxidants, desulphurising agents or of similar uses in the metallurgy of non-ferrous metals. The copper content generally ranges between 30 and 90% in these products but may, in special cases, be above or below these limits.</td>
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<tr>
<td>Harmonised System (HS) Code. - Master alloys of copper are covered by one HS code: HS 7405.00</td>
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<tr>
<th>Master alloys of copper</th>
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<tbody>
<tr>
<td>I.6 Copper Waste and Scrap, Cuprous Ashes and Residues:</td>
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<tr>
<td>Copper Scrap can be subdivided into:</td>
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<tr>
<td>Scrap from refined copper</td>
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<tr>
<td>Scrap from copper alloys; old scrap, e.g. from used, worn out, or obsolete copper products returned from the market place e.g. castings, electronic scrap, Cu-Fe-materials, catalysts;</td>
</tr>
<tr>
<td>New scrap, e.g. turnings, stampings, cuttings etc. and defective products i.e. Products that have never entered the consumer market plus manufacturing scrap and other scrap from first and second processing stage.</td>
</tr>
<tr>
<td>Harmonised System (HS) Code. - Copper waste and scrap is covered by four HS codes: HS 7404.00 Copper and copper alloys, HS 7404.00.10 Copper, HS 7404.00.91 Copper-zinc base alloys, HS 7404.00.99 Other copper alloys. Cuprous ashes and residues is covered by one HS code: HS 2620.30</td>
</tr>
<tr>
<td>Ashes and cuprous residues.</td>
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</table>

**Reserves of Copper**

*Copper Reserves and Resources*

The future availability of copper is classified by the concepts of reserves and resources. The latter is far bigger and include: i) reserves, ii) discovered deposits, and iii) undiscovered deposits that are predicted based on preliminary geological surveys. Copper reserves data is dynamic; estimates may be reduced as ore is mined or the extraction possibility diminishes, or they may increase as additional deposits are developed. Reserves will be developed based on business profitability and geologic limitations in terms of economic ore grade and tonnage (U.S. Geological Survey, 2016).

According to the U.S. Geological Survey (2017), global copper reserves currently total about 720 million tons, and identified and undiscovered copper resources are estimated to be

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3 According to the U.S. Geological Survey (2014), a resource is a concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth’s crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible; and reserves that part of the Reserve Base (that part of an identified resource that meets specified minimum physical and chemical criteria) which could be economically extracted or produced at the time of determination. The term reserves need not signify that extraction facilities are in place and operative. Reserves include only recoverable materials; thus, terms such as “extractable reserves” and “recoverable reserves” are redundant and are not a part of this classification system.
around 2,100 million tons and 3,500 million tons, respectively. Figure 3.2 shows the participation of some countries in the global reserves. With reserves of 210 million tons as of 2016, Chile has the world’s largest copper reserves and it represents almost one third of the world’s reserves. Australia was second with 88 million tons or 12%, Peru was third with 82 million tons or 11%. The Russian Federation has 30 million tons of copper reserves, which is approximately 4% of total reserves. However, the International Copper Study Group (2016) estimates that the current and future exploration opportunities will lead to increases in both reserves and known resources.

Related to the Kazakhstani copper reserves, Brininstool (2015) reported that it reached approximately six million tons of copper reserves in 2014, 1% of the global copper reserves. However, according to the Portal for Kazakh exporters of manufacturing industries and for foreign buyers (2012), Kazakhstan’s copper reserves are estimated at 37 million tons or 5.5% of the world reserves. Therefore, there is a contradiction between national and international data about the copper reserves.

Copper Production

There are two types of production; i) primary copper production starts with the extraction of copper-bearing ores through one of the three basic extraction methods which are surface, underground mining and leaching; ii) secondary copper production utilizes copper scrap from primary copper production. Copper scrap is derived from either metals discarded in product
manufacturing processes (“new scrap”) or obsolete end-of-life products (“old scrap”)(International Copper Study Group, 2016).

Copper Mine Production

Figure 3.3 shows that the 2016 global copper production from mines amounted to an estimated 19.4 million tons. The major four highest-producing countries are Chile (28%), Peru (12%), China (9%), and the United States (7%). Chile produces almost one-third of the world’s copper, and these top four countries produce more than 50% of all the global copper production (56 % in 2016). Kazakhstan is the world's twelfth largest copper mine producer. And since 1900, global copper mine production has been growing by 3.2% per year (International Copper Study Group, 2016).

Figure 3.3 World Copper Production, 1900-2015 (thousands, metric tons)

In terms of the world leading copper miners by production output, the 10 main mining companies in 2015 were CODELCO, Freeport-McMoRan, BHP Billiton, Glencore, Southern Copper, KGHM, Rio Tinto, Anglo American, Antofagasta, and First Quantum.

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4 US Geological Survey and the website of Statista ([www.statista.com](http://www.statista.com))
5 The World Copper Factbook 2016 of ICSG (The International Copper Study Group).
Finally, CODELCO (2016) states that the main challenges to copper production are the steep declining average industry ore grade,\(^7\) the environmental and community challenges, as well as the legal obstacles and lack of predictability of the economic and financial environment. In addition, Calvo, Mudd, Valero, & Valero (2016) confirm the CODELCO’s concerns in their study prove that the average copper ore grade is decreasing over time. These authors have analyzed the copper case and have concluded that the average ore grade has decreased approximately by 25% in just ten years.

*Copper Smelter Production*

Figure 3.4 shows that since the 1980’s, there has been an upward trend in the copper smelter production for both primary smelters, which use mine concentrates as their main source of feed, and secondary copper smelters, which use copper scrap as their feed. According to the International Copper Study Group (2016), the world copper smelter production\(^8\) reached 18.6 million tons copper in 2015. In addition, the Asia’s share of world copper smelter production jumped from 27% in 1990 to almost 60% in 2015. This is the result of the sharp increase of the smelter production in China that was the largest producer of blister and anode in 2015 with around 6.9 million tons of production.

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\(^7\) “Ore grade” is the concentration of an element of interest in a potentially mineable ore deposit (based on a Dictionary of Earth Sciences definition).

\(^8\) Smelting is a pyrometallurgical process to produce copper metal (International Copper Study Group, 2016).
In 2015, the major four producing countries of copper smelter production were China, which produced more than one third of the global production, followed by Chile (8%), Japan (8%), and the Russian Federation (5%). Kazakhstan is the world's 14th largest copper smelter producer (International Copper Study Group, 2016).

**Refined Copper Production**

According to the International Copper Study Group (2016), the refined copper production reached 23 million tons, including 3.9 million tons of secondary refined production in 2015. China accounted for over a third of world copper refined production (35%), followed by Chile (12%), Japan (6%) and the United States (5%) while Kazakhstan ranks 18th in the world among refined copper producers. Finally, the top 21 refined copper producing countries accounted for almost 90% of the refined copper production worldwide in 2015 (Natural Resources Canada, 2016).

Figure 3.7 shows the refined copper production by region since 1990. The regions with the highest output of refined copper in 1990 were the Americas (4.3 million tons), followed by Europe (3 million tons) and Asia (2.5 million tons). However, in 2015, the leading region in the world is Asia with 12 million tons of refined copper production (International Copper Study Group, 2016).
Finally, Figure 3.8 shows the total global production of copper including mine, smelter and refinery production from 2006 until 2014 and it shows an upward trend in all types of copper production.
Kazakhstan Copper Production

Table 3.2 shows the copper production in Kazakhstan up to 2013. From 2009 to 2013, there is a positive trend in copper mine production. The growth in Kazakhstan’s copper mine production since 2011 kept pace with the pace of growth globally. Indeed, after the contraction of around 6% in 2010, the quantity of production (tons) showed more marked growth than the global trend for 2011-2013 period with an average growth rate of 5% against the global average growth rate of 4% for the same period. In case of Kazakhstan’s copper smelter production, there is a negative trend which runs counter to the global production which shows a positive trend. Finally, related to the refined copper production, Kazakhstan shows a reduction of 5% in its level of production for 2012-2013 which is not in pace with the global trend.

Table 3.2: Kazakhstan Production of Mineral Commodities (tons)

<table>
<thead>
<tr>
<th>Copper Product</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine production</td>
<td>406,100</td>
<td>380,600</td>
<td>405,300</td>
<td>419,200</td>
<td>440,300</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Smelter, undifferentiated</td>
<td>332,854</td>
<td>318,637</td>
<td>302,975</td>
<td>302,576</td>
<td>269,687</td>
</tr>
<tr>
<td>- Refined, primary</td>
<td>312,767</td>
<td>323,368</td>
<td>338,524</td>
<td>373,259</td>
<td>354,726</td>
</tr>
</tbody>
</table>


This trend might reflect the fact that it is more profitable to produce copper concentrate than to produce refined copper. According to some specialists, in Kazakhstan, it is not profitable to conduct copper through the metallurgy process to produce cathodes; instead, it is easier to sell raw mined copper to Chinese consumer. In addition, specialists believe that the construction of a copper smelter does not justify the small discount that the company receives in the price for its copper.
It is important to mention that the main entities that are part of the Kazakhstan copper sector are: i) KAZ Minerals PLC\(^9\) - this entity has controlled most copper production; ii) Kazzinc JSC\(^{10}\) - this is a major fully integrated zinc producer with considerable copper and precious metals. Glencore International AG is the company's main investor with 69.61% of share participation; iii) Aktyubinsk Copper Co TOO\(^{11}\) (CJSC Russian Copper Co) - their main copper products are copper concentrates, cathodes and rods; iv) JSC Polymetal; and v) Central Asia Metal plc. Table 3.3 shows the mining projects that are managed by all these companies through 2013. And Figure 3.9 shows the geographic area where these companies operate.

Figure 3.9 Concentration of copper mines operated up to 2013

Finally, related to the Kazakhstan mining sector, Safirova (2013) concludes that the sector “will likely continue to increase along with an increase in the number of projects aimed at exploiting the country’s significant mineral resources. Projects involving copper, gold, rare metals, rare-earth elements, and uranium could be of particular interest. And the number of exploration projects underway in Kazakhstan indicates the potential for future increases in

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\(^9\) Following completion of the restructuring on 31 October 2014 the company was renamed from “Kazakhmys plc.” as “KAZ Minerals PLC” that had a market capitalization of £1.6 billion ($2.0 billion) as at 1 January 2017. The company originally listed in London as Kazakhmys PLC in October 2005. Its group undertook a number of divestments and completed a major restructuring in 2014 which have transformed it into a high growth copper company focused on large scale, low cost open pit mining in Kazakhstan (http://www.kazminerals.com).

\(^{10}\) The company’s core operations are in East-Kazakhstan Region and it was established in 1997 through the merger of three non-ferrous metal companies (Ust-Kamenogorsk Lead and Zinc Combinat, Leninogorsk Polymetallic Combinat and Zyryanovsk Lead Combinat). These three companies were majority-owned by the Government of Kazakhstan. (http://www.kazzinc.com).

\(^{11}\) Aktubinsk Copper Company is located near the town of Aktobe in Kazakhstan.
production of mineral commodities in the country, but any future development will depend on a variety of factors, including mineral commodity prices and the development of government policies and programs to encourage the growth of the industry”. It is worth to mentioning here, that Kazakh government decided to create a special Committee of Geology and Subsoil Use under the Ministry for Investment and Development of the Republic of Kazakhstan in October 2014 (“About Committee of geology and subsoil use,” n.d.). According to this committee, the President of Kazakhstan, N. Nazarbayev, stated that “Kazakhstani land is almost untouched. What was discovered is only tiny amount.” (“Nazarbayev o delah Bishimbayeva i Nurabayeva,” 2017). So, we can see that Kazakhstan’s government indeed is interested in growth of the mining industry.
## Table 3.3: Kazakhstan’s Major Operating Companies and Capacity in tons (2013)

<table>
<thead>
<tr>
<th>Major operating companies, main facilities, or deposit</th>
<th>Region</th>
<th>Name</th>
<th>Location</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Mining, recoverable, Cu content</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Central region</td>
<td>Konyrat Mine</td>
<td>Karagandy Province</td>
<td>11,800</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Sayak I and III Mines</td>
<td>Karagandy Province</td>
<td>23,500</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Sharykul Mine</td>
<td>Zhambyl Province</td>
<td>12,700</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Abyz Mine</td>
<td>Karagandy Province</td>
<td>5,710</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Nurkazgan Mine</td>
<td>Karagandy Province</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Akbastau Mine</td>
<td>East Kazakhstan Province</td>
<td>9,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Artemeyevsky Mine</td>
<td>East Kazakhstan Province</td>
<td>25,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Belousovsky Mine</td>
<td>East Kazakhstan Province</td>
<td>2,700</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Irtyshsky Mine</td>
<td>East Kazakhstan Province</td>
<td>5,750</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Nikolayevsky Mine</td>
<td>East Kazakhstan Province</td>
<td>25,700</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Orlovsky Mine</td>
<td>East Kazakhstan Province</td>
<td>86,200</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Yubileyno-Snegirikhinsky Mine</td>
<td>East Kazakhstan Province</td>
<td>14,200</td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Zhezkazgan Region</td>
<td>Anzensky mine</td>
<td>Karagandy Province</td>
<td>25,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>East Mine</td>
<td>Karagandy Province</td>
<td>35,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>North Mine</td>
<td>Karagandy Province</td>
<td>28,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>South Mine</td>
<td>Karagandy Province</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>Stepnoy Mine</td>
<td>Karagandy Province</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>West Mine</td>
<td>Karagandy Province</td>
<td>23,300</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>Zhomart Mine</td>
<td>Karagandy Province</td>
<td>60,000</td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Ridder complex</td>
<td>Ridder-Skoly Mine</td>
<td>East Kazakhstan Province</td>
<td>NA</td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Ridder complex</td>
<td>Shubinsky Mine</td>
<td>East Kazakhstan Province</td>
<td>2,750</td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Zyrianovsk complex</td>
<td>Maleysky Mine</td>
<td>East Kazakhstan Province</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>Zyrianovsk complex</td>
<td>Grekhovsky Mine</td>
<td>East Kazakhstan Province</td>
<td>NA</td>
</tr>
<tr>
<td>Aktyubinsk Copper Co TOO (CJSC Russian Copper Co)</td>
<td></td>
<td>50th Anniversary of October Mine</td>
<td>Koktau, Aktoobe Province</td>
<td>NA</td>
</tr>
<tr>
<td>JSC Polymetal</td>
<td></td>
<td>Varvarinskoye Deposit</td>
<td>Kostanay Province</td>
<td>NA</td>
</tr>
<tr>
<td><strong>2. Concentrates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Central region</td>
<td>Balkhash concentrator</td>
<td>Karagandy Province</td>
<td>40,000</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Karagailiy concentrators</td>
<td>Karagandy Province</td>
<td>28,000</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Abyz</td>
<td>Karagandy Province</td>
<td>28,000</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Akbastau</td>
<td>Karagandy Province</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Kosmurun</td>
<td>Karagandy Province</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Nurkazgan concentrator</td>
<td>Karagandy Province</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Orlovsky concentrator</td>
<td>Karagandy Province</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Belousovsky concentrator</td>
<td>Karagandy Province</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Nikolayevsky concentrator</td>
<td>Karagandy Province</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Satpayev concentrator</td>
<td>Karagandy Province</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Zhezkazgan No 1 concentrator</td>
<td>Karagandy Province</td>
<td>88,800</td>
</tr>
<tr>
<td></td>
<td>East Region</td>
<td>Zhezkazgan No 2 concentrator</td>
<td>Karagandy Province</td>
<td>95,000</td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Ridder complexes</td>
<td>Ridder concentrator</td>
<td>Karagandy Province</td>
<td>10,000</td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Ridder complexes</td>
<td>Zyrianovsk complex</td>
<td>Karagandy Province</td>
<td>10,000</td>
</tr>
<tr>
<td>Aktyubinsk Copper Co TOO (CJSC Russian Copper Co)</td>
<td></td>
<td>50th Anniversary of October Mine</td>
<td>Koktau, Aktoobe Province</td>
<td>NA</td>
</tr>
<tr>
<td>JSC Polymetal</td>
<td></td>
<td>Varvarinskoye Deposit</td>
<td>Kostanay Province</td>
<td>NA</td>
</tr>
<tr>
<td><strong>3. Metal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kazakhmys plc:</td>
<td>Central region</td>
<td>Balkhash smelter</td>
<td>Karagandy Province</td>
<td>250,000</td>
</tr>
<tr>
<td></td>
<td>Central region</td>
<td>Balkhash refinery</td>
<td>Karagandy Province</td>
<td>250,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>Zhezkazgan smelter</td>
<td>Karagandy Province</td>
<td>250,000</td>
</tr>
<tr>
<td></td>
<td>Zhezkazgan Region</td>
<td>Zhezkazgan refinery</td>
<td>Karagandy Province</td>
<td>250,000</td>
</tr>
<tr>
<td>Ust-Kamenogorsk metallurgical complex [Kazakhmys JSC (Glencore International plc (69.61%)]</td>
<td>Oskemen</td>
<td>70,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Asia Metal plc</td>
<td>Central region</td>
<td>Oskemen</td>
<td>Karagandy Province</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Sources: (Safirova, 2013)
Copper Consumption

Based on the report of International Copper Study Group (2016), the global consumption of refined copper is steadily increasing. Figure 3.10 shows that since 1900, the usage of refined copper has increased from less than 500,000 tons to 23.6 million tons in 2015, and the usage over that period grew by a compound annual growth rate of 3.4% per year.

Figure 3.10 World refined copper usage, 1900-2015 (thousand metric tons)

International Copper Study Group (2016) states that the key driver of global refined copper usage has been Asia. Figure 3.11 shows that the demand has expanded almost eight-fold over the last 30 years, and according to Thompson Reuters (2016), China became the largest consumer of refined copper in 2015 with around 9.9 million tons that represent 46% of the worldwide usage of refined copper as it is showed in Figure 3.12. One of the causes of this precipitous increase in the level of demand of refined copper is explained by Visual Capitalist\(^\text{12}\) that states that between 2010 and 2017, an additional 70 million Chinese will migrate from rural to urban areas, which is causing a growth in the copper demand enormously.

Moreover, Focus Economics estimates that global copper consumption will increase by 3.5% in 2017 and by 3.1% by 2018. Although China will still be the greatest copper consumer, its annual demand for refined copper will slow down by 4% in 2017 because the Chinese government will seek to reduce its indebtedness, and change its economic model to one based on

\(^{12}\) Visual Capitalist is a digital media brand that have information for investors around the world. [http://www.visualcapitalist.com/website/](http://www.visualcapitalist.com/website/)
the consumption and services sectors that will cause a reduction in the infrastructure investment, and consequently, a reduction in the copper demand.

Related to the copper demand of the United States, Focus Economics estimates it will grow by 1% and JP Morgan estimates it will grow by 2% in 2017 over 2016. By 2020, Focus Economics estimates that this growth rate will continue, while JP Morgan forecasts average annual growth of 2%. According to both specialists, the economic stimulus that will be applied in the United States would have a marginal impact on world copper demand.

Therefore, it seems that trends in regional copper demand will not change in the upcoming years.

Figure 3.11 Refined Copper Usage by Region, 1960, 1980 and 2015 (thousand metric tons)

Source: (International Copper Study Group, 2016)
International Trade Flows

The major product categories of copper traded internationally include: copper concentrates, copper blister and anode, copper cathode and ingots, copper scrap and copper semis\(^\text{13}\). Figures 3.13 and 3.14 show the global import and export levels of these copper products.

\(^\text{13}\) Based on (International Copper Study Group, 2016), the primary copper production starts with the extraction of copper-bearing ores. After the ore has been mined, it is crushed and ground followed by a concentration by flotation. The obtained copper concentrates typically contain around 30% of copper, but grades can range from 20 to 40 per cent. Smelting and electrolytic refining to produce a pure copper cathode (copper cathode). In the following smelting process, sometimes preceded by a roasting step, copper is transformed into a “matte” containing 50-70% copper. The molten matte is processed in a converter resulting in a so-called blister copper of 98.5-99.5% copper content. In the next step, the blister copper is fire refined in the traditional process route, or, increasingly, re-melted and cast into anodes for electro-refining. The output of electro-refining is refined copper cathodes, assaying over 99.99% of copper. Alternatively, in the hydrometallurgical route, copper is extracted from mainly low grade oxide ores and some sulphide ores, through leaching (solvent extraction) and electrowinning (SX-EW process). The output is the same as through the electro-refining route-refined copper cathodes.
In 2015, according to International Copper Study Group (2016), the top five exporters of copper ores and concentrates were Chile, Peru, Australia, Indonesia and Canada, while the top five importers were China, Japan, India, Spain, and Korean Republic. In the case of copper blister and anode, the top five exporters in 2015 were Chile, Bulgaria, Spain, South Africa, and Belgium, while the top five importers were China, Belgium, India, Canada, and Korean Republic. The top five exporters of refined copper in 2015 were Chile, the Russian Federation, Japan, Australia, and Kazakhstan, while the top five importers were China, Germany, United States, Italy, and Taiwan.

Finally, in the case of semi-fabricated copper products, there is a more diversified participation. Figure 3.15 below shows the major importers and exporters of this product.
As discussed in the previous section, we found that Kazakhstan is the fifth leading exporter of refined copper. However, Kazakhstan produces and exports other types of copper products as well. This section presents information on Kazakhstan’s copper imports and exports of copper using the Harmonized System (HS) and data from UN Comtrade.

Kazakhstan’s Global Trade

Source: (International Copper Study Group, 2016)

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14 UN Comtrade International Trade Statistics Database (https://comtrade.un.org)
15 The Harmonized Commodity Description and Coding System (HS) is an internationally standardized system of names and numbers to classify traded products.
**Copper Ores Concentrates (HS 2603)**

Kazakhstan’s export of copper ores concentrates (HS 2603) in 2015 amounted to an estimated USD $311 million. The top export destinations were China (67%) and the Russian Federation (22%). These two countries represent almost 90% of all exports. It is important to notice that the participation of the Russian Federation has changed over time; in 2005, this country represented almost 95% of all Kazakhstan exports.

On the imports side, Figure 3.17 shows that copper ores and concentrates reached USD $19 million in 2015. The top import origins were Tajikistan (81.2%) and the Russian Federation (18.8%). Almost all imports came from these two countries. In 2005, the top import origin was the Russian Federation (47.4%).

Figure 3.16 Export destination of ores and concentrates (2015)  
Source: UN Comtrade

Figure 3.17 Import origins of ores and concentrates (2015)  
Source: UN Comtrade

Figures 3.18 and 3.19 show the trend of exports and imports between 1995 and 2015. During 2015, there was a contraction of around 60% in quantity of exports (kg). It is worth mentioning here that according to Smirnov (2010), the independent experts five years ago warned that in the coming years the volume of copper production in the country would decrease due to the depletion of the ore base and the deteriorating mining conditions at the operating mines. Smirnov also provides a similar caution from the experts of the “National Center on Complex Processing of Mineral Raw Materials of the Republic of Kazakhstan,” warning that if the situation with ore supply does not change, then, in 10 years, the copper production in the country would drop by one third, and by 2030, the deposits would be fully developed. Thus, the
sudden drop in national exports in 2015 can be partially explained with reduction of the ore mining and worsening of mining conditions at the operating mines.

Figure 3.18 Kazakhstan ore and concentrate copper exports in trade value (USD) and net weight (Kg)

Source: UN Comtrade

Figure 3.19 Kazakhstan ore and concentrate copper imports in trade value (USD) and net weight (Kg)

Source: UN Comtrade
Refined Copper (HS7403)

Refined copper is one of the top largest exports of Kazakhstan after crude petroleum, refined petroleum, and petroleum gas radioactive chemicals. In 2015, Kazakhstan exported 354,500 tons of refined copper valued at USD $1,919.7 million (a 37% increase compared with that of 2014). On the imports side, refined copper reached USD $4.4 million in 2015.

Figure 3.20 Kazakhstan refined copper exports in trade value (USD) and net weight (Kg)

Source: UN Comtrade

Figure 3.21 Kazakhstan refined copper imports in trade value (USD) and net weight (Kg)

Source: UN Comtrade
In 2015, Kazakhstan’s main export partner was China, which received 40%, by value, of the country’s exports. It was followed by Malta (26%), Turkey (22%), United Kingdom (9%), and Germany (1%), while the main imports of refined copper came from the Russian Federation (88%) and China (9.3%).

Copper cathodes and sections of cathodes unwrou (HS740311)

In 2015, the level of exports of the copper cathodes and section of cathodes unwrou reached 290.6 thousand tons valued at USD $1,562.3 million. While on the imports side, refined copper reached USD $0.1 million in 2015.
Kazakhstan’s main export partner was China (49%) followed by Malta, United Kingdom (12%) and Turkey (6%); and the main import partner was United States, which provided Kazakhstan with 52% of its imports, by value. It was followed by Germany (34%) and the Russia Federation (13%).
Factors Affecting Trade

Changes in trade regulations, such as import duties or export quotas, can have significant impacts on the volume of international trade of copper.

Copper Price

Copper is an internationally traded commodity with prices principally determined by the major metal exchanges. One of the most important factors in trading a commodity such as copper is the settlement price for the present day (spot price) or for future days. Figure 3.28 shows a negative trend of copper price level between June 2001 and June 2016. One of the most important factors that explains why price has dropped fairly steadily is the increase in the global copper production that has caused a surplus in the copper market (CODELCO, 2016), as well as the slowdown and uncertainties about the Chinese economic growth.

Figure 3.28 Copper Stocks, Prices and Usage (06/2001 – 06/2016)
(thousand metric tons and US cents /pound)

Source: (International Copper Study Group, 2016)
Perspectives about the copper price are shown in Figure 3.29. Although copper price is not expected to have very high growth rates in the coming years, copper is one of the metals with a better long-term perspective since there is a predicted positive trend until 2030.

Figure 3.29 World Bank Commodities Price Forecast (nominal US dollars)

![Graph showing commodity price forecast from 2014 to 2030.](image)

Source: (World Bank, 2017), released: January 24, 2017

*Role of a Commodity Exchange*

The role of a commodity exchange is to facilitate and transparently settle prices. There are three commodity exchanges that provide the facilities to trade copper. Firstly, the London Metal Exchange (LME) allows copper to be traded in 25-ton metric lots where it is quoted in USD per ton. Secondly, the Commodity Exchange Division of the New York Mercantile Exchange (COMEX/NYMEX) is another example where copper is traded in lots of 25,000 pounds and quoted in US cents per pound. Lastly, the Shanghai Futures Exchange (SHFE) is another example where copper is traded in lots of five tons and quoted in Renminbi per ton. In all these three commodity exchanges, prices are settled by bid and offer, reflecting the market's perception of supply and demand of a commodity on any day.
Conclusion

Kazakhstan ranks among the largest 20 copper producing countries around the world and it is located near the highest copper consumer countries (China, Germany and Belgium). Thus, Kazakhstan has a comparative advantage to other producing countries (i.e. Chile) in terms of geographical proximity.

One of the main factors that determines the level of copper supply is the level of copper reserves. Based on U.S. Geological Survey, Kazakhstan owns less than 2% of the global copper reserves, which is relatively low compared to other country’s reserves like Chile and Peru. However, this copper reserve data may vary over time and depends on new copper discoveries. Therefore, one action that Kazakhstan should start is to promote new mining exploration to attract new participants (investors) in its copper industry.

In most traditional copper products (smelter copper and refined copper), there is a projected negative trend in domestic production. There is a notable positive trend only in the production of mined copper. This means that Kazakhstan is no longer adding value to its copper production. Therefore, it is important that Kazakhstan evaluate its industrialization and trade policies as well as policies to attract investment to change this negative trend.

There are very few companies that produce copper in Kazakhstan. The mining sector is often subject to laws and regulations about concession fees, water use and discharges, power use and generation, use and storage of explosives, surface rights, taxation, labor standards, and mine safety, among others. Therefore, any changes in these regulations affect, first and foremost, the operational costs of a company. Therefore, Kazakhstan should guarantee a stability and predictability in operational costs to attract new producers to the copper market. In addition, the geo-political framework might also be causing some disincentive for foreign private investment in Kazakhstan copper mining sector.

Finally, the copper exports of Kazakhstan are highly concentrated. In case of refined copper, for example, only four countries (China, Russia, Serbia and Bulgaria) represent almost all total exports.
3. Natural Gas

Overview

In defining natural gas, we reference International Energy Agency\textsuperscript{16} (hereafter IEA), which states that, “Natural gas comprises gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both "non-associated" gas originating from fields producing only hydrocarbons in gaseous form, and "associated" gas produced in association with crude oil as well as methane recovered from coal mines (colliery gas) or from coal seams (coal seam gas). Production represents dry marketable production within national boundaries, including offshore production and is measured after purification and extraction of NGL [Natural Gas Liquids] and Sulphur. It includes gas consumed by gas processing plants and gas transported by pipeline. Quantities of gas that are re-injected, vented or flared are excluded” (“IEA - Balance Definitions,” n.d.).

Natural gas can have two states: gaseous natural gas (GNG) and liquefied natural gas (LNG). The former is compressed and transported through pipelines under high pressure and the latter is cooled to shrink the volume, convert it into liquid form and then, this gas is transported under cool temperatures in special ships (sometimes by tracks). It is worth mentioning here that Kazakhstan does not have large potential in LNG and must rely on GNG because of two main reasons. First, Kazakhstan is a landlocked country, so it has to use pipelines to reach its primary consumers like European countries, Russia and China. Secondly, LNG requires advanced technologies to be liquefied and transported and, thus, it is more expensive than GNG.

Additionally, there are two sources of natural gas: conventional and unconventional. The main differences between the two sources are in the different geological structure of the deposits and the methods of their production (“Types of gas and its use,” n.d.). The conventional natural gas is extracted by vertical drilling methods whereas unconventional sources of gas, among other techniques, are extracted by horizontal drillings because it is trapped underground by impermeable rocks, such as coal, sandstone and shale (IEA, n.d.). The extraction of conventional

\textsuperscript{16} The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA carries out a comprehensive program of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports (International Energy Agency, 2016).
natural gas is cheaper than unconventional one. So far, Kazakhstan is well known for its rich reserves of conventional sources, but it might develop also the unconventional gas on the eastern part of the country (Shale Gas International, 2014).

The importance of natural gas is increasing in the world. This is despite the fact that “[g]as has low energy content per unit volume, even when substantially compressed, compared to oil and coal” (Ericson, 2012) and so far it ranks third as a global primary energy source (21%), after oil and coal (IEA, n.d.). However, the world is seeking a cleaner source of energy and here, gas can be a good substitute for oil and coal because it produces less carbon dioxide and thus, releases less into the atmosphere. Thus, IEA states that in the next few decades, the consumption of gas will continue to increase and most likely will displace coal consumption (“Resources2013.pdf,” n.d.). Additionally, according to IEA, natural gas as well as renewable energy sources have a large potential to meet energy demand growth until 2040 (“World Energy Outlook 2016,” n.d.).

Natural gas plays an important role in Kazakhstan, especially in the oil sector because of the reinjection process. According to National Energy Report (2015) (hereafter the Report), the major portion of natural gas in Kazakhstan is produced with oil (associated) and the large volume of it is re-injected to maximize oil production. Thus, the commercial volumes of natural gas to date have a secondary significance. Specifically, the report states that nearly 40% of the associated gas is re-injected and only approximately 60% of gas is available to market to consumers. The natural gas sector, as an independent energy source, is an opportunity for the country’s economic growth. For example, Kazenergy states that the natural gas sector of Kazakhstan has significant potential for further development, which could allow Kazakhstan to become one of the top leading regional producers of natural gas in the future. However, to realize this potential, a large amount of investments is needed to build necessary pipeline infrastructure.

Natural Gas Reserves

In understanding the global reserves of natural gas, both conventional and unconventional sources should be taken into consideration. IEA provides a detailed outlook of world gas reserves. Specifically, it states that the proven world conventional gas reserves are more than 200 trillion cubic meters (tcm), which given the current production levels is enough for more than 60 years. Figure 4.1 illustrates that more than half (54%) of the gas reserves are located in Russia,
Iran and Qatar and about 40% of world reserves belong to Organization of the Petroleum Exporting Countries (OPEC) member countries.

Figure 4.1 Distribution of conventional natural gas in 2012

![Distribution of conventional natural gas in 2012](image)

Source: IEA, 2012

The unconventional natural gas greatly affects the world gas outlook for reserves, production and demand (“National Report 2015.pdf,” n.d.). According to the Report, unconventional global reserves approximately equal to 385 tcm (see Figure 4.2). So, when the two sources of gas are added, the global reserves become about 789 tcm, which at current rates of consumption will last nearly 250 years.
Nationally, Kazakhstan is also rich in natural gas. However, it is difficult to identify the exact amount of reserves because different resources use different measures and thus, illustrate different results. For instance, according to Kazakhstan’s State Commission on Reserves (GKS), the country’s gas reserves are about 4.03 tcm (as cited in the Report). Whereas, IHS Energy\(^{17}\) estimates Kazakhstan’s remaining gas reserves at 3.8 tcm.” The less optimistic estimates for proven gas reserves is about 2.4 tcm in 2015 as is shown by BMI research reported by A Fitch Group Company\(^{18}\) in their “Kazakhstan Oil & Gas Report Q2 2017.” Nevertheless, in this paper, we follow BP Statistical Review of World Energy, June 2015, where by international definitions for only “proven” reserves, Kazakhstan has about 1.5 tcm of natural gas at the end of 2014.

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\(^{17}\) About IHS Energy: Our global network of technical teams and industry experts research and analyze energy industry activities, covering more than 200 countries, to bring you the most comprehensive and accurate information and analysis available when, where and how you need it (“IHS Energy,” n.d.).

\(^{18}\) Fitch Group is a global leader in financial information services with operations in more than 30 countries. In addition to BMI Research, Fitch Group is comprised of: Fitch Ratings, a global leader in credit ratings and research; Fitch Solutions, a leading provider of credit market data, analytical tools and risk services; and Fitch Learning, a provider of learning and development solutions for the global financial services industry (“About Fitch Group,” 2015).
which is approximately 0.8% of the global total (as cited in the Report). The Report further states that according to this measure, Kazakhstan has the third largest natural gas reserves among the Commonwealth of Independent States (CIS) after Russia and Turkmenistan and 23rd in the world.

**Natural Gas Production**

The production of natural gas has been increasing around the world. According to IEA (2016), the global production of natural gas has been growing in every region. Figure 4.3 illustrates the dynamics of production from 1973 to 2015 by world regions. Importantly, IEA argues that the global production peaked at 3,590 billion cubic meters (bcm) in 2015, which is the new record and 1.6% higher than the previous year.

![Figure 4.3 World Natural Gas Production by Region](image)

Source: International Energy Agency (2016, p. 8)

The production of natural gas has increased significantly in Kazakhstan as well. Figure 4.4 shows the production of 43.2 bcm in 2014 is five times more than it was in the beginning of the 1990s. There was some minor fluctuation between 1990 and 2000 but after that we can see a stable increase in production.
However, as mentioned above, since 2004 about 40% of the total gas production volume was reinjected to maximize the oil producing process. So, even though there was a sharp increase in production since 2004 (see Figure 4.4), the reinjected volume has also grown at the same pace since that time (see Figure 4.5). According to the Report, one of the main reasons that the reinjection process began specifically in 2004 by producers is the enactment of the law “On Oil” in the same year. This legislation obliged producers to utilize associated gas either for technical needs or to selling the gas whereas before this law, producers could just burn all the gas and produce only the oil.

Source: adapted from National Report (2015)

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19 The Report makes some notes regarding Kazakhstani calculation method of natural gas production. Specifically, it states that the “Gross production includes total volumes extracted from the reservoir, so it also includes all non-methane components, including hydrogen sulfide, carbon dioxide, nitrogen etc. It also includes reinjected volumes. In standard international statistical practice, reported production does not include reinjected volumes, but only “commercial” output available for project use and distribution to consumers. In Kazakhstan, a total of about 18.4 Bcm in 2014, or nearly 43% of gross gas production, is reinjected. All gas volumes in this report are quoted in the measure employed in countries of the former Soviet Union of 8,200 kilocalories (kc) per cubic meter (i.e., volumes are measured at 20°Centigrade (C) and 760 millimeters [mm] of mercury) instead of the usual international standard of 9,500 kc per cubic meter (at 15°C at a pressure of one atmosphere [760 mm of mercury]). To convert Soviet/Russian volumes to international standard gas volumes, multiply by 0.935.”
As a result, the outlook of Kazakhstan’s production of natural gas is shown in Figure 4.6. This figure illustrates the international standards of production, which count only commercial volumes. If we compare this with data in Figure 4.4, we can see that the total production level of gas was not growing between 2009 and 2014.

In terms of prediction, BMI (2017) believes that because Kazakhstan’s natural gas is mostly associated gas (produced with oil), its production trends will depend heavily on oil at least until 2026. BMI provides two main reasons for the limited potential of Kazakhstani natural
gas; firstly, the weak domestic demand and saturated regional market will limit potential as it will keep providing strong incentives to further reinject the main volume of gas. Interestingly, the same scenario for Kazakhstani natural gas production is given by the Report. Secondly, the forecast is also supported by the fact Kazakhstan emphasizes oil extraction and thus, the associated gas production has also grown significantly. Particularly, as it is seen in Figure 4.7, associated gas production is almost twice as high as non-associated gas production between 2009 and 2014. Overall, the gap in the dynamic of growth has been increasing since 1994.

Figure 4.7 Gas Production (including reinjected volumes) in Kazakhstan: Associated versus Non-Associated Gas

Source: Kazakhstan statistical agency; Ministry of Energy as cited by the National Report (2015)

According to the Report, the main actors in Kazakhstani natural gas production are international oil company-partnered projects. As Figure 4.8 illustrates, the biggest share of total production is held by the Karachaganak Petroleum Operating (KPO) – 42%. The second most important company is Chevron-led TengizChevroil (TCO) joint venture (JV) – 34%. So, we can see that KPO and TCO jointly produce over 75% of Kazakhstan’s gross gas production. Other companies have much smaller shares in the gas market (see Figure 4.8 for details).
In terms of geographic distribution of gas production, the leader is the western part of Kazakhstan. This region is located next to the Caspian Sea. So, 94% of the natural gas gross production is in the western regions (“National Report 2015.pdf,” n.d.). Figure 4.9 shows the most production of gas is in Aktobe, Atyrau, Mangistau, and West Kazakhstan oblast (administrative region), these regions are located in the western Kazakhstan.
Natural Gas Demand: Global and Domestic

The global demand of natural gas has been increasing as the world is seeking cleaner energy sources. According to IEA (2016), the demand of gas around the world hit almost 3,600 billion cubic meters (bcm) in 2015, which is a year-on-year increase of 1.4%. Figure 4.10 demonstrates the world gas demand by region. We can see that Africa, the Non-OECD Americas and the Middle East are the top three regions where the demand increased almost three-fold between 1971 and 2015. The IEA Medium Term Gas Market Report 2015 forecasts an average annual growth rate of 2% until 2020.

Figure 4.10 World Natural Gas Demand by Region

Despite large reserves and significant production level of natural gas, Kazakhstan has to import gas from neighbor states. Figure 4.11 illustrates the import trends between 1990 and 2014. We can see a large fluctuation during this period. There were two main peaks of imports in 1992 (14.3 bcm) and in 2004 (11.7 bcm). According to BMI (2017), some regions of Kazakhstan are not connected to domestic gas pipelines due to limited infrastructure. As a result, BMI further explains that the southern part of Kazakhstan must import natural gas from Uzbekistan via Tashkent-Shymkent-Bishkek-Almaty pipeline and the northern part of the country imports gas from Russia.
In order to address this problem and provide natural gas to the capital and north regions of the country, the President, N. Nazarbayev, ordered a project to build a gas pipeline “Tobol-Kokshetau-Astana” in 2012 (Ministry of Energy, 2015). However, shortly after, the Ministry of Energy concluded that this project is too expensive and implementation of this project must be postponed to the future. According to Ministry of Energy, only nine oblasts out of 14 have access to natural gas in gaseous state and other five oblasts are provided only liquid gas.

Figure 4.11 Kazakhstan’s Natural Gas Imports (in bcm)

Adapted from Source: Ministry of Energy; Kazakhstan statistical agency; IHS Energy as cited by the Report (2015)

The Report provides a forecast for Kazakhstan’s gas imports until 2040. Figure 4.12 illustrates that since the beginning of 2015, there was not any significant fluctuation compared to the previous two decades (see Figure 4.11). Particularly, the Report predicts that Kazakhstan will keep importing about six bcm in the next several decades. There are several reasons for this forecast. First, the Ministry of Energy of the Republic of Kazakhstan has an agreement with Russia to import gas. Secondly, Kazakhstan is not planning to build gas pipelines to the central and west regions in the near future because these projects are too costly. As a result, Kazakhstan will continue to import six bcm of natural gas regularly at least until 2040.
Kazakhstan’s Natural Gas Exports

The export of natural gas from Kazakhstan has increased about four times since the 1990s. Figure 4.13 illustrates a fairly modest export volume from 1990 to 2001. However, after that we can observe a sharp increase in the export of gas. According to the latest data from BMI (2017) the export in 2015 was 12.1 bcm, which is about twice less than in 2013.
The major organizations that conduct analysis in the energy sector predict a negative scenario for Kazakhstan’s natural gas export trend. For example, BMI (2017) anticipates that even with gas production increasing, exports will fall from 12.1 bcm in 2015 to 11.2 bcm in 2026. A more pessimistic perspective in medium term (next ten years) is provided by IHS\(^{20}\), who predicts that gas exports will fall to 7.8 bcm in 2025 (see Figure 4.14). However, in the long term (next 20-25 years), the Report is more optimistic. Particularly, we can see in Figure 4.14 below that the export will steadily increase and reach 16 bcm in 2040, which is slightly higher than it was in 2005.

![Figure 4.14 Forecasts for Kazakhstan’s Natural Gas Exports (in bcm)](image)


BMI explains that this pessimistic prediction for exports is due to high competition in the region. Specifically, Russia, Uzbekistan and Turkmenistan are increasing their exports to fulfill growing demand for natural gas from China. According to BMI, Chinese pipeline imports will increase from 42.41 bcm in 2016 to 92.1 bcm by 2016 due to its government’s greener policies. However, Kazakhstan will not be able to compete with its neighbors.

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\(^{20}\) About HIS: “IHS Markit is a dynamic team that includes more than 5,000 analysts, data scientists, financial experts and industry specialists. Our global information expertise spans numerous industries, including leading positions in finance, energy and transportation” (“IHS Markit - About Us,” n.d.)
As seen in Figure 4.15, Kazakhstan exports gas mainly to its closest neighbors: Russia, China and Kyrgyzstan. We can observe that all exports between 1990 and 2010 went only to Russia and only after that, two other importers China and Kyrgyzstan started to import Kazakhstani natural gas. According to Ericson (2012), Russia had a monopoly, buying all Kazakhstan’s gas until 2009 due to a pipeline system inherited from Soviet era that transports Kazakhstani gas to Europe through Russia’s territory. After 2009, China intervened in the Central Asian gas market. The detailed overview of the geopolitical aspects around regional gas and the price change because of the Chinese presence in Kazakhstan gas exports will be given in the “Infrastructure and Geopolitical Challenges for Natural Gas” section later in this paper. Here, we would like just to mention that there is an agreement between Kazakhstan and China about delivering 10 bcm of gas every year. However, as it was mentioned above, analytics are skeptical that Kazakhstan will be able to deliver that volume to China up to 2030 because the exports will decrease (see Figure 4.15).

Figure 4.15 Kazakhstan’s Natural Gas Export Destinations


Note: “Exports are aggregated only to those countries for which there is a contractual relationship (e.g., Russia, Kyrgyzstan, China), rather than those for which exports are reported by trade statistics” (the Report 2015).
Natural Gas Transit

Despite the expected decrease in exports, Kazakhstan has some potential to serve as an intermediary for natural gas transit due its geographic location in the heart of Eurasia ("National Report 2015.pdf," n.d.). BMI (2017) states that Kazakhstan plays a significant role in gas pipeline exports flowing from Uzbekistan and Turkmenistan to Russia and China (see Figure 4.16). According to Ministry of Energy (2015), the volume of natural gas transited through the territory of Kazakhstan in 2013 was about 99 bcm. In order to understand the role of Kazakhstan as a gas intermediary, we can compare transited volume with export volume, which was only 20.6 bcm in the same year (see Figure 4.13). So, we can see that the amount of gas transited is almost five times more than that exported. Thus, Kazakhstan can use this not only as an economic advantage but also as a political tool in relationship with its neighbors.
In terms of future scenario, the Report states that the flow of transit gas to China will increase in the future. In Figure 4.17 we can observe that this transit volume through Kazakhstan’s territory to China will account for more than 60% of the total transit. At the same time, it is clear that Turkmen and Uzbek gas volume to Russia through Kazakhstan has declined significantly and this low volume will continue.

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21 A trunkline is a pipeline which is used to transport crude oil and natural gas across countries or within states. These pipelines are the set of large diameter carbon steel pipelines which carry the petroleum products (Petropedia, 2017).
Conclusion

The importance of natural gas is increasing in the world as countries are seeking this cleaner source of energy. It is expected that in the next few decades natural gas consumption will continue to grow and most likely will outpace coal consumption. However, natural gas in Kazakhstan is a secondary commodity from oil production. A large amount of gas is used to maximize oil production and only about 60% of gas production is available directly to consumers.

Using the international standards of assessing natural gas volumes, Kazakhstan had about 1.5 tcm of gas at the end of 2014, which is approximately 0.8% of the global total. Kazakhstan has less reserves than Russia and Turkmenistan among CIS countries and ranks 23rd overall in the world. The trend in production of natural gas has increased five times in Kazakhstan since 1990. However, despite large reserves and significant production levels, Kazakhstan has to import natural gas from neighbor states to provide gas to the northern and southern regions. This is due to limited pipeline infrastructure. In terms of exports, Kazakhstan has increased the volume of selling gas about four times since 1990s. Despite these promising factors, BMI and IHS analytics predict a pessimistic future for Kazakhstan’s natural gas exporting potential until 2025. The main reason for this forecast is high competition in the region from Russia,
Turkmenistan and Uzbekistan. However we do find, at the current time, there is great potential for gaining benefits from gas transported through Kazakhstan in the future.

4. Wheat

Overview

The cultivation of wheat reaches far back into history. Wheat was one of the first domesticated food crops and for 8,000 years has been the basic staple food of the major civilizations of Europe, West Asia and North Africa. Today, wheat is grown on more land area than any other commercial crop and continues to be the most important food grain source for humans. Its production leads all crops including rice, maize and potatoes (“Wheat in the world - B.C. Curtis,” n.d.).

(220.4 million hectares, 2014) (“FAOSTAT,” n.d.). World trade in wheat is also greater than for all other crops combined. Since 1960, the world production of wheat and other grain crops has tripled and is expected to grow further through the middle of the 21st century (Godfray et al., 2010).

Kazakhstan is one of the world’s major wheat and flour exporters. It is among the 10 largest wheat producers. The main grain crop is milling wheat, which is typically high in quality and protein. There is a growing trend for Kazakhstan to export its grain internationally (“Embassy of the Republic of Kazakhstan » Agricultural Sector,” n.d.).

Wheat Production

World Wheat Production

Most of the world's wheat production is grown as winter wheat in the Northern Hemisphere, but Kazakhstan, Russia, Canada, and the United States have large spring wheat production, which is planted much later. Moreover, in the Southern Hemisphere, Australia and Argentina plant their winter wheat after the Northern Hemisphere's spring wheat. With wheat being planted and harvested at different times, countries can respond quickly to changing market conditions (“USDA ERS - Trade,” n.d.).
The leading wheat producers worldwide in 2016 are European Union, China, India, Russia, United States, Canada, Pakistan, Australia, Ukraine, and Turkey. The European Union, which is an amalgamation of several European nations, is the largest producer. However, among other nations, China is the world's second largest wheat producing country. India is the third-largest wheat producing nation, followed by Russia, United States, and Canada.

Figure 5.1: World Wheat Production by Country

Source: Food and Agriculture Organization, 2016

Figure 5.2: Projected Leading 10 Wheat Producers Worldwide in 2016/2017

Source: Statista
In past 10 years, the world wheat production increased from 600 million tons to 758 million, however, the production growth was not steady and there were some fluctuations. According to the forecast of FAO, the global wheat production will reach 744 million tons in 2017, indicating a 1.8% decline from 2016, but is still above the average record of last five years ("FAO," n.d.). The year-on-year decline would mostly reflect expectations of reduced crops in North America and a return to normal production levels in Australia after an extremely high output in the previous season.

Figure 5.3: World Wheat Production Overview

![World Wheat Production](chart.png)

Source: Food and Agriculture Organization, 2016

**Kazakhstan Wheat Production**

Kazakhstan consists of 14 administrative territories, or oblasts. About 75% of the country’s wheat is produced in three oblasts in north-central Kazakhstan: Kostanai, Akmola, and North Kazakhstan. Kostanai alone plants about four million hectares of wheat, as much as the entire state of Kansas. Spring wheat occupies 95% of the total wheat area in Kazakhstan and virtually all of the wheat in the three north-central oblasts. Minor grains include spring barley and oats (which are grown in the same region as spring wheat), winter wheat (southern Kazakhstan.), and rice (southern Kazakhstan, mostly in Kzyl-Orda oblast) (“Kazakhstan Agricultural Overview,” n.d.).
Over 3/4s of the cereals land area for production is occupied by spring wheat. Spring wheat is cultivated generally in northern region, and in the south, winter wheat is cultivated. Consistent with previous years, the main wheat production comes from three regions: Akmola, Kostanay and North Kazakhstan. (‘2016 Kazakhstan Country Report.pdf,’ n.d.)

Figure 5.4: Kazakhstan Wheat Production by Oblast

Source: State Statistical Agency of Kazakhstan, 2008

<table>
<thead>
<tr>
<th>Area under wheat 2016, thous Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kostanay region, thous Ha</td>
</tr>
<tr>
<td>Other regions, thous Ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall wheat harvest in 2016, thous Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kostanay region, thous Ha</td>
</tr>
<tr>
<td>Akmola region, thous Ha</td>
</tr>
<tr>
<td>North Kazakhstan region, thous Ha</td>
</tr>
<tr>
<td>Other regions, thous Ha</td>
</tr>
</tbody>
</table>

Source: Forecast of Agricultural Ministry of the Republic of Kazakhstan
Kazakh wheat has high protein, and soft wheat flour has excellent baking qualities that are valued in many countries of the world. Figure 5.5 provides some details of Kazakhstani wheat quality.

### Figure 5.5: Quality of Kazakhstan Wheat

<table>
<thead>
<tr>
<th>Quality of Kazakhstan Wheat at Normal Climate Year</th>
<th>Wheat Quality Expectations in the 2016/2017 Corp Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat production - 14-15 mio tons</td>
<td>Wheat Production – 17,8 mio tons</td>
</tr>
<tr>
<td>Wheat Grade I, II – 25%</td>
<td>Wheat Grade I, II – 5%</td>
</tr>
<tr>
<td>Wheat Grade III – 60%</td>
<td>Wheat Grade III – 20%</td>
</tr>
<tr>
<td>Wheat Grade IV – 10%</td>
<td>Wheat Grade IV – 45%</td>
</tr>
<tr>
<td>Feed Wheat – 5%</td>
<td>Feed Wheat – 30%</td>
</tr>
<tr>
<td>Average export capacity 6,5-8,5 mio tons</td>
<td>Average export capacity 8,5 – 9 mio tons</td>
</tr>
</tbody>
</table>

### Figure 5.6: Quality Division of Kazakhstan Wheat

<table>
<thead>
<tr>
<th>Wheat Grade I, II</th>
<th>Test weight: 76 kg/hl minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wet gluten: 26-28% minimum</td>
</tr>
<tr>
<td></td>
<td>Protein (on dry basis): 14,5% minimum</td>
</tr>
<tr>
<td></td>
<td>Moisture: 13,0% maximum</td>
</tr>
<tr>
<td></td>
<td>Falling number: 250 seconds minimum</td>
</tr>
<tr>
<td></td>
<td>Foreign material: 2.0% maximum</td>
</tr>
<tr>
<td></td>
<td>Other grains: 4,5% maximum</td>
</tr>
<tr>
<td>Wheat Grade III</td>
<td>Test weight: 73 kg/hl minimum</td>
</tr>
<tr>
<td></td>
<td>Wet gluten: 23-25% minimum</td>
</tr>
<tr>
<td></td>
<td>Protein (on dry basis): 12,5% minimum</td>
</tr>
<tr>
<td></td>
<td>Moisture: 14,0% maximum</td>
</tr>
<tr>
<td></td>
<td>Falling number: 200 seconds minimum</td>
</tr>
<tr>
<td></td>
<td>Foreign material: 2.0% maximum</td>
</tr>
<tr>
<td></td>
<td>Other grains: 4,5% maximum</td>
</tr>
<tr>
<td>Wheat Grade IV</td>
<td>Test weight: 70 kg/hl minimum</td>
</tr>
<tr>
<td></td>
<td>Wet gluten: 18% minimum</td>
</tr>
<tr>
<td></td>
<td>Protein (on dry basis): 9,5% minimum</td>
</tr>
<tr>
<td></td>
<td>Moisture: 14,0% maximum</td>
</tr>
<tr>
<td></td>
<td>Falling number: 100 seconds minimum</td>
</tr>
<tr>
<td></td>
<td>Foreign material: 2.0% maximum</td>
</tr>
<tr>
<td></td>
<td>Other grains: 5,0% maximum</td>
</tr>
</tbody>
</table>
| Feed Wheat          | Test weight: 65 kg/hl minimum  
|                    | Moisture: 14.0% maximum         
|                    | Foreign material: 2.0% maximum  
|                    | Other grains: 15.0% maximum     |
| Barley             | Test weight: 62 kg/hl minimum   
|                    | Moisture: 14.0% maximum         
|                    | Foreign material: 2.0% maximum  
|                    | Other grains: 7.0% maximum      |

Source: Agricultural Ministry of the Republic of Kazakhstan

The Foreign Agriculture Service of USDA estimates wheat production in Kazakhstan in MY 2016/2017 at 16.0 MMT, lower than the Government of Kazakhstan’s (GoK) official statistics. Post production estimates are based on a detailed region-by-region analysis of sown area, harvest and yields. However, quality was a significant issue in the 2016-2017 wheat crop. Low levels of sunlight resulted in low gluten content making much of the wheat unusable for millers. Moreover, the high moisture levels during the growing season resulted in significant losses due to rot, rust, and underdeveloped kernels (“Kazakhstan Agriculture Update 2016.pdf,” n.d.).

Productivity of wheat in Kazakhstan considerably varies year by year, caused, mainly, by weather conditions. However, the average yield grew by 6% from 2009 to 2013 in comparison with 2001 to 2005 (“Kazakhstan Country Report, BTI 2016.pdf,” n.d.). Thus, in the long term, production of wheat in Kazakhstan may have a more positive trend towards efficiency due to the introduction of improved resource-saving technologies, steady grades, and some gradual warming of the climate.

During the period from 2009 to 2015, the land area where wheat was planted declined significantly from 14.7 million hectares to 11.7 million hectares. The decline in wheat area is largely attributable to policies of the GoK which have encouraged crop diversification. The Kazakhstani Ministry of Agriculture has indicated it still plans to discourage the planting of wheat for the next few years as part of its “crop diversification” strategy (“Kazakhstan Agriculture Update 2015.pdf,” n.d.).

The Kazakhstani Ministry of Agriculture still believes that for the next few years, Kazakhstan needs to decrease the wheat planting area another 2.2 million hectares in order to continue the “crop diversification” strategy.
The Kazakhstan’s Ministry of Agriculture recently reported that the total planted area in 2016 will be 21.6 million hectares, which is 413,000 hectares (or 2%) higher than in 2015. The spring planting area will reach 18.4 million hectares. The demand for spring planting seeds in 2016 is estimated at 2.4 million tons. This level of demand will result in a deficit of more than 10,000 tons of seed, necessitating significant seed imports. Given devaluation of the tenge, seed, machinery and spare parts imports will be costly and may have a significant impact on farmers’ margins ("Grain and Feed Annual_Astana_Kazakhstan - Republic of_4-19-2016.pdf," n.d.).
World Wheat Demand and Supply

According to the statistics from USDA, European Union, China, India, United States and Russia are the leading consumers of wheat in the world. Figure 5.8 clearly illustrates this statement.

Figure 5.8: World Wheat Consumption by Country

Source: Foreign Agricultural Service, Office of Global Analysis, IPA Division, USDA

The world wheat supply increased steadily in past 10 years. Total world wheat supplies will be greatly impacted by changes in acreage by region. There is a positive relationship between the previous year's price and the following year's planted acreage. Thus, a higher price the previous year suggests higher acreage the next year, indicating a higher supply.
Figure 5.9: Supplies in Top Exporting Countries (in MMT)

(U.S., Canada, Australia, Argentina, EU, Russia, Ukraine and Kazakhstan)

Source: USDA World Agricultural Supply and Demand Estimates, April 11, 2017

Record size world carry-in stocks add to the global surplus, resulting in the largest estimated world wheat supply on record. USDA estimates 2016-2017 world carry-in stocks at 240 MMT (8.84 billion bushels), up 11 percent from last year and greater than the five-year average of 197 MMT (7.25 billion bushels). Total world supply will reach a projected 993 MMT (36.5 billion bushels), up 40.4 MMT from the record set in 2015/16. The ample world supply will help meet strong global wheat demand (Stephanie Bryant-Erdmann, USW Market, n.d.).

Global wheat consumption over the last 10 years has grown by about 10.8 million tons per year. Rising population, especially in developing countries, has been a major driving force behind increases in global demand for wheat. Wheat is a staple food in many low- and middle-income countries and most of the countries has limited ability to expand wheat production, which increases global wheat demand.
Figure 5.10: World Wheat Supply and Demand

Source: USDA World Agricultural Supply and Demand Estimates, April 11, 2017

**Kazakhstan Wheat Supply**

The supply of grains on the Kazakhstani market is much higher than the internal demand. Moreover, the agrarian policy of the Government of Kazakhstan is aimed at ensuring beneficial conditions for the export of grain to external markets. This is mainly caused by the size of the total grain production; the average grain harvest for the last 10 years is 16 mio tones, while the domestic consumption for this product is 6-8 mio tones. Even within low harvest production in the amount of 10 mio tones, including 3-4 mio tones of the ending stocks, there are 5-6 mio grain tones will be exported (“Kazakhstan 2016 | World Grain,” n.d.).

**Wheat Trade**

*International Wheat Trade*

The international trade in wheat reached an average volume of around 160 million tons during the last five years. World trade in wheat increased by 4.4% per annum during the last 10 years. During the same time, world wheat production showed a growth of approximately 2.4%. (“ICG Grains Market Report 2017.pdf,” n.d.)
FAO’s report shows that global trade of wheat is boosted to a new record in recent years with higher imports for China, Morocco, and Vietnam, more than offsetting reductions in imports to Ethiopia, the E.U., and South Korea. Larger exports for Argentina, Ukraine, and the United States are partially offset by reductions from Kazakhstan and Russia. For the 2016-2017 wheat marketing year, Russia is projected to be the No. 1 exporter in the world with 1.1 billion bushels.

Figure 5.11: World Wheat Trade from 2006 to 2017

![World Wheat Trade chart](chart)

Source: Food and Agriculture Organization

World wheat trade is dominated by a few exporting countries: United States, Canada, Australia, the E.U., and Argentina. Even though exporting countries compete with each other, the world wheat market is not perfectly competitive in an economic sense. In the past, some countries have used state trading agencies to market their grain. In addition, countries use credit guarantees and others use preferential trade policies to promote their exports.
Whereas exports of wheat continue to be dominated by developed industrialized countries, imports are increasingly dominated by less-developed countries in Asia, Latin America and North Africa. The largest importer of wheat is Egypt, followed by Indonesia, Algeria and Brazil. Imports by Indonesia, which has the fastest growing wheat imports in Asia, are catching up and it has become the world’s second-largest wheat-importing country. The E.U. is, by far, the largest exporter of wheat, but it also imports considerable amounts of wheat from the United States, Canada, Argentina, and Australia.
The largest growth markets for wheat include Africa (both North—Egypt, Algeria, and Morocco and Sub-Saharan—Ethiopia, Kenya, Nigeria, South Africa, and Sudan) and the Middle East (Iran, Jordan, Lebanon, Saudi Arabia, and Syria) as well as Southeast Asia (Indonesia, Philippines, and Vietnam). Increased imports in Africa are driven by population growth, while in Asia, increases are driven by income growth that encourages higher wheat feed as well as a substitution of wheat for traditional rice and boost imports.

**Kazakhstan Wheat Trade**

The Foreign Agriculture Service of USDA estimates MY 2016/2017 wheat exports at 8.2 MMT on the background of higher production volumes (“Kazakhstan Agriculture Update 2016.pdf,” n.d.). Statistical data from the United Nations shows that Russia, Azerbaijan, Tajikistan, Uzbekistan, Iran, Turkey, Kyrgyzstan, Egypt, Georgia, China and UAE are the main importers of Kazakhstan’s wheat. Even Kazakhstan is one of the major exporters in the world, most of its wheat is exported to its neighboring countries.
Figure 5.14: Proportion of Global Wheat Exports in Grain Equivalent (2016-2017)

Source: USDA

Figure 5.15: Wheat Exporting Countries from Kazakhstan (1995 to 2015)

Source: UN Comtrade Database

Wheat is the most produced cereal product in Kazakhstan. It has a significant role in the agricultural production of the country. Furthermore, Kazakhstan is one of the world’s major wheat exporters, with a 35% export market share among Black Sea wheat exporters between 1996 and 2015 (UN Comtrade). Kazakh wheat is known for its high quality as more than 50% of
its total production features protein contents above 14% (“Agricistrade Country Report Kazakhstan.pdf,” n.d.). However, frequent government market interventions and adverse weather conditions have contributed to a substantial degree of volatility in Kazakh wheat production and exports, leading to a sharp decline in the export share of wheat from a level of 50% in the year 2000 (“Kazakhstan Agriculture Update 2015.pdf,” n.d.).

There are several reasons why the share of Kazakh wheat exports has been declining compared to other Black Sea producers. First of all, Kazakhstan is the largest landlocked country in the region. Three alternative trade routes exist for its wheat exports; Iran, Azerbaijan, Georgia and Turkey account for 35% of export destinations. Central Asian countries account for 24%, and European markets make up 10% of Kazakh wheat exports. Kazakhstan faces high transportation costs due to railway capacity constraints, especially for exports to European markets. Wheat exports to Western countries also suffer from a lack of sea cargo capacity at the Caspian Sea and dominance of the Russian Federation and Ukrainian-owned sea terminals at Black Sea and Baltic Sea ports. In a recent paper on the competitive position of Kazakhstan, Russia and the Ukraine in the global wheat market confirmed the negative impact of high transportation costs on wheat export of Kazakhstan (“The Impact of Export Restraints on Rising Grain Prices,” n.d.). Last but not least, wheat trade is hampered by the fact that Kazakhstan is not a member of World Trade Organization (WTO), which exposes its exports to high import tariffs when exporting to WTO members. Burkitbayeva and Kerr (2013), using a global simulation model (GSIM), found that accession to the WTO would benefit Kazakhstan and particularly its wheat export industry (“The Accession of Kazakhstan Russia and Ukraine to the WTO: What will it mean for the world trade in wheat,” n.d.).
Several Central Asian countries (Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) and Azerbaijan are among the largest buyers of Kazakh wheat, driven by geographical proximity, and existing cultural, linguistic and religious ties. However, railway capacity constraints in many Central Asian destination markets also limit Kazakhstan’s wheat exports in southern directions. While Tajikistan and Uzbekistan are heavily reliant on wheat imports, Kyrgyzstan and Turkmenistan import only small quantities (“On The Determinants of Exports Survival,” n.d.). Although Kazakhstan is the main wheat supplier to these four countries, Tajikistan and Uzbekistan also regularly import wheat from Russia. In the case of South Caucasian countries, Azerbaijan imports half of its wheat from the Russian Federation, but is also a major importer of Kazakh wheat. Georgia has a diversified wheat importing strategy with imports sourced from Kazakhstan, the Russian Federation, Ukraine, the U.S. and a number of other origins. Armenia imports only small share of its demand from Kazakhstan, and mainly buys Russian, Ukrainian and some EU wheat. The majority of Kazakh wheat trade is concentrated among the group of C.I.S. countries. Between 2000 and 2012, 53% of Kazakh wheat was exported to these former Soviet Union members (“Competitive Structure of Kazakhstan, Russia and Ukraine in World Wheat Market: Gravity Model Approach,” n.d.). The main reasons are that the same railway system in the region offers no tariff rates for Kazakh
wheat and high quality wheat. The other two reasons are language and long term political connections of Kazakhstan with importing countries.

From the report of USDA, wheat exports are constrained because of tighter wheat supplies, and the difficulty and high costs of getting Kazakhstani wheat to external markets. The lion’s share of these exports is expected to continue to be sold to nearby regional buyers. In CY 2015, 68% of wheat exports were made to Central Asian counties and 18% to Iran (“Kazakhstan 2016 | World Grain,” n.d.). Important factors in evaluating the current Kazakhstani grain trade trends include:

- Afghanistan has been the main wheat export market for Pakistan for many years mainly due to easy accessibility and traditional trade linkages between the two countries. Based on traditional trade patterns, good beginning stocks and strong projected production, Pakistan is likely to continue to supply wheat to Afghanistan. However, the Pakistani wheat export price is higher than the export prices from Central Asia, including Kazakhstan.
- Kyrgyzstan cancelled the value added tax (VAT) for wheat imports, enabling wheat importation from Kazakhstan.
- Kazakhstan is unlikely to import wheat from Russia in the near future because of the disadvantageous Russian ruble-Kazakhstani tenge exchange rate. Additionally, Russian wheat pieces are 20% higher than current Kazakhstani wheat prices.
- China imported 128,000 tons of wheat from Kazakhstan in CY 2015 and 387,000 tons of wheat flour in February 2016 (“Ministry of Commerce of the People’s Republic of China,” n.d.). Exporters project that Kazakhstan’s exports to China will increase in the future, particularly as they adjust to the Chinese import requirements.
- According to the Russian grain transporting company, Rusagrotrans, Kazakhstani wheat will be in high demand from Russia, causing a decline in the market prices for grain.
- While Russia has harvested a record crop in 2016, the quality has also been low so Kazakhstani wheat, with higher gluten content, will be in demand.
- The Russian ruble/Kazakhstani tenge exchange rate difference makes the price for Kazakhstani wheat very attractive.
- Both wheat and wheat flour exporters describe the current year as difficult due to low
availability of good quality wheat for export contracts.

- 150,000 tons of wheat imports to Kazakhstan in MY 2016/2017 were mainly from Russia. Although EAEU statistics show wheat imports from Russia at only 16,000 tons, market analysts believe that wheat imports from Russia this year reached 100,000 tons (“Grain and Feed Annual_Astana_Kazakhstan - Republic of_4-19-2016.pdf,” n.d.).

**Policy Update**

Trade policy in Kazakhstan is mainly determined by the rules of the Customs Union that was formed on the July 6, 2010 and the Eurasian Economic Union which officially opened on January 1, 2015, ensuring the free flow of goods, services, capital and workforce throughout the Union (“ICG Grains Market Report 2017.pdf,” n.d.). The upcoming changes in trade policy will be made in accordance to the agreements under WTO accession. The accession to the Customs Union brought unified tariffs for imports, common customs procedures and standards. Considering the levels of import protection, the average duty for agricultural commodities calculated on simple average method is 12.3% (Russia and Belarus 12.2%), whereas in other sectors of economy the import duties are 8.6% (“2016 Kazakhstan Country Report.pdf,” n.d.).

**Kazakhstan and Russia**

According to the Russian grain transporting company, Rusagrotrans, Kazakhstani wheat will be in high demand from Russia, causing a decline in the market prices for grain. While Russia has harvested a record crop in 2016, the quality has also been low. So Kazakhstani wheat, with higher gluten content, will be in demand. The Russian ruble/Kazakhstani tenge exchange rate difference makes the price for Kazakhstani wheat very attractive.
According to the Kazakhstani Ministry of Agriculture, wheat exports to China increased four-fold over the last two years, reaching 414,000 tons in MY 2015/2016. Previously China required that all wheat imports from Kazakhstan arrive bagged. This past summer, China agreed to allow bulk shipments for future imports. Kazakhstan and China are currently discussing the possibility of raising the export quota to 500,000 tons for wheat, potentially reaching one million tons during the next three years. Additionally, both countries are discussing an increase in the quota for non-food wheat up to 300,000 tons, with a further increase up to 2.5 million tons (“USDA Grain: World Markets and Trade.pdf,” n.d.). The Chinese Government has also suggested establishing an additional border check point (for phyto-sanitary certification) at Lianyun-gang on the Kazakh-Chinese border. At this location, the Chinese have built grain storage elevators specifically for wheat and flour from Kazakhstan to facilitate transit to additional countries after passing through China.

Conclusion

Kazakhstan is one of the world’s leading producers and exporters of wheat. The grain production in Kazakhstan is mainly concentrated in the three northern regions (Akmola, Kostanai and North Kazakhstan regions); this is mainly due to good climate conditions. The annual share of these regions is 75% of total country’s grain production and more than 83% of
total wheat production. In recent years, the production of wheat in Kazakhstan has deceased and will continue to decrease because of the Crop Diversification Policy.

Even though Kazakhstan is one of the major exporters in the world, its exporting is limited to regional neighbors. Most of its wheat is exported to Russia, Azerbaijan, Tajikistan, Uzbekistan, Iran, Turkey, Kyrgyzstan, and China.

Kazakhstan’s export potential has significantly decreased over the past few years. The demand for Kazakhstan wheat from many trading partners has decreased. This is because the traditional import trading partners are trying to produce grain domestically at the expense of their own labor, thereby increasing food security.

Russia is the top importer of Kazakhstan wheat. The main reason for this is because Russia controls the main exporting channel of Kazakhstan’s wheat, and therefore, can import wheat from Kazakhstan and then resell it to other countries at a higher price.

China could be the potential trading partner for wheat as the Presidents of Kazakhstan and China, Nursultan Nazarbayev and Xi Jinping, earlier reached agreements to expand cooperation in the frameworks of Kazakhstan's Nurly Zhol and China's One Belt-One Road programs, especially in the agro-industrial sector.

5. Infrastructure

5.1 Infrastructure Related to Copper

Background

In the copper mining sector, there are three types of infrastructure that are critical: transportation, electricity and water resources. This section puts emphasis on the copper transport infrastructure. According to Satke & Galdini, (2016), in the specific case of Kazakhstan, most of the critical infrastructure has historically advantaged Russia and former Soviet republics in Central Asia.

In case of transport and water infrastructure related to copper, Figures 5.1.1 and 5.1.2 show the railroads and the water resources in Kazakhstan. The railroad transport is a crucial part of the production infrastructure in Kazakhstan because its geographic conditions. Kazakhstan
does not have a direct access to navigable waterways and has poor condition of road infrastructure.

The most important rail network is the Kazakhstan Temir Zholy (KTZ\textsuperscript{22}) that operates a rail network of 14,800 kilometers with a freight traffic totaled 231 billion ton-kilometers in 2013, which represent around 43\% of the Kazakhstan’s total freight movement (Gorbunov, Hunt, & Meketon, 2015).

![Figure 5.1.1 Railroads](image1)

![Figure 5.1.2 Water Resources](image2)

Source: (Gorbunov et al., 2015)

Data source: Diva-GIS

**Current Situation of Copper Transportation**

To understand the current situation of the copper transportation as well as the relevance of the railroads, it is appropriate to understand how the main copper producers deliver their products to their major consumers. According to the KAZ Minerals PLC’s annual report, this company has direct links to national rail network. Its mines are connected to the existing infrastructure of the national rail network which allow them to efficiently deliver copper products to customers (KAZ Minerals PLC. (2016).

Kazakhmys, which is another important copper producer in Kazakhstan, mentions that it sold its copper to Europe and China mainly (together accounted around 80\% and 90\% of the total sales). In the case of China, copper is transported by rail, but in the case of Europe, copper is sent by rail to the Black Sea for shipment (Kazakhmys PLC, 2010a, p. 9, 10).

\textsuperscript{22} KTZ is a state enterprise that was established by the decree of the Government of the Republic of Kazakhstan \#129 dated January 31, 1997.
In the case of the company Polymetal International PLC, it reports that, in 2016, the reconstruction of a railway station at Varvara and installation of a stacker to optimize ore delivery from the station to the concentrator were completed (Polymetal Int., 2016).

Finally, in the case of the Central Asia Metals PLC., it sells and distributes its copper cathode product primarily through an offtake arrangement\textsuperscript{23} with Traxys. These copper cathodes are delivered from the Kounrad site by railroads under an Free Carrier -FCA\textsuperscript{24} (Incoterms 2010) contractual basis and delivered to the end customers in Turkey (C.A.M.P., 2016).

**Perspectives**

Kazakhstan ranks 77 out of 160 countries based on the Logistic Performance Index (LPI)\textsuperscript{25}. LPI measures the performance along the logistics supply chain based on six dimensions of trade: i) tracking and tracing, ii) international shipments, iii) customs, iv) opportunity, v) logistics and vi) infrastructure. Figure 5.1.3 shows that Kazakhstan improved its position from 133 in 2007 to 77 in 2016.

The infrastructure component of this index measures the quality of infrastructure relating to trade and transport and includes railroads, ports, roads, as well as information technology. In the last 10 years this indicator has had an unclear trend. However, since 2014, it seems that Kazakhstan is improving its indicators (from 2.4 to 2.8).

There are national and international factors that might support improvements of the infrastructure in Kazakhstan. Internally, it seems that there is a political interest in this initiative. For example, the Minister of Transport and Communication of Kazakhstan, Askar Zhumagaliyey, indicated that by 2020, most of Kazakhstan’s roads are going to be improved.

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\textsuperscript{23} An offtake agreement is an agreement between a seller and a buyer of a resource to purchase or sell portions of the seller’s future production.

\textsuperscript{24} FCA means that the seller delivers the goods, cleared for export, to the carrier nominated by the buyer at the named place.

\textsuperscript{25} LPI is an interactive benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance. The LPI scale goes from 1 (lowest score) to 5 (highest score). The LPI includes the following six dimensions:

1. **Customs.** Efficiency of customs and border management clearance.
2. **Infrastructure.** The quality of trade and transport infrastructure.
3. **Ease of arranging shipments.** The ease of arranging competitively priced shipments.
4. **Quality of logistics services.** The competence and quality of logistics services—truck, forwarding, and customs brokerage.
5. **Tracking and tracing.** The ability to track and trace consignments.
6. **Timeliness.** The frequency with which shipments reach consignees within scheduled or expected delivery times.
specifically more than 80% of them will be upgraded to a “satisfactory quality.” This infrastructure project will involve reconstruction of 30,000 km and will focus on the following road projects:

- Western Europe - Western China highway.
- Center - South highway.
- Center - East highway.
- Center - West highway.
- Astana - Ust-Kamenogorsk highway.
- Astana - Almaty highway.
- Astana - Aktau highway.

Figure 5.1.3 Logistic Performance Index (LPI)

<table>
<thead>
<tr>
<th>Year</th>
<th>LPI Rank</th>
<th>LPI Score (Overall)</th>
<th>Customs</th>
<th>Infrastructure</th>
<th>International Shipments</th>
<th>Logis. Competence</th>
<th>Tracking and tracing</th>
<th>Timeless</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>77</td>
<td>2.75</td>
<td>2.52</td>
<td>2.76</td>
<td>2.75</td>
<td>2.57</td>
<td>2.86</td>
<td>3.6</td>
</tr>
<tr>
<td>2007</td>
<td>133</td>
<td>2.12</td>
<td>1.91</td>
<td>1.86</td>
<td>2.10</td>
<td>2.05</td>
<td>2.19</td>
<td>2.65</td>
</tr>
</tbody>
</table>


Additionally, the first Vice Minister of National Economy, Marat Kussainov, states that since 1992, the World Bank has invested more than USD $6.8 billion in the development of road
and social infrastructure in Kazakhstan to improve its competitiveness. He goes on to note that the Western Europe-Western China transport corridor is one of the most important and largest joint projects. 33% (2787 km) of the transport corridor “western Europe – western china” passes through Kazakhstan, which is considered the most direct route in international transportation between Europe and China.

Moreover, there is a special interest from the Chinese government to invest in Kazakhstan. According to the International Crisis Group (ICG), China has the following three national interests: i) preserving and maintaining social peace and stability via the economic development of Xinjiang province; ii) connecting the latter with Kazakhstan and greater Eurasia via railroads, highways and pipelines; and iii) securing China’s strategic energy supply lines from oil and gas rich states of Central Asia, including Kazakhstan. In addition, Richard Weitz (2013) points out that expanding Kazakhstan’s transit capacity serves Beijing’s strategic objective to create a land-link between its economy and the vast European market. Therefore, Kazakhstan has leverage to negotiate the conditions of the Chinese investments on infrastructure to reach its own economic growth.

**Conclusion**

The copper products are delivered by railways mainly. In addition, based on the annual reports of the main copper producers, it seems that this method of transport is very convenient since none of the reports include complaints about the railway system and its cost for transporting copper. Furthermore, there is an international interest, specifically from the Chinese government, to invest in railways that might guarantee improvements over time. Therefore, the Kazakhstani government must emphasize investments in roads and other kind infrastructure to improve its domestic market.
5.2 Infrastructure Related to Wheat

General Overview of Transportation Systems in Central Asia

Figure 5.2.1

Railway

Regional traffic in Central Asia is overwhelmingly carried by rail. Even for trade within CARs, roads carry only about 22%. The total length of the rail network in the four CARs is about 19,600 kilometers (km) but size varies by country. Kazakhstan has about 14,600 km of main line of which 37% are double-track and 28% have electricity. Uzbekistan has about 4,000 km including the 400 km of new line constructed in the last 2–3 years. About 150 km are double-track and about 10% are electrified. In the other CARs, most lines are single track and not electrified. In 2004, main lines consisted of 426 km in the Kyrgyz Republic mostly in the north, and 533 km in Tajikistan including 106 km in the north ("Infrastructure-in-Central-Asia-Energy-and-Transportation-Controversies.pdf," n.d.).
The network was designed with the needs of the former Soviet Union in mind. This means that Central Asia is mainly oriented north-south and that present borders were ignored. As a result, virtually all freight movements from the CARs to Russia cross Kazakhstan as do a large proportion of exchanges with Europe and even some between Uzbekistan and Turkmenistan and East Asia. Uzbekistan also has significant transit traffic.

While rail is the most common mode of transportation in Kazakhstan, the future of rail transit through Almaty will depend on the city’s ability to absorb high maintenance costs for planned rail additions, to overcome problems related to incompatible rail infrastructure between Kazakhstan and its trading partners, and to remove unnecessary delays and regulatory bottlenecks.

Roads

The total road length under central government management (national highway) in the CARs is 59,430 km, almost all of which is paved. Although the network gives broad coverage to the region, major difficulties arise in some areas from the imposition of new border controls. Most of the international road traffic is carried on a core network of 19,600 km of roads most with two lanes designed for 100 km/hour and an average daily traffic flow of 1,000–3,000 vehicles. Current flows are well below capacity; 56% of the core network has a flow of less than 1,000 vehicles per day and only 20% has a flow above 3,000. The average annual daily traffic flow on the main regional roads is about 1,700 vehicles (“Infrastructure-in-Central-Asia-Energy-and-Transportation-Controversies.pdf,” n.d.). The pattern of heavy truck flows is similar to that of total traffic. There are significant seasonal variations due to the production of fresh agricultural products that are almost entirely carried by road transport from south to north mainly during the summer.

Road transport is also used for consumer goods not only from Europe and other markets that quickly developed after 1990, but also from the PRC and dealers in the United Arab Emirates through the Iranian port of Bandar-Abbas. About 300–500 transit trucks currently cross the Iranian border each month with imports for Central Asia, and this traffic is expected to grow. Road transport of imports from the PRC is also expected to grow. Increasingly, exports of agricultural products are likely to become important depending on the extent to which the PRC has to supplement its own production and the extent to which roads are improved to provide
reliable transport. This has important implications for developing corridors such as that between Osh and Irkeshtam and between Dushanbe and Irkeshtam where potential growth rates could be much higher than other roads (“Infrastructure-in-Central-Asia-Energy-and-Transportation-Controversies.pdf,” n.d.).

Additionally, the condition of the network is often poor. The roads in Kazakhstan and Tajikistan require either rehabilitation or major repairs. The main causes of the poor road conditions are overloading of vehicles and lack of preventive maintenance due to funding constraints. This has led to a growing backlog of maintenance work. There is also a need to consider the higher axle loads of modern trucks when designing maintenance programs and rehabilitation projects.

Regional road freight transport services are usually provided by heavy trucks with three or more axles. Only modern trucks, meeting the latest European technical standards for emissions, are able to operate in Europe. Under current competitive conditions, foreign transporters have been able to gain a majority market share on interregional routes because they have substantial trucking experience and know-how; modern, more efficient vehicles; and convenient access to shippers handling imports into the region.

Overall, Kazakhstan’s road transport services are the most competitive of all Central Asian countries, with haulage rates from Almaty to key destinations yet the price of trucking varies significantly depending on various factors, including truck availability and direction of travel.

Central Asia Transportation System

Multilateral financial institutions, such as the Asian Development Bank, the European Bank for Reconstruction and Development and the World Bank have long been investing in the region’s infrastructure. The Kazakhstan government has its own $9 billion stimulus plan, directing money from its sovereign wealth fund to infrastructure investment. Other countries, including Turkey, the US, and the EU have also made improving Eurasian connectivity a part of their foreign policy. The following figure shows newly-established transportation system in Central Asia (“ADB connecting-CA-roadmap.pdf,” n.d.).
Route 2: Khorgos-Aktau railway. In May last year, Kazakhstan’s President Nursultan Nazarbayev announced a plan to build — with China — a railway from Khorgos on the Chinese border to the Caspian Sea port of Aktau. The scheme dovetails with a $2.7bn Kazakh project to modernize its locomotives and freight and passenger cars and repair 450 miles of rail (“ADB connecting-CA-roadmap.pdf,” n.d.).
Route 3: Central Asia-China gas pipeline. The 3,666km Central Asia-China gas pipeline predated the new Silk Road but forms the backbone of infrastructure connections between Turkmenistan and China. Chinese-built, it runs from the Turkmenistan/Uzbekistan border to Jingbian in China and cost $7.3bn. (“ADB connecting-CA-roadmap.pdf,” n.d.).

Route 4: Central Asia-China gas pipeline, line D. China signed agreements with Uzbekistan, Tajikistan and Kyrgyzstan to build a fourth line of the central Asia-China gas pipeline in September 2013. Line D is expected to raise Turkmenistan’s gas export capacity to China from 55bn cu m per year to 85bn cu m (“ADB connecting-CA-roadmap.pdf,” n.d.).

Route 5: China-Kyrgyzstan-Uzbekistan railway. Kyrgyzstan’s Prime Minister Temir Sariev said in December that the construction of the delayed Kyrgyz leg of the China-Kyrgyzstan-Uzbekistan railway would start this year. In September 2016, Uzbekistan said it had finished 104km of the 129km Uzbek stretch of the railway (“ADB connecting-CA-roadmap.pdf,” n.d.).

Route 6: Khorgos Gateway. This is a dry port on the China-Kazakh border that is seen as a key cargo hub on the new Silk Road and began operations in August. China’s Jiangsu province has agreed to invest more than $600m over five years to build logistics and industrial zones around Khorgos (“ADB connecting-CA-roadmap.pdf,” n.d.).
Infrastructure of Kazakhstan Grain Export

Analysis of the infrastructure of grain exports and the development of transport logistics Kazakh grain exports are largely affected by the country’s remoteness from world markets and the lack of direct access to sea ports. The average annual volume of grain exports from Kazakhstan is about 5.5-6 million tons. However, the position of Kazakh grain exporters is unstable and subject to significant fluctuations, depending on product prices and the lack of development for export infrastructure. Export policy in modern times should be based on multi-vector principles. This approach will make it possible to diversify markets and flexibility by selecting promising areas for marketing wheat products.

Our research indicates Kazakh can export grain to the following destinations through directional routes:

**North** - through the border crossing railway Art. Tobol, Petropavlovsk, Ozinki Aksarajskaya towards sea ports of the Black, Azov and Baltic Seas.

Source: Food Contract Corporation, 2017
South - through railway border crossings Saryagash, Beyneu (Uzbekistan, Turkmenistan, Kyrgyzstan, Tajikistan and Afghanistan) (“A Regional view of wheat Market Food Security in Central Asia,” n.d.).

West - through the Aktau port, border crossing railway Art. Beyneu Aksarajskiy (Azerbaijan, Iran).

East - through the border railway Art. Kulunda, Elbow (Russia, Mongolia), to the use of the planned areas: through the border railway Art. Dostyk - Alashankou (China).

For the development of grain exports to these areas, it is necessary to build better transportation routes and export infrastructure. The main way to enhance exports is through the creation of infrastructure in the Caspian and Black Seas, capable of supporting the growing needs of Kazakh grain exports to these regions. Transport infrastructure for grain exports, which includes marine grain terminals in Aktau, Baku (Azerbaijan) and Amirabad (IRA), create conditions for strengthening the position of Kazakh grain exporters in the markets of the countries of the Caspian and the Caucasus (“Grain quality and end use of Kazakh wheat varieties,” n.d.). In order to reduce price risks, grain terminals are planned to link together a coherent network with a mill complex which will be transported to the markets in these countries not only with raw materials, but also with a constant steady demand of wheat. Kazakhstan's export destinations have been constantly changing in the past year, beginning with September’s significantly decreased shipment via the Black Sea ports of Russia and Ukraine.
Basic Infrastructure Problems for Grain Exports

• Railways are main method of transportation for grain exports. Domestic grain Cars Park is 5,200, so many cannot meet the needs of traders in the period of mass shipments. You also need to consider the time of disposal of cars from its territory while sending cars to neighboring states, also untimely return of wagons.

• When transporting to Central Asia (Uzbekistan, Tajikistan, Turkmenistan, Afghanistan), all delivery must pass through "Saragash" station which forms a large loading rail junction and causes delays.

• When transporting to the north (Georgia, Turkey, Egypt, Tunisia, Morocco), there are several problems such as high transport tariffs and artificial obstacles from the Russian Federation. The main transport company (not official government), Rusagrotrans, will approve the transportation plan for Kazakh grain through the territory of Russia only if logistics services in Kazakhstan will carry Russian private company PT "Trans", which charges fees for its services.

Source: Food Contract Corporation, 2017
in the amount of U.S. $20 per ton. This issue significantly increases transport costs for grain exports through the Black Sea and Baltic ports.

5.3 Infrastructure and Geopolitical Challenges for Natural Gas

Infrastructure and geopolitics are considered in this section together because building gas pipelines involves large political issues. Ericson (2012) provides several main reasons for natural gas being a highly-politicized sector: geography, input costs, high risks and vital economic interests. This section clarifies these reasons as well as examines the historical background, current situation and future plans of Kazakhstani natural gas infrastructure.

Historical Background

Most natural gas pipelines in Central Asian countries have been inherited from the USSR. The major pipeline "Central Asia-Center" (CAC) was built between 1960-1988 by Soviets (Kolb, 2012). The total length of the CAC is 4892 km (3040 miles) (“Intergas Central Asia,” n.d.). According to Stern (2005), during the USSR period, the process of supplying gas from Soviet Republics to European countries was not geopolitically complicated because Moscow controlled all gas flows from Central Asia to Eastern and Western Europe (as cited by Kolb, 2012). However, after the demise of Soviet Union, the CAC were divided among Turkmenistan, Uzbekistan, Kazakhstan and Russia. The geographic situation has advantaged the Russian Federation, as seen in Figure 5.3.1, natural gas flows from three Central Asia countries to Europe through Russian territory. As a result, the legacy pipeline routes from the Soviet era provided the state-owned energy megalith, Gazprom, a monopsonistic position (Kolb, 2012).
This situation changed in 2009, when China became a new actor in Central Asian natural gas market. The main reason for this is because China wanted to support its growing economy with necessary energy sources (Ericson, 2012). As a result of Chinese competition, Russia had to increase the price of natural gas from the Central Asian region. The state-owned oil and gas company of Kazakhstan, KazMunayGas, signed a protocol with Gazprom to increase the transit tariff from $1.4 to $1.7 per 1,000 cubic meters on every 100 km (62.1 miles) (Kazenergy, n.d.).

**Current Situation**

In the current system of gas pipelines, Kazakhstan now exports natural gas into two directions - to Russia and to China (see Figure 5.3.2). To the north, Russia was a monopsony, pricing Kazakhstani gas and reselling it at a higher price to European countries or using it for domestic consumption (Ericson, 2012). The Kazakhstan-China gas pipeline is an integral part of the Turkmenistan-Uzbekistan-Kazakhstan-China transnational gas pipeline system and was placed into operation in 2009. According to an expert from the Ministry of Energy, Mr. Sagatuly
(2017), there are certain plans to increase capacity for the first section of the Kazakhstan-China gas pipeline to 30 billion cubic meters per year with the subsequent expansion to 40 billion cubic meters. However, as it was mentioned in the previous section, the BMI analysts are skeptical that Kazakhstan will even be able to satisfy 30 billion cubic meters’ demand of China in the nearest future. At this point, Kazakhstan has only two options to export its gas: 1) Russia or 2) China.

The outlook of the current Kazakhstani natural gas infrastructure is shown in Figure 5.3.2. Specifically, the pipeline system, current and prospective compressor stations, gas fields, and underground gas storages are illustrated on the map. About 98% of all proven gas reserves are concentrated in the west of Kazakhstan (Sagatuly, 2017). Additionally, it is clearly seen that only nine out of 14 administrative regions have access to natural gas pipelines. According to BMI (2017), the biggest Kazakhstan's gas storage facility is located in Bozoi and has a capacity of 3.5 bcm. BMI states that “it is used to meet peak demand in the Tashkent area of Uzbekistan to ensure a stable flow of Uzbek gas to southern Kazakhstan during the winter. There are two further storage facilities, at Akyrto and Poltoratskoye, with respective capacities of 0.2 bcm and 0.4 bcm, which serve pipelines running to Tashkent and Kyrgyzstan.”
Current and Future Scenarios for Natural Gas Transportation

There are four main scenarios to export Kazakhstan’s natural gas: north, west, south and east. Let’s take a look to each scenario and analyze advantages and disadvantages of each of them.

1. **North.** Basically, this option will continue exporting natural gas to Russia as in the current situation. The main advantage of this scenario is that the pipeline infrastructure already exists and there is no need of large investments in this scenario to build any new pipelines. The disadvantage in this case is related to the low price of gas. As it was mentioned before, Russia realizes that Kazakhstan does not have a lot of choices to export its gas and thus purchases gas for a low price and then resells it to Europe at higher cost (or uses it for domestic consumption).

2. **West.** This scenario is to export Kazakhstan’s natural gas to Europe and bypass the Russian territory. In other words, reduce dependence on the Russian Federation for natural gas exports and pipeline infrastructure. According to Kolb (2012), there has been a lot of dialogue about bringing gas from the Central Asian region to Europe, and many pipeline proposals have been focused on achieving this goal. However, Kolb further states that the proposed Nabucco Pipeline has been paramount, among other options. Figure 5.3.3 illustrates the Nabucco Pipeline

Source: [http://www.intergas.kz](http://www.intergas.kz)
would originate in the Caspian region, run the length of Turkey, cross into Europe near Cape Helles, continue through Bulgaria, transit Hungary, and finally terminate in Baumgarten, Austria, a main hub in a western Europe gas pipeline network (Kolb, 2012).

Figure 5.3.3 The Proposed Nabucco and Southern Stream “Southern Corridor” Pipeline Routes

Source: Kolb, 2012

The main disadvantage in this case is that a large investment is needed to construct new pipeline infrastructure. Another important challenge to consider in this scenario is geopolitics. Specifically, Russia does not allow countries to build other gas pipelines that bypass its territory. It is understandable because Russia currently has an advantageous and profitable position and can consume most of Central Asia’s gas. If the Nabucco project is completed, the main benefit for Kazakhstan will be that it would no longer be dependent on Russian gas pipelines. Another advantage is that Kazakhstan would sell its gas for higher price for European countries.

3. **South.** This route implies to export Kazakhstan’s natural gas to South Asian countries like India, where demand for gas is growing. However, this scenario is highly unlikely because South Asian countries have access to sea and can easily buy Qatar’s LNG gas rather than build expensive pipelines.
4. **West.** Kazakhstan since 2009 has been exporting its gas to China. However, as it was mentioned above experts are skeptical that Kazakhstan will be able to satisfy Chinese growing demand in natural gas. Though, there are a lot of advantages in this scenario for Kazakhstan if it will keep promises to export 30 bcm annually to China. First of all, because of Chinese presence in Central Asian gas sector, Russia had to increase importing price. So, Kazakhstan started to sell to Russia gas for higher price than before. Another advantage is that China invests a lot of capital to Kazakhstani pipeline infrastructures.

6. **SWOT Analysis and Recommendations**

**SWOT Analysis – Copper**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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</table>
| • Kazakhstan has a strategic geographic location. Kazakhstan is close to big copper consumer countries like China, Germany and Brussels. For instance, China and European Union represents 46% and 15% respectively, of the total global copper demand in 2015. Therefore, Kazakhstan has a comparative advantage related to other producing countries (i.e. Chile) in terms of geographical proximity.  
  • Kazakhstan has a well-developed railway system. According to specialists and annual reports of main producers, the railways of Kazakhstan is ramified and well developed from the East Kazakhstan and Zhezkazgan regions to China. | • Kazakhstan must deal with both internal political issues and geopolitical interest of powerful countries like Russia and China. This fact may have a negative impact on the levels of investment in the Kazakhstan mining sector, specifically in the copper sector.  
  • The dependence on China is direct and significant since the exports of copper of Kazakhstan are very concentrated in this country. In addition, there is no local consumption of copper.  
  • Although Kazakhstan has an important participation in the copper reserves, it is smaller in comparison to its competitors like Chile and Peru. According to international data sources, Kazakhstan has less than two percent (2%) of the global reserves. |
• Kazakhstan ranks among the top 20 copper producing countries around the world, and also contains one of the largest reserves of copper in the world.

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
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<tbody>
<tr>
<td>• Copper demand will keep growing since the world population is increasing. Since 1900, the world copper mine production has been growing by 3.2% per year (International Copper Study Group, 2016).</td>
<td>• The mining sector is highly speculative in nature, so its performance depends on the viability of exploration and mineral discovery. In addition, there is a concern about the steep declining average industry ore grade.</td>
</tr>
<tr>
<td>• There is a positive perspective of the copper price in the following years. According to the World Bank, the copper price tends to be increase albeit at a moderate growth rate.</td>
<td>• Although currently Kazakhstan does not deal with social and environmental conflicts, most of the mining operation around the world is subject to these risks that involve strikes and protests of communities, NGOs, and local governments against the mining operations. Therefore, Kazakhstan regulation should consider strict standards of environmental regulations in their policies to avoid these potential conflicts.</td>
</tr>
<tr>
<td>• The migration process of people from rural to urban areas will continue. Therefore, more infrastructures are needed causing an increase in the demand for copper since this material is used in many things like plumbing, electrical wiring, heating, among others.</td>
<td>• Although some entities like the World Bank Group can make predictions about the copper price, the conditions and assumptions of these projections can vary over time. The copper price may be cyclical and highly volatile as the result of many out of control factors, such as the overall demand for and worldwide supply of copper, international</td>
</tr>
<tr>
<td>• Kazakhstan membership in the World Trade Organization will encourage greater competitiveness. Opening markets require Kazakh companies to improve their competitiveness by</td>
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reducing production costs. In addition, it will cause an increase in the number of destiny markets for the Kazakhstan products that will access under the same condition of other countries to these new markets.

• The membership in the World Trade Organization will promote the competitiveness of Kazakhstan and it will provide the opportunity to enter to new markets and with better conditions.

economic and political trends, and global or regional political or economic crises.

Recommendations Regarding Copper

1. Kazakhstan government should promote new mining explorations to update and or confirm its level of copper reserves that is very important to attract new participants in the market, or increase the investment in facilities by the current participants. There is a critical need to open new copper deposits.

2. Kazakhstan government should improve the access for official information in English that is useful for foreign investors. It is quite hard to get information in detail from official source because most of them are in Kazakh. Information is relevant to take decisions.

3. Kazakhstan government should export refined copper rather than mined copper. Based on the Table 3.2 that shows the production of mineral commodities, it seems that Kazakhstan is no longer adding value to its copper production. Thus, it is relevant to evaluate measure to change this negative trend.
# SWOT Analysis - Wheat

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>• Vast and diverse land resources.</td>
<td>• Small scale production leads to low productivity.</td>
</tr>
<tr>
<td>• Traditional specialization on wheat production.</td>
<td>• Lack of skilled labor force.</td>
</tr>
<tr>
<td>• One of the World leaders in wheat exports.</td>
<td>• Extreme continental climate and droughts decrease the yields.</td>
</tr>
<tr>
<td>• Geographical position close to the growing market of China, Russia and India.</td>
<td>• Lack of investment due to high risks.</td>
</tr>
<tr>
<td>• Cheap labor force.</td>
<td>• Low level of introduction of new technologies.</td>
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<td></td>
<td>• Corp diversification policy which reduces wheat production.</td>
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</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
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</thead>
<tbody>
<tr>
<td>• Increasing global demand for wheat.</td>
<td>• Increased competition on the international market after accession into WTO.</td>
</tr>
<tr>
<td>• Entering new market with access into WTO.</td>
<td>• Spillover effect of the political relationships between Russia and EU.</td>
</tr>
<tr>
<td>• Transfer of the technologies from developed countries. For example, short rain corps and moisture saving technology.</td>
<td>• Climate change will cause more natural disasters.</td>
</tr>
<tr>
<td>• Development of infrastructure helps to reduce transportation costs.</td>
<td>• Price volatility in the global market has huge influence on wheat trade.</td>
</tr>
</tbody>
</table>
Recommendations Regarding Wheat

1. Introduction of Advanced Technologies

Introduce modern technologies of the industry, modernization and technical equipment of grain production. Modern technologies in the grain industry include the correct management of farming. In Kazakhstan, most farms were established main monoculture wheat alternating with steam. This outdated method of grain production, which puts the economy totally dependent on the weather for one culture on the price of this culture. Research shows that like the experience of Canada, northern Kazakhstan should move to diversify, that is under oilseed crops expand and legumes. (“Recommendation-to-the-wheat-production-sector-in-Kazakhstan.pdf,” n.d.) This will improve the sustainability of the production as a whole. It should be noted that the grain market pea, chickpea and lentil significant enough. Suffice it to say that India imports about 3 million tons of grain legumes in the year, mainly from Canada. Nuts are in great demand in Uzbekistan. In addition, the size of farms and equipment set to match each other, so that the technique was fully loaded and the field work was carried out at the optimum time. For example, in Canada, if the size of the farm does not comply with performance art, then go to the ground rent. Currently in the country mainly large grain holdings were able to secure their production close to the optimum set of modern technology. In other regions, particularly in the south, in small farms generally do not have its own equipment, used rental equipment, resulting in missed optimal sowing and harvesting, as part of arable land from year to year do not sown. In irrigated agriculture in the south is totally unacceptable use of primitive technology. The application of modern high-performance agricultural machinery increases grain yield by reducing losses.

2. Optimize Infrastructure of Grain Exports

In the eastern region, one promising area is the export of grain to China. In 2015-2016, plans was finalized to build a rail grain terminal in the border area of China (Xinjiang) on railway crossing Art. Dostyk - Alashankou or ICBC "Khorgos". The planned annual capacity of the terminal will be about 500 thousand tons, including one-time storage silo capacity of 25 thousand tons of grain (“Infrastructure-in-Central-Asia-Energy-and-Transportation-Controversies.pdf,” n.d.).
To the north, the report studied the possibility of building a grain terminal in the port of the Black Sea (Russia, etc. Taman). At the same time, it is important that the load intersects only one boundary in Kazakhstan - Russian Federation, meaning that the route passes through the country with a stable environment. In the coming decades, this corridor has the opportunity to become the main route for Kazakh grain exports to the EU, the Middle East and North Africa.

In autumn 2013, Chairman of the CCP and President of the PRC, Xi Jinping, announced the “One Belt, One Road (OBOR)” initiative. This core element of a more pro-active Chinese foreign policy comprises of the land-based “Silk Road Economic Belt”, and the “Maritime Silk Road of the 21st Century”. The OBOR initiative by far exceeds the development of linear connections between Europe and Asia. In fact, Beijing strives to establish a comprehensive Eurasian infrastructure network. Kazakhstan stands out as the most willing participant in the project. The Kazakh authorities have for a number of years identified infrastructure development as key to achieving their ambition of entering the world’s top 50 economies by 2030.
Figure 5.2.5

Source: Merics China Mapping, 2016
China’s “One Belt, One Road” project aims to make Central Asia more connected to the world, yet even before the initiative was formally announced China had helped to redraw the energy map of the region. It had built gas pipelines to increase the flow of natural gas to China. Chinese companies have funded and built roads, bridges and tunnels across the region. A ribbon of fresh projects, such as the Khorgos “dry port” on the Kazakh-Chinese border and a railway link connecting Kazakhstan with Iran, is helping increase trade across central Asia ("Embassy of the Republic of Kazakhstan » Agricultural Sector,” n.d.).

A train carrying 720 tons of wheat from Kazakhstan arrives in Lianyungang Port in Lianyungang, east China's Jiangsu Province, Feb. 5, 2017. The first batch of wheat from Kazakhstan arrived in Lianyungang port by a cargo train on Sunday and was then shipped to Southeast Asia, opening a new trade route. Kazakhstan has made the first delivery of 720 tons of wheat to Vietnam via the new transportation corridor Kazakhstan – Lianyungang – Vietnam. For the first time, Kazakhstan delivered wheat via the new transport corridor Kazakhstan-
Lianyungang-Vietnam, reports the Ministry of Foreign Affairs. The main task is not only delivering this freight to Vietnam, but to test the delivery route to South-East Asia through the territory of China. This way Kazakhstan can not only export its goods, but deliver the goods of other member states of the Eurasian economic union to Vietnam and other states of South-East Asia. It is a great opportunity for Kazakhstan to open new markets (“Kazakhstan Exports First Wheat To Vietnam Via China | KazWorld.info,” n.d.).

3. Improve the Regulatory Framework

Kazakhstan should improve its regulatory framework to protect and boost wheat trade. Classical instrument to regulate foreign trade are tariffs that the nature of their actions relate to economic regulators. Customs tariff - a systematic list of customs duties levied on goods when imported, and in some cases, when exported from the country. Tariffs remain one of the most important instruments of state regulation of foreign trade, which allows to use it to protect the national interests of producers from foreign competition. Kazakhstan rate needs to improve so as to best suit the task to protect the economic interests of the country.

Average tariff rates of developed countries in modern conditions are low, but their influence on foreign trade is very significant. After all, using a relatively small fee, Kazakhstan can make the importing of certain goods unprofitable and stimulate domestic production by imposing higher tariffs compared to the raw materials required for foreign production. At the present level of scientific and technical development extremely high degree of specialization, such protection is very effective. (“Competitive Structure of Kazakhstan, Russia and Ukraine in World Wheat Market: Gravity Model Approach,” n.d.)

At the same time, the experience of industrialization in several countries suggests that tariff can be an effective tool to stimulate targeted import goods required for certain industries. In order to apply these tools, such as the use of targeted customs privileges under customs regimes of processing and simply establish different tariff rates depending on whether imports of the product fits in the strategy adopted economic development.
## SWOT Analysis – Natural Gas

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Large natural gas reserves. According to BP Statistical Review of World Energy (2015), Kazakhstan by international definitions for only “proven” reserves, has about 1.5 tcm of natural gas at the end of 2014, which is approximately 0.8% of the global total (as cited in the Report).</td>
<td>• Limited domestic gas pipeline infrastructure. Five out of fourteen regions of Kazakhstan are not connected to domestic gas pipelines due to limited infrastructure. As a result, the Southern part of Kazakhstan must import natural gas from Uzbekistan via Tashkent-Shymkent-Bishkek-Almaty pipeline and the Northern part of the country imports gas from Russia.</td>
</tr>
<tr>
<td>• Geographic location. Kazakhstan has a good geographic location at the heart of Eurasia. It provides a great potential to be a transition country of natural gas. If we look to the forecast from leading energy companies that was shown above, the export of Central Asian gas to China and Russia will increase significantly. Uzbekistan and Turkmenistan does not have other alternatives to sell their gas, but through Kazakhstan territory. So, Kazakhstan can get advantage by being a transition country and charge fees for transition gas.</td>
<td>• Large regional competition. The current situation in the region illustrates how competitive Kazakhstan regarding exporting natural gas in the region. The main factor is reserves of natural gas. The following list clearly illustrates that neighbor countries have much more natural gas reserves than Kazakhstan:</td>
</tr>
<tr>
<td></td>
<td>– Kazakhstan – 0.9 tcm or 0.5 % of world reserves</td>
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<tr>
<td></td>
<td>– Russia – 32.2 tcm or 17.3 % of world reserves</td>
</tr>
<tr>
<td></td>
<td>– Uzbekistan – 1.1 tcm or 0.6 % of world reserves</td>
</tr>
<tr>
<td></td>
<td>– Turkmenistan – 17.5 tcm or 9.4 % of world reserves</td>
</tr>
<tr>
<td></td>
<td>– Iran – 34.0 tcm or 18.2 % of world reserves</td>
</tr>
<tr>
<td></td>
<td>This high competition is negatively affects to Kazakhstan’s export potential.</td>
</tr>
</tbody>
</table>
Another weakness of Kazakhstan’s large territory and that 98% of gas reserves are located on the west part of the country. Additionally, there are only 18 mln people live on such a huge territory, which is 6.5 person per kilometer. Whereas, Uzbekistan and Turkmenistan has comparitively small territories and has 73.5 and 11.5 people per kilometer respectively. Which means these countries can much easier build pipelines within their smaller territories and faster provide more densely populated citizens and then export their gas.

<table>
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<tr>
<th>Opportunities</th>
<th>Threats</th>
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<tbody>
<tr>
<td>Active exploration of gas reserves. New gas reserves could be a good opportunity to expand export potential of Kazakhstani natural gas. Especially, if unconventional gas will be found in the eastern part of Kazakhstan, it would be a great opportunity to export gas to China.</td>
<td>Political future of the country. In most analytical reports the political aspect of the country is stated as a main risk.</td>
</tr>
<tr>
<td>Restart of the giant Kashagan field will boost Kazakhstan's gas output over the next three years with plenty of room for a much larger expansion (BMI, 2017).</td>
<td>Russia’s geopolitical policies. Russia creates huge obstacles to any initiatives to transport Kazakhstani gas that implies to bypass Russia’s territory. It is crucial for Russia to keep dependent Kazakhstan on CAC pipelines system.</td>
</tr>
<tr>
<td></td>
<td>The price volatility for natural gas creates certain risks for any long-term projects to construct new pipeline infrastructures in Kazakhstan.</td>
</tr>
</tbody>
</table>
Recommendations Regarding Natural Gas

1. **Provide natural gas for all 14 administrative regions.** The most territory of Kazakhstan has severe winter season. During the winter months, temperatures can fall to minus 40 degrees Celsius (minus 40 degrees Fahrenheit) in the central and northern parts of the country. It is worth mentioning here that the capital Astana, which is located in the center of Kazakhstan, is the second coldest capital-city in the world after Ulaanbaatar, Mongolia. This implies that the heating of big cities is an acute issue without natural gas. Nowadays, 5 regions (out of 14) of Kazakhstan do not have access to natural gas pipelines and coal is used as a heat source. Coal carries a substantial burden to environment and human health as well as negatively affects to the global climate change in the long term. Thus, natural gas is a social product in Kazakhstan and the current policy of gasification of the Kazakhstan’s territory should be continued. This would provide significant social and environmental benefits to the country.

2. **Explore more natural gas reserves.** Exploration of new gas reserves should be in priority of Kazakhstan. Especially in the eastern part of the country. This is because a former Prime Minister Karim Masimov announced in 2014 at the International Conference on Energy Charter that Kazakhstan is “also going to develop projects for the development of shale gas” (Shale Gas International, 2014). The unconventional gas most probably can be explored in the eastern part of the country. This could give a great competitive advantage for Kazakhstan to export gas to China because eastern part of the country is located closer to Chinese territory than Uzbekistan and Turkmenistan.

3. **Actively consume associated gas.** Kazakhstan should adopt new technologies to maximize consumption of associated gas that is currently flared. Some areas where Kazakhstan can use associated natural gas can include the transportation sector, petrochemical industry, electric power generation and domestic consumption.
Appendix

Interview Questions:

Wheat

1. Could you describe the outlook for the wheat production look like in Kazakhstan?
2. Who are the major players in Kazakhstan’s trade market? For example, large state-owned companies? Or government? Or individual workshop? How about the private sector?
3. Do these players have a “fair trade rules”? How their competition affect the overall export of Kazakhstan?
4. What is the current status of underlying logistics infrastructure? How does wheat transported and stored? Does the government or private investors have plans to improve upon infrastructure and technology in this sector?
5. What are the main advantages of Kazakhstan in this commodity compared to other exporting countries like Russia, Ukraine, China etc.?
6. Is there any differences between Kazakhstan’s wheat and Russian, Ukrainian wheat?
7. How being part of Custom Union, Eurasian Economic Community, and WTO affects export potential of Kazakhstan? Are there any problems and/or potentials?
8. How government supports wheat producers (subsidies, tax credits etc.)?
9. What are the major barriers in export? For instance, the insufficient quantity and/or quality, price volatility, transportation, regulation etc.
10. How to deal with the commodities price fluctuation in the global market? How to adapt to the international price fluctuation?
11. Besides the major imported countries, who are interested in Kazakhstan’s wheat?
12. Who are the main competitors for Kazakhstan? How to deal with the regional/global competition from your point of view?
13. Russia is the largest wheat exporting country in the world, so why Russia imported a large quantity of wheat from Kazakhstan?
14. China consumes a large number of wheat, however, China does not import a lot from Kazakhstan. Why?
15. What are the leading technologies (machines, computer science, trans-genetic, chemicals) Kazakhstan use in wheat production and wheat storage?
Natural Gas

1. Could you tell us how you see the Present Natural Gas Situation in Kazakhstan?
2. What is the Outlook for Natural Gas Situation in Kazakhstan for the nearest 5 years?
3. Russian, Uzbekistan, Turkmenistan, and Azerbaijan are major natural gas producers in the region: How do they fit into the Kazakhstan Natural Gas Picture?
4. If Kazakhstan is going to be short of Natural Gas, why is it exporting it to other countries?
5. What are the major barriers to export more natural gas?
6. Are government and/or investors planning to improve infrastructures in natural gas export? For example, are there any plans to build pipelines bypassing Russian territory?
7. The demand for natural gas is increasing in East and South Asia, does Kazakhstan have plan to build new pipelines for these parts of the world?
8. As it is well known, the role of geopolitics is large in natural gas sphere, so how would you describe the present situation? What is the role of Russia and China in Kazakhstan’s gas exporting sector?

Copper

1. Could you tell us how do you see the present Copper situation in Kazakhstan?
2. Do you think that copper is underproduced in Kazakhstan? If yes, why?
3. What are the main factor that affect the production level in Kazakhstan (i.e. Infrastructure (i.e. rail, ports, power, technology, water) or the legal framework)? Does the government or private investors have plans to improve upon infrastructure and technology in this sector?
4. From your perspective, what are the main factors that affect the trade of copper (i.e. import duties, export quotas). What are the main barriers to export Kazakhstan’s copper?
5. What is the current status of underlying logistics infrastructure? How does copper transported and stored?
6. What are the major benefits or disadvantages that Kazakhstan’s copper market potentially can get from its Custom Union, Eurasian Economic Community and WTO membership?
7. How do you see the future situation of the copper market in Kazakhstan and its interaction with the world?

8. Does Kazakhstan have any plans to expand export of copper to particular market (country or region)?

9. Where can we get information about the futures plans (investments) of the main copper producers that have operation in Kazakhstan? Where can we get information about investors that are seeking to invest in copper sector in Kazakhstan?

10. Where can we get information about the KZ international trade of copper as well as information about Kazakhstan’s copper production? This is because the UN comtrade database shows that there is no information regarding Kazakhstan’s copper export and imports for some years?

11. What do you think will be the impact of the new mineral legislation? What do you think are the most important changes that should be included in the legal framework?

12. How do you think the environmental regulation in Kazakhstan can affect the investment in the copper mining sector?

13. What are the main risks of the copper sector? (i.e. the high dependency on the Chinese economy). What type of policies the government is implementing to manage these risks?

14. How is the mining sector perceived by communities/society? Do you think that the promotion of investment in copper mining could generate social conflicts? If this is the case, why?
Table 1: Elements that can be present in refined copper

<table>
<thead>
<tr>
<th>Element</th>
<th>Limiting content % by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag</td>
<td>Silver 0.25</td>
</tr>
<tr>
<td>As</td>
<td>Arsenic 0.5</td>
</tr>
<tr>
<td>Cd</td>
<td>Cadmium 1.3</td>
</tr>
<tr>
<td>Cr</td>
<td>Chromium 1.4</td>
</tr>
<tr>
<td>Mg</td>
<td>Magnesium 0.8</td>
</tr>
<tr>
<td>Pb</td>
<td>Lead 1.5</td>
</tr>
<tr>
<td>S</td>
<td>Sulphur 0.7</td>
</tr>
<tr>
<td>Sn</td>
<td>Tin 0.8</td>
</tr>
<tr>
<td>Te</td>
<td>Tellurium 0.8</td>
</tr>
<tr>
<td>Zn</td>
<td>Zinc 1.0</td>
</tr>
<tr>
<td>Zr</td>
<td>Zirconium 0.3</td>
</tr>
<tr>
<td>Other elements*, each</td>
<td>0.3</td>
</tr>
</tbody>
</table>

* Other elements are, for example, Al, Be, Co, Fe, Mn, Ni, Si.
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