俄乌冲突对钨制品市场与价格的影响

IMPACTS OF RUSSIA-UKRAINE CONFLICT ON TUNGSTEN MARKET & PRICE

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作者简介

厦门中钨在线科技有限公司，简称“中钨在线”，是中国第一家钨、钼、稀土行业的电子商务公司，1997 年 9 月以我国第一家顶级钨制品网站 www.chinatungsten.com 为基础在厦门设立。中钨在线以其在钨钼制品领域几十年积累的信息数据和专业经验为基础的设计、制造，卓越的商业信誉和优质服务闻名全球业界，使其成为钨钼稀土，特别是钨化学品、金属钨、硬质合金、高比重合金、钼及钼合金领域的最佳综合应用解决方案提供商。

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BRIEF INTRODUCTION TO THE AUTHOR

As the 1st E-commerce company of Tungsten (W), Molybdenum (Mo), Rare Earth (RE) in China, China Tungsten Online Manu. & Sales (CTOMS) was founded in 1997 based on China's the 1st and top tungsten website www.chinatungsten.com. As its specialized design, professional manufacturing, excellent service and powerful information database, CTOMS is not only the most authoritative information source of Chinese and English information of W Mo and RE products globally, but also the best comprehensive application solution provider of W, Mo and RE, both chemical materials and machined products, such as tungsten oxide, metal, cemented carbide and heavy alloys.

CTOMS has been created more than 1 million web pages and WeChat information message of W, Mo and RE news, price and market research, analysis. The web news.chinatungsten.com, www.ctia.com.cn are the world's top index websites of tungsten which have received 1 billion visits from 1997.

The major business of CTOMS is to complete product design, R & D with customers and provide customers with processing and integration services. In the past 2 decades, it has provided more than 100,000 different types of W, Mo & RE products to more than 10,000 customers all over the world. Years experience and technology accumulation have laid a foundation for promoting the flexible and intelligent manufacturing of customized products.

The professional research articles and reports of CTOMS are written by Dr. Hanns, Miss Sunny Zheng, professional analyst and its marketing team. Dr. Hanns is an expert of the main market and technical research of CTOMS has been engaged in e-commerce and international trade of tungsten and molybdenum products, production and manufacturing of cemented carbide and high specific gravity tungsten alloy since the early 1990s. He is a well-known expert in e-commerce, tungsten product design, processing and Market Research of tungsten and molybdenum products in the industry with more than 30 years of experience. Miss Sunny has been committed to the research of tungsten market, creating and promoting CTOMS social media form many years. She has strong professional delicacy and sensitivity to tungsten products market and price.

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PART IV OF X

Political & Economic Environment Production Cost of China's Tungsten Products in 2022 (1/2)

In the first three parts of this paper, we gradually introduced the various military uses of tungsten products as important strategic materials under the background of the conflict between Russia and Ukraine, and clarified the importance and strategic significance of tungsten products under the haze of regional tension and war; We also introduced the tungsten resources, mining and processing of tungsten products in Russia, which is a major resource country in the world; In the third part, we summarize Russia's resource advantages in oil and gas, nickel, aluminum and other metals, wheat, corn and other food crops to illustrate the comprehensive and irreversible cost pressure on China's tungsten products in several aspects, such as energy and power, chemical raw materials, labor costs and so on, under the background of the conflict between Russia and Ukraine and the price rise caused by serious global inflation caused by the over development of the US dollar.

In the fourth part of this paper, we plan to analyze the macro political and economic environment faced by China's tungsten products market; At the micro level, we analyze the price change trend of various cost components of China's tungsten products production and processing enterprises, so that we can make a basic trend judgment on the price change of tungsten products in 2022. At the end of the third part, we predict that the probability of price rise of tungsten products made in China is greater than 90%, and:

THE PRCIE OF TUNGSTEN IN CHINA'S MART HAS INCREASED BY 20% IN 2021
THE TOTAL AVERAGE PRICE WILL STILL RISE BY NO LESS THAN 20% IN 2022

So far, our analysis logic is clear. The obvious reasons include but are not limited to: (1) the Russian Ukrainian conflict has brought about the shortage of tungsten products produced in Russia and the increase of military demand; (2) Sanctions against Russia and poor logistics have led to a tight supply of energy and bulk commodities and a corresponding rise in prices; (3) Quantitative easing will trigger global inflation, while the US dollar interest rate hike will drive the prices of metals and other commodities to soar; (4) As the world's major producers of tungsten products and 80% of the suppliers without resources, China's

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political and economic stability, proper and efficient epidemic control, increased demand in China's domestic market, moderately loose currency and obvious appreciation trend of RMB. We are divided into four factors at the same time. It is very unlikely that the average price of tungsten products will fall in 2022. There is only an overall upward trend. Our only question is how much it will rise!

The judgment that China's tungsten products and the global tungsten products market will increase by an average of 20% in the next year is mainly based on the price change trend of various raw materials in the Chinese market in 2021 and the rising range of tungsten products prices, and we believe that the lag of cost transmission after the price rise of some raw materials will be basically reflected this year, and the resonance effect of subsequent price rise will be superimposed. So, this is an uncomputed empirical estimate. Just reflect a trend and a professional " Somatosensory" of this trend!



Typical Raw Ore of Wolframite

According to the above logic, we believe that the price of tungsten products will maintain a slight fluctuation and an overall average upward trend from 2022 to the first quarter of 2023. China Tungsten online will analyze from two perspectives: (1) macro aspects, namely, economic development needs, monetary and financial policies, etc; (2) Micro aspect, that is, the change of production and manufacturing cost and price composition of tungsten products.

1. Macro Factors Affecting the Market Demand and Price of Tungsten Products

1.1 Russian Demand for Tungsten Products

Since the conflict between Russia and Ukraine for more than a month, the two sides seem

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to have won or lost each other. Behind the battlefield is the peace talks vigorously promoted by the two sides and all parties around the world. On March 29, Russia and Ukraine completed the fourth round of peace negotiations in Istanbul, Turkey. The negotiations sent a positive and constructive signal, which plunged the international oil price and gave all people hope for peace.

As stated in the title of this article, the decisive factor we can identify is that the Russian Ukrainian conflict that has occurred and is continuing has changed the original supply and demand pattern of tungsten products. According to the data we sorted out earlier, it is estimated that Russia's annual production capacity of nearly 3000 tons of tungsten products will be used in Russia. However, because several major Russian tungsten products production and processing enterprises can only produce some primary processed tungsten products, Some higher-end tungsten products, such as nano tungsten powder, tungsten carbide powder, high-end cemented carbide, high specific gravity tungsten alloy, tungsten copper alloy and other products, do not have a large capacity in Russia. Therefore, Russia may also need to buy some high-end tungsten raw materials and products from the international market. With the tight war and increasing demand, it is expected that the demand for tungsten products in Russia will continue to increase at home and abroad. Of course, such demand is caused by non market factors, because the consumption of tungsten products by war and the expected reserves of war will lead to an irrational increase in the demand for tungsten products. This is also the most difficult aspect for us to predict the tungsten products market in 2022.



The world's largest mass production of Russian made AK47 and its ammunition. Russia's military industry is second to none in the world, so we can reasonably infer that there is a large corresponding demand for tungsten

1.2 Dmand of China's Economic Growth for Tungsten Products

1.2.1 "Rigid Demand" of GDP Growth on Tungsten Products in 2022

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According to the just concluded session of China's National People's Congress, Premier Li Keqiang put forward in his government work report on March 5 that the main expected development goals for this year are: GDP growth of about 5.5% and consumer prices rise of about 3%. It also emphasizes that the setting of the expected target of economic growth mainly considers the needs of stabilizing employment, ensuring people's livelihood and preventing risks, and is connected with the average economic growth in the past two years and the objectives of the 14th Five-Year Plan.

China's GDP is expected to grow by 5.5% in 2022, which is actually a medium and high-speed growth on a high base. It seems that the growth rate is lower than the overall target of 6% in 2021, but it reflects the initiative. On the basis of the huge overall volume of China's economy, it needs hard work to achieve it.



Trend chart of China's GDP over the years (trillion US dollars)

We know that the production of modern industry is inseparable from the use of tools and instruments such as cutting, drilling, maching tools and molds dominated by tungsten. Based on the analysis of the consumption structure of tungsten products, tungsten is mainly used in cemented carbide cutting tools, tungsten containing steel production, metal tungsten material processing, tungsten heavy alloy products and tungsten chemical raw materials. The application consumption structure of tungsten products can not only reflect the overall development level and technical capacity of all aspects of China's contemporary industry, but also reflect the mining, smelting and fine processing capacity and development trend of China's tungsten industry.

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According to the production and consumption data of tungsten products industry in the past few decades, on average, about 50% of tungsten raw materials are used to process and manufacture cemented carbide, and about 72% in developed countries represented by Sandvik and Kennametal in Europe and America. However, since China is a major producer and supplier of tungsten products in the world, we provide most tungsten products except cemented carbide mainly produced in the west, including tungsten chemicals, from primary sodium tungstate and ammonium tungstate, To high-quality micron and nano tungsten chemicals and alloy products of tungsten and metal elements such as molybdenum, copper, iron and nickel, therefore, the production and supply of tungsten products in China covers the whole industrial chain of basic application fields and high-end processing of tungsten products, in which cemented carbide products account for slightly less than 50%. However, with intelligent manufacturing and industrial upgrading, the product structure of tungsten products in China will change, the proportion of tungsten products such as cemented carbide with high technical content will continue to increase, and more and more low-end tungsten products will be imported from Vietnam and other countries.



Tungsten Cemented Carbide Tools

Comprehensively analyze the relationship between the growth of China's GDP and the consumption of tungsten concentrate in recent years. For the first time in the industry, China Tungsten online uses the consumption ratio between GDP and tungsten concentrate to investigate the relationship between the quality of China's GDP growth and the use efficiency and recovery rate of tungsten concentrate, so as

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to reflect the technical capacity of China's tungsten products industry and the quality of China's GDP growth.

2010-2021 年中国万亿 GDP 与钨精矿消耗比					
年份	中国 GDP 万亿	GDP 增长率 %	中国钨精矿折合 WO3/吨	GDP 与钨精矿消耗比	钨精矿价格 元/标吨
2010	401513	10.64%	99514	0.2478	84,772
2011	473104	9.55%	119875	0.2534	138,322
2012	538580	7.86%	120283	0.2233	119,510
2013	592963	7.77%	125850	0.2122	125,331
2014	641281	7.43%	126820	0.1978	103,953
2015	685993	7.04%	129090	0.1882	73,538
2016	740061	6.85%	124078	0.1677	70,340
2017	820754	6.95%	130866	0.1595	91,535
2018	919281	6.75%	125984	0.1371	106,531
2019	986515	5.95%	133528	0.1354	88,151
2020	1013567	2.35%	138610	0.1386	84,609
2021	1143670	8.10%	133221	0.1165	103,109

Ratio of China's Trillion RMB Yuan GDP to Tungsten Concentrate Consumption

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According to the data analysis in the above table, we find that the ratio of trillion GDP to tungsten concentrate consumption in China has continued to decline since 2010, and the trillion GDP tungsten concentrate consumption in 2021 (0.1165) is lower than 50% of that in 2010 (0.2478). We believe that this shows that (1) the comprehensive utilization rate of China's tungsten products industry has improved. The average ore consumption of front-end ammonium tungstate and oxide products is reduced, and the recovery rate and utilization rate of waste scrap and waste products are improved; At the same time, the proportion of back-end products, such as alloy products, and high value-added products, such as cemented carbide and printing spherical tungsten powder, has increased; (2) The quality of China's GDP has improved year by year. From the consumption of tungsten products, the production efficiency of factories and the added value of products have been improved, the proportion of tertiary industry has increased, and the proportion of high-tech, information industry and service industry has increased year by year. The statistical data of China Tungsten Industry Association also shows this point: the main business income of tungsten industry in 2021 hit a record high, reaching nearly 100 billion yuan, a year-on-year increase of 34.23%; The total profit and tax was 9 billion yuan, a year-on-year increase of 22.45%, and the total profit was about 5.3 billion yuan, a year-on-year increase of 51.43%. APT production capacity was 192000 tons, a year-on-year decrease of 2.78%; Cemented carbide production capacity of 60000 tons, an increase of 9.09%.

The basic situation of China's tungsten products industry in 2021 can be described as the rise of both volume and price. In 2021, the production and operation activities of

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enterprises continued to recover at a high speed after the epidemic, bringing a bumper harvest year to the tungsten products industry. According to the data released by the Ministry of natural resources and the Ministry of industry and information technology, the total mining control index of tungsten concentrate (65% WO3) in China was 108000 tons in 2021, an increase of 3000 tons over the same period in 2020, a year-on-year increase of 2.90%. Among them, the main mining index was 80820 tons, with a year-on-year increase of 3.42%, and the comprehensive utilization index was 27180 tons, with a year-on-year increase of 1.23%. On the consumer side, the demand of manufacturing industry boosted the domestic tungsten consumption by 13%, and the total tungsten consumption in the whole year was 65000 tons, of which the consumption of various tungsten concentrates increased by 13% year-on-year to 55000 tons; The recycling of tungsten scrap alloy exceeded 10000 tons, with an increase of 11%. The overseas market increased by 55.16%, and China exported 24000 tons of tungsten raw materials (metal) of non cemented carbide in the whole year.



In recent years, mining tungsten cemented carbide tips and bottons has increased significantly with the growth of infrastructure construction and the improvement of mechanization

According to the industry statistics of China Construction Machinery Industry Association, the main manufacturing enterprises of construction machinery sold a total of 342784 sets / set of various excavation machinery products in 2021, with a year-on-year increase of 4.6%. Among them, 274357 units were sold in the domestic infrastructure market, with a year-on-year decrease of 6.3%; Due to the increase of rigid demand for construction machinery due to economic recovery in the international market, the export sales volume of China's construction machinery was 68427, with a year-on-year increase of 97.0%. In addition, according to the statistics of China Automobile Industry Association, as the world's largest automobile market, China's automobile production and sales were more than 26 million in 2021, with a year-on-year increase of more than 3.0%; In the field of 3C, the overall domestic notebook computer panel market increased by about 26% in 2021, and the sales volume reached 287 million pieces. The global shipment of tablet computers outside China was 170 million units, a slight increase of 3%; In 2021, the overall shipment volume of domestic mobile phone market was 350 million, with a year-on-year increase of 14%. The annual shipment volume of global smart phones was 1.355 billion, with a year-on-year increase of 5.7% (data of IDC).

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In the market atmosphere where the mining and beneficiation forces did not increase significantly, but the demand side rose synchronously with economic growth, the average price of domestic wolframite concentrate (65% WO3) was 102500 yuan / ton in 2021, an increase of 20.95% over the same period in 2020; The average price of apt was 154400 yuan / ton, an increase of 21.06% over the same period in 2020. The prices of other tungsten products are also rising, showing increases of different ranges. The annual price increase of all tungsten products is more than 20% on average. A small number of high-end tungsten products that are not included in the overall statistics, such as nano tungstic acid, refined ammonium metatungstate, purple tungsten, cesium tungsten bronze, etc., have increased significantly.

1.2.2 China's General Control "Valve" of Tungsten Raw Materials in 2022

According to the increment of 5.5% of the total economic volume in 2021, it will bring an absolute increment of at least 6,300 billion GDP. If this increment is calculated according to the simple average of the proportion of tungsten GDP consumption in 2021, we can know that the absolute increase of the overall consumption of tungsten products in 2022 will reach the tungsten concentrate mining volume equivalent to about 7,300 tons of tungsten trioxide. In this calculation, we ignore the increment of a small amount of tungsten waste and scrap recycled materials, this is the annual production scale of a medium and large apt smelter, which is not a simple small quantity for the tungsten industry.



Wolframite Ore

On February 25, 2022, the Ministry of Natural Resources issued the total amount control index of rare earth and tungsten mining in 2022 (the first batch). The total mining control index of the first batch of tungsten concentrate (tungsten trioxide content 65%) in all

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provinces (autonomous regions) is 63,000 tons, including 46,890 tons of main mining index and 16,110 tons of comprehensive utilization index, which are the same as that in the same period of last year. However, from a regional perspective, Zhejiang Province decreased by 48.72%, Anhui Province decreased by 62.96%, Hunan Province increased by 3.5%, and the other three provinces remained unchanged.

Statistics show that the total control index of tungsten concentrate mining in China in 2021 is 108,000 tons, an increase of 2.86% over the previous year. Therefore, we estimate that the annual control index in 2022 will be less than 120,000 tons. However, in fact, the mining volume of tungsten concentrate is often slightly larger than the control index issued by the state. For example, in 2021, the national output of tungsten concentrate was about 138,900 tons, with a year-on-year increase of 0.22%, and the actual mining volume is much larger than the control index. Therefore, if the total amount control index of tungsten mining in 2022 issued by the Ministry of natural resources is strictly followed, the consumption increment of tungsten products required by China's economic increment in 2022 needs to tap the potential, improve the resource utilization rate, improve the recovery rate of waste and broken materials, and improve the technical level and industrial competitiveness of the whole tungsten industry.

2010-2021 年中国钨矿开采总量控制指标					
时间	主采指标	综合利用指标	预留	合计	单位
2010 年	66480	13520	—	80000	三氧化钨含量 65%，吨
2011 年	68680	16200	2120	87000	三氧化钨含量 65%，吨
2012 年	69400	17600	—	87000	三氧化钨含量 65%，吨
2013 年	71000	18000	—	89000	三氧化钨含量 65%，吨
2014 年	71000	18000	—	89000	三氧化钨含量 65%，吨
2015 年	73300	18000	—	91300	三氧化钨含量 65%，吨
2016 年	73200	18100	—	91300	三氧化钨含量 65%，吨
2017 年	73350	17950	—	91300	三氧化钨含量 65%，吨
2018 年	76150	23850	—	100000	三氧化钨含量 65%，吨
2019 年	78150	26850	—	105000	三氧化钨含量 65%，吨
2020 年	78150	26850	—	105000	三氧化钨含量 65%，吨
2021 年	80820	27180	—	108000	三氧化钨含量 65%，吨

Total control index of tungsten mining in China from 2010 to 2021

1.2.3 New Project in China are Veritable "Big Stomach King" of Tungsten Raw Materials

At the same time, China's tungsten industry will also usher in a year of great development in 2022. According to the "chronicle of China's Tungsten Industry in 2021" released by China Tungsten Industry Association, in 2021, China's tungsten industry enterprises will focus on industrial transformation and upgrading, process and technology innovation, product optimization and quality improvement, and plan a number of key projects. These projects are the technological transformation of Zhujiang hard group tungsten carbide powder intelligent production line of China tungsten high tech The CNC blade production line of

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Zigong Cemented Carbide Company, Ganzhou Industrial Park project with a total investment of 10.2 billion yuan for the first phase with an annual output of 10000 tons of tungsten powder and 8000 tons of tungsten carbide production line, Xiamen Jinlu Haicang cemented carbide industrial park with a total investment of 2 billion yuan for Xiamen tungsten industry, 12000 tons of tungsten powder, 11200 tons of mixture, 2000 tons of mining alloy production line powder and mining alloy production line and supporting facilities Boyun Oriental has invested 560 million yuan in the industrialization project of Lugu Base with an annual output of 2000 tons of high-efficiency and precision cemented carbide tools and high-strength and toughness extra coarse-grained cemented carbide tunneling tools. These projects will further increase the output of high value-added products in China's tungsten products industry, "boost the green and intelligent development of the industry and provide strong support for the high-quality development of the industry". Of course, there is no doubt that these projects also have a huge demand for upstream tungsten raw materials.

While expanding production capacity, China's tungsten products industry is also increasing R & D investment, actively expanding the product quality and production capacity of high-end products, hoping to compete with major international brands in the domestic high-end product market, increase the export volume of high-end tungsten products, especially cutting tools, and win a bigger share in the international market.



The difficulty of adjusting the micro drill from 0.10mm to 0.01mm is the thinnest drill that can be manufactured in the world at present, which is only one eighth of the fineness of hair. The fine micro drill is generally used in the machining of high-precision products such as printed circuit board (PCB). The correlation of micro drill size, precision and hardness can be continuously improved with the development of PCB manufacturing to high precision, high density, fine aperture, fine wire and other properties. China's scale advantage in the electronic information industry will provide a powerful opportunity for the expansion of China's Cemented Carbide high-end micro drilling market.

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Taking the high-end cutting tools of China tungsten high tech as an example, its self hardening will add 10 million NC blades in 2021 and plans to put into production in the fourth quarter of 2022, so that it can reach the output of 20 million blades in 2022; Another Zhuzhou drilling company under the company mainly produces CNC blades, integral tools, CNC tools and traditional blades. The two production lines approved for construction are also expected to increase the production capacity of more than 10 million pieces. Jinzhou company will produce about 550 million micro drills in 2021 and plans to produce more than 700 million by the end of 2022. According to the introduction of its board secretary, sinotungsten high tech "at present, the expansion of production is small batch expansion, but the frequency of expansion will be relatively high. Jinzhou has production bases in Shenzhen, Kunshan and Nanchang. The three bases develop synchronously, and there will be enough space for expansion in the future." At the same time, Jinzhou company of China tungsten high tech has also actively explored dental tools, expanding from a few dental tools to a full range of dental tools, and then to dental tools specifically for children; With many years of tungsten wire production experience, technology, production equipment, raw materials and other advantages, the self hardening company of China Tungsten online plans to invest in the construction of a 10 billion meter high-strength fine tungsten wire production line for the photovoltaic industry. Because the fine tungsten wire has the characteristics of cutting efficiency, stability and lower loss rate of silicon wafer, although the price of tungsten wire is higher than that of carbon steel currently used in the photovoltaic industry, it still has strong competitiveness, The downstream acceptance is still relatively high and the demand is relatively strong.



Planning Map of Ganzhou Tungsten Industrial Park, Jiangxi Tungsten Holding Group

From this, we can see that China's tungsten products industry is making efforts to respond to national policies, reduce and shut down the old production capacity with high energy

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consumption and low output, actively forge ahead, develop towards high-end products, avoid "Involution" competition on low-end products, strive to realize high-quality double circulation in domestic and foreign markets, and expand the market share of high-end products by taking full advantage of technology and quality on the basis of existing resource advantages.

Therefore, we believe that under the macroeconomic background of stable and upward economic development in China, the tungsten products industry will continue to improve production technology and product quality, and increase the output of tungsten products in the whole industry to serve national construction and participate in global competition. On the premise of no significant increase in the total mining volume of tungsten products, from the perspective of demand, it will form a long-term tight supply state, and the price will rise for a long time, even if there are short-term small fluctuations, on the premise of the rising mining cost of tungsten concentrate, the supply of tungsten concentrate will become an "invisible hand" that plays a decisive role in regulating market supply, demand and price.

1.3 China's Infrastructure is Heating Up



China's 5g technology is unique in the world

1.3.1 China's Ddomestic Infrastructure Demand

After the reshuffle in 2021, at the beginning of 2022, relevant national ministries and local governments frequently issued supportive regulation policies to promote the healthy development of the real estate market. For example, the central bank clearly implemented the prudent management system of real estate finance and increased financial support for Housing leasing; LPR interest rate in January "double down"; The Ministry of natural resources should "comprehensively update the registration results of collective land

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ownership confirmation in two years"; At the beginning of 2022, Zhengzhou, Henan Province introduced some measures to relax the real estate market. Under the premise of "no speculation in housing", all parts of the country also introduced policies and measures conducive to real estate development and buyers' needs. Taking into account the optimization of fertility policy schemes, encouraging the implementation of two child and three child policy and relaxing the use of provident fund in other places, it not only facilitated buyers, but also prevented and steadily resolved the risk of "grey rhinoceros" in real estate.

1.3.2 Demand for 5G and New Energy Vehicles

Under the environment of moderate carbon neutralization in real estate, the construction of green intelligent buildings and the accelerated replacement of traditional fuel vehicles by new energy vehicles drive the demand for steel, cement and building materials. On the one hand, new energy vehicles improve the demand for processing tools, appliances and molds, on the other hand, the application and consumption prospect of new energy batteries for tungsten containing chemical raw materials is becoming clearer, which may bring a new wave of tungsten use revolution. In 2022, there will be 2.5 million 5g base stations in China. The continuous research, development and use of 5g and 6G will greatly increase the consumption of processing tools.

According to the economic daily, China's new energy vehicle industry developed rapidly in 2021, with a sales volume of 3.521 million vehicles, ranking first in the world for seven consecutive years, with a market share of 13.4%. China Automobile Industry Association believes that in 2022, more expectations will be placed on new energy vehicles, and 5 million vehicles will become a new target. Therefore, we can expect that the consumption of tungsten products in the automotive field will further increase under the situation that China's subsidy policy for new energy vehicles continues to promote and new energy vehicles go to the countryside.



Driverless new energy vehicles in 5g Era

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On March 26, 2022, Xiang Libin, Vice Minister of the Ministry of Science and Technology of the People's Republic of China, said at the forum of the 2022 China electric vehicle hundred people's meeting that the problems such as the sharp rise in the price of metal raw materials such as cobalt, lithium and nickel and the lack of core are perplexing the new energy vehicle enterprises. For these pain points and difficulties faced by the industry, the state will organize forces to tackle key problems and support relevant enterprises, universities and colleges in various ways Support the research and breakthrough of basic cutting-edge and common key technologies, prospectively layout the key core technologies such as all solid-state batteries and a new generation of electric drive system based on new materials and devices, and focus on breaking through the bottleneck technologies restricting the development of the industry; Accelerate the construction of innovation platforms such as national key laboratories in the field of new energy vehicles and the national technological innovation center, and pool the innovative resources of colleges and universities, scientific research institutes, upstream and downstream enterprises, large, medium and small enterprises to serve the development of the whole industry; Research and develop high safety and all climate power battery system technology, carry out technical research on cobalt free power battery and low weight rare earth permanent magnet material driven motor, and strengthen the research and development of battery echelon utilization technology. Vigorously promote the integrated development of new energy vehicles and green energy scientific and technological innovation, strengthen the research and demonstration application of hydrogen energy technologies such as green production, safe storage and efficient transmission and distribution of hydrogen energy, help build a clean hydrogen energy supply system and support the industrialization of fuel cell vehicles. It can be seen that China will continue to increase investment in the field of new energy vehicles that have achieved market, scale and certain technical advantages, and strive to maintain the global leading position in the field of expandable new energy.



China's battery technology is leading. At present, some institutions are studying the application technology of tungsten in new energy batteries.

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It is worth noting that under the current soaring price of nickel cobalt lithium battery materials, the current technology and commercialization prospect of sodium ion battery is unclear. Therefore, the hot research in recent years is that lithium, sodium and potassium are homologous potassium materials. Theoretically, potassium compounds are used as positive electrodes, but they have not been commercialized. The partners of China Tungsten online have studied and tried for several years on the purity and particle size preparation process of Purple Tungsten. Because the lattice of purple tungsten is about twice larger than that of other homologous materials, it is possible to be the pole of battery, with low cost, little technical difficulty and theoretical feasibility. We don't know if there is any similar research in Ningde era, the leader of battery. We hope that one day tungsten can be applied to battery production on a large scale, which will open up another spring of tungsten industry.



China Tungsten Online and its partners have been studying the possibility of improving the purity of nano violet tungsten and commercializing battery applications for many years

1.3.3 Reconstruction of Afghanistan and Ukraine

There are many countries in need of reconstruction internationally. The reconstruction of Iraq, Syria and Lebanon has not been completed, but the most special ones in 2022 may be our close neighbors Afghanistan and Ukraine, where the conflict between Russia and Ukraine took place.

Although Afghanistan is a neighboring country bordering China, and there are great differences between Afghanistan and China in political system, culture, religion and economic development level, Afghanistan's lithium, copper and other mineral reserves rank among the top in the world; After the withdrawal of the U.S. military, Afghanistan has

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a lot of waste waiting to flourish, and has a huge demand for China's goods, especially in terms of capital, technology and other aspects of China's infrastructure assistance. If the economic cooperation between the two countries is carried out in the future, combined with the China Pakistan corridor between China and Pakistan, the infrastructure in Afghanistan may become a new highlight of China's foreign cooperation infrastructure.

According to the information of the Ministry of foreign affairs of China, the third foreign ministers' meeting of neighboring countries of Afghanistan was held in Tunxi, Anhui Province, China from March 30 to 31. The countries that sent foreign ministers (or representatives) to the meeting included China, Pakistan, Iran, Russia, Tajikistan, Turkmenistan, Uzbekistan, acting foreign minister of Afghanistan, foreign minister of Indonesia, foreign minister of Qatar, special representative of the United States on Afghanistan and other countries, such a high-level neighboring Afghanistan + Afghanistan is actually a meeting between China, the United States, Russia, Muslims and Afghanistan. It is launched before the end of the Russian Ukrainian conflict, which shows the depth of China's efforts and the importance of creating a peaceful environment for the reconstruction of Afghanistan in the future. Therefore, we can expect the reconstruction of Afghanistan. Since the conflict between Russia and Ukraine, representatives of Russia and the United States have rarely met at the same table at this meeting, which has aroused international attention; It may also indicate another potential positive signal of the Ukrainian issue after the negotiations between Russia and Ukraine and Turkey.


INTERNATIONAL MONETARY FUND

UKRAINE

March 7, 2022

REQUEST FOR PURCHASE UNDER THE RAPID FINANCING INSTRUMENT AND CANCELLATION OF STAND-BY ARRANGEMENT

www.chinatungsten.com

EXECUTIVE SUMMARY

Context and policy response. While geopolitical tensions with Russia had already curtailed Ukraine's access to markets, the escalation to an invasion of Ukraine by Russia and full-blown war on February 24 has dramatically altered Ukraine's outlook. A deep recession and large reconstruction costs are to be expected, on the backdrop of a humanitarian crisis. With the war ongoing, the situation remains extremely fluid, and any forecast is at this stage subject to massive uncertainty. The authorities are rightly

IMF's report on war losses in Ukraine

A few days ago, an IMF official said: in the context of the humanitarian crisis, Ukraine's economy is expected to experience a severe recession (GDP shrinking by 35%) and huge reconstruction costs. Kyrylo Shevchenko, governor of the Central Bank of Ukraine, said that Russian assets frozen abroad due to sanctions should be used to help rebuild Ukraine; "The demand for funds for reconstruction will be

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huge," Shevchenko said. "It can be achieved through loans and grants from multinational organizations and direct assistance from other countries." Ukraine is one belt, one road in China, which is the first European country to sign a regional agreement with China. It is also an important source of grain and oil, military technology and equipment in recent years. The two countries have good cooperation from the private sector to the government. We believe that after the end of the conflict between Russia and Ukraine, China will become the main participant in the reconstruction of the country with its technology and capability.

1.3.4 Global Inflation and China's CPI

As we have analyzed in detail in the third part of this paper, the main causes of global price rise come from two aspects: first, the shortage of energy, bulk metals, food and chemical fertilizer caused by sanctions in Russia under the background of the conflict between Russia and Ukraine, and there is no cheap alternative supplier in the short term; Second, it has become a fact that the nominal price of goods caused by excessive currency issuance in Europe, America and other countries has been inflated.



Schematic Diagram of Consumer Price Index of China,2021

With the rise of global prices, it is difficult for China to be alone. The possibility of price rise in China is not only the above-mentioned global common reasons, but also the recent special situation of China. Compared with the United States, the CPI in February 2022 was close to the highest 8% in 40 years; According to the data released by China's National Bureau of statistics on January 12, 2022, the national consumer price index (CPI) in 2021 increased by 0.9% over the previous year, lower than the annual expected target of about 3%; Similarly, Premier Li Keqiang proposed in the government work report that consumer prices will rise by about 3% this year.

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The data show that the CPI target in recent 10 years has been set within 3% in seven years, which also shows the government's intention to normalize the price rise by 3%.

In the past two years, the positive fiscal policies adopted by many economies around the world due to the epidemic have led to the high fever of inflation. However, China's prices are moderate and controllable, and the CPI has been at the level of about 1 for a long time. This is mainly due to the sufficient supply of pork, sluggish consumption, falling meat prices, sufficient supply of fruits and vegetables and other essential consumer goods, and stable prices. However, we must note that from 2021 to now, the price of pork in China has remained low. At present, the average price of live pigs is 12 yuan / kg and the average retail price on the market is about 22 yuan / kg. However, the industry generally believes that the rise cycle of pork price is the second half of 2022, that is, the effect of pork price on CPI will disappear in the second half of 2022 and is likely to become the main factor driving CPI rise. At present, China's CPI is running at about 2%, and it is estimated that it will continue to rise in the second half of the year.

Due to the reduction of grain production in South America due to the severe drought in 2021, the conflict between Russia and Ukraine has reduced the supply of grain and oil, and it is very likely to miss the management of sowing and fertilization in spring, resulting in a reduction in production. Serious food shortages worldwide may occur in 2022; In this way, the prices of edible grains and feed imported by China will rise sharply, which will promote the rise of prices; If the superimposed international geopolitical situation has a serious impact on the global industrial chain, supply chain, energy and commodity supply, China will have to face imported inflation.

If China's CPI reaches the set target of 3% in 2022, it will put great pressure on the production and processing costs of many industries, including tungsten products industry, which will be described in the subsequent production costs of tungsten products.

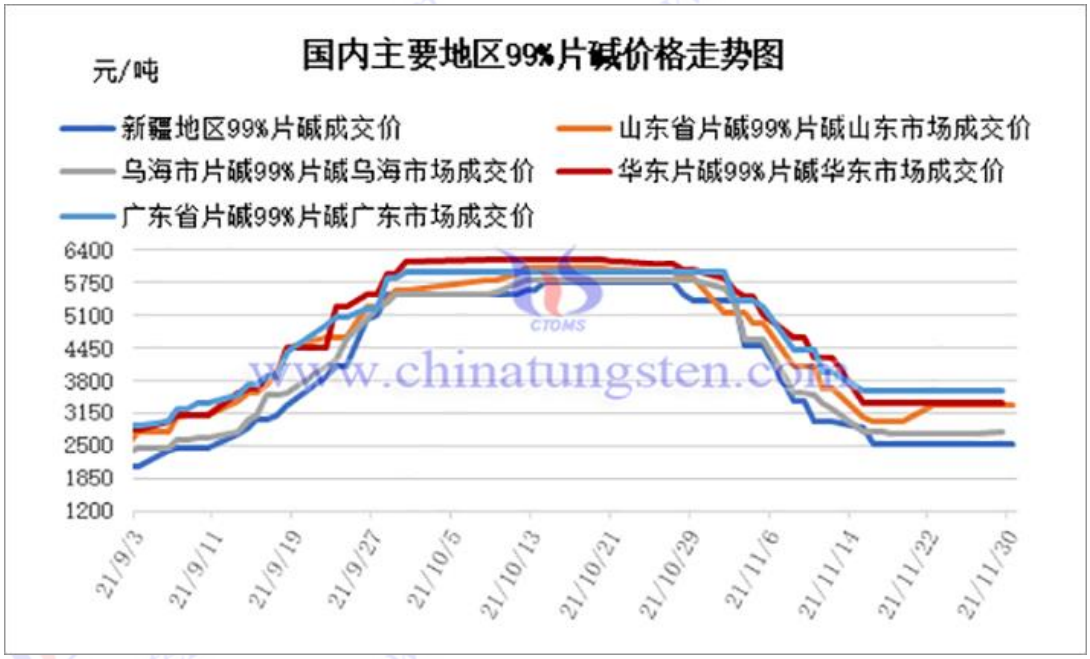
2. Direct Costs Affecting the Market Price of Tungsten Products

Since 2021, China's tungsten concentrates and other raw materials have increased by more than 20%. The annual average price in 2021 was 103000, and other tungsten products have also increased by about 20% in the same period. Since 2022, after a short period of slight decline and fluctuation, tungsten concentrate has been maintained at about 118000. The price is close to 2013, that is, the high price period nearly 10 years ago. We have made a detailed analysis and prediction in 2021. The main factors can be seen in the analysis articles at that time. This time, the price of tungsten products increased slightly. In addition to the high level of raw materials, from the micro level, at the front of the tungsten products industry chain, the price

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of auxiliary materials in the production process of tungsten chemicals, such as flake alkali, hydrochloric acid, ammonia and other main consumption auxiliary materials, increased by more than 200% continuously in 2021. Accordingly, other auxiliary materials also increased to varying degrees.



As the main auxiliary material for the production of tungsten intermediate products, the mainstream ex factory average price of flake alkali rose from 2400 yuan / ton in early September to 5800 yuan / ton, a record high within one month in 2021, with an increase of 146.81%. From the end of October to the middle of November, the price of flake alkali fell to about 2650 yuan / ton in just half a month, with a decrease of 54.31%. The analysis shows that the abnormal fluctuation of supply side is the core factor of the sharp fluctuation of flake alkali price.

The price of hydrochloric acid, another auxiliary material for smelting tungsten products, has increased slightly since March 2022, from 316.25 yuan / ton to 341.25 yuan / ton, an increase of 8% and a year-on-year increase of 70.62%. However, according to the price statistics of the past decade, the price of hydrochloric acid has increased by nearly 400% in a row in the past decade.

The power cost of tungsten products production, i.e., energy price, also continued to rise in 2021-2022. Due to the consumption of heating coal in the winter of 2021, the cost of fuel and electricity increased. In the second half of 2021, power rationing occurred in most parts of the country. Tungsten smelting is an industry with high energy consumption, and power cost is an important factor affecting the price. Therefore, energy price is an unavoidable long-term problem in the tungsten industry. According to the monitoring of the market prices of 50 important means of production in 9 categories in the national circulation field by the National Bureau of statistics, the prices of 37 products increased in the first ten days

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of March 2022 compared with the last ten days of February. Among them, the price of ordinary mixed coal increased by 32.0% month on month.

What's more, as a non-renewable mineral resource, as China's high-quality tungsten concentrate resources are decreasing day by day, the mining grade of tungsten mines is getting lower and lower, and it is difficult to find a single mine of high-grade standard tungsten concentrate. Low grade tungsten concentrate means higher impurity content, so more impurity removal processes have to be added in the production process. Therefore, higher impurity removal cost and lower conversion rate gradually increase the manufacturing cost; Moreover, in order to achieve the double carbon goal of carbon peak and carbon neutralization, the emission control is becoming more and more strict, and the cost and risk of treating sewage, waste gas and waste materials in the production and processing of tungsten products are increasing.



After the Russia-Ukraine Conflict, the prices of oil, thermal coal and coking coal rose sharply

Based on the investigation and analysis of the main factors affecting the price of tungsten products, the basic conclusion is that the prices of food and energy will rise significantly in the foreseeable period from 2021 to 2022, and the raw materials, main auxiliary materials, power energy and pollution control costs for the production and processing of tungsten products will increase significantly. In addition, the cost of human resources will accelerate the process of urbanization and reduce the labor population in China Under the trend that the payment of capital and social security benefits only increases but not decreases, we can predict that the price of tungsten products will continue this trend and continue to rise in 2022 after rising in 2021!

(Part IV unfinished, to be continued)

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SUMMARY

Based on the experience of tungsten products market in the past decades and the current situation of the conflict between Russia and Ukraine, the author believes that the price of tungsten products will continue to rise in 2022, but the main factor is not traditional market factors; Therefore, in the first part, we focus on the conflict between Russia and Ukraine and the military use and importance of tungsten products. In the second part, we focus on the global resource distribution of tungsten products, especially the general situation of Russian tungsten resources and the relationship between China's tungsten products industry and Russia; The third part analyzes the factors of the sharp rise in the prices of energy, bulk metals and grain and the cost pressure of China's tungsten market under the background of the conflict between Russia and Ukraine; In the fourth part, we analyze in detail the market trend of tungsten industry under the background of war and sanctions from the perspective of macroeconomic factors and processing cost of tungsten products, and comprehensively analyze the main factors and possibilities of rising and falling prices of tungsten products in 2022; At the same time, we will also discuss the feasibility and risk of China's tungsten products futures; Since it is related to Russia, finally, we will briefly analyze the suspected fraud such as the so-called sky high price Russian tungsten gold bars that have appeared from time to time in the past few decades.



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