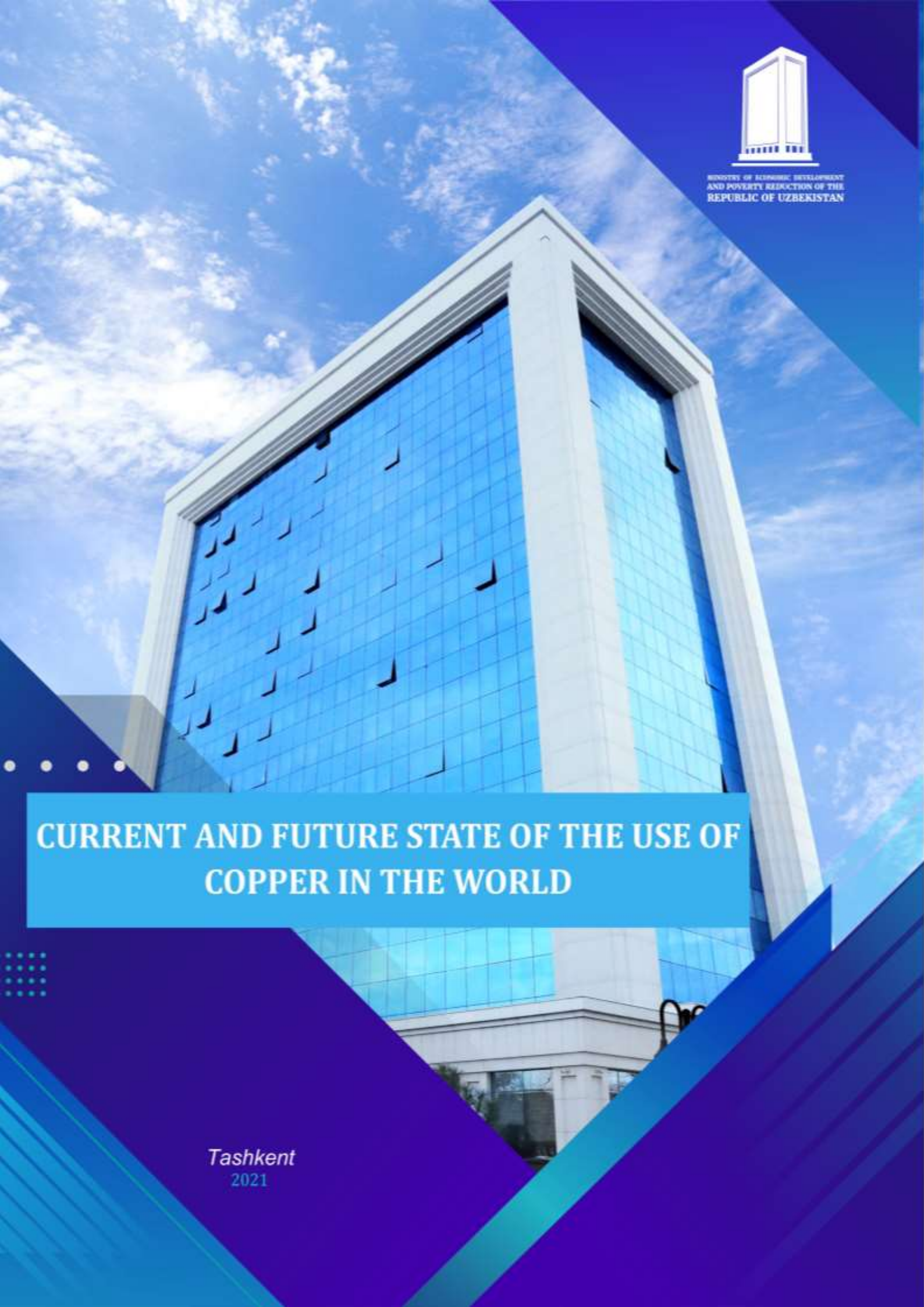


MINISTRY OF ECONOMIC DEVELOPMENT AND POVERTY REDUCTION OF THE REPUBLIC OF UZBEKISTAN

# CURRENT AND FUTURE STATE OF THE USE OF COPPER IN THE WORLD

*Tashkent*
2021

## Current and future state of the use of copper in the world

In the bowels of the earth there are a large number of different minerals that can be used to produce various materials. Copper ore is quite common.

The suitability of ore for beneficiation is determined if it **contains 0.5-2% copper**.

The industry treats rock that has a copper concentration of about **0.5%.** Rich ores contain **2%** copper, ordinary ores contain **1-2%**, and poor ores contain less than **1%.**

**Copper content in ores in the whole world.**
**Industrial recovery and concentration**

| Country | Name of the field | The concentration of copper in the ore in % | Obtaining copper from ore in % |
|---|---|---|---|
| **Poland** | Mine (quarry) «Nijnyaya Sileziya» | **1,64** (1 ton of ore contains 16.4 kg of copper) | **90** |
| **Indonesia** | Mine (quarry) «Grasberg» | **0,9** (9,0 kg of copper) | **84** |
| **Chile** | Mine (quarry) «Kandelariya» | **0,54** (5,4 kg of copper) | **91** |
| **Peru** | Mine (quarry) «Serro-Verde» | **0,4** (4,0 kg of copper) | **86** |
| **USA** | Mine (quarry) «Bingemskiy Kanyon» | **0,6** (6,0 kg of copper) | **84** |
| **USA** | Mine (quarry) «Bagdad» | **0,36** (3,6 kg of copper) | **85** |
| **USA** | Mine (quarry) «Syerrita» | **0,25** (2,5 kg of copper) | **82** |
| **Uzbekistan** | Mine (quarry) «Kalmakir», «Sari-Cheku» | **0,345** (3.45 kg of copper) | **75** |

Source: “Extractive Metallurgy of Copper” (fifth edition) Journal – Mark E. Schlesinger, Matthew J. King, Kathryn C. Sole, William G. Davenport

Depending on the sulfide form as well as the mineral compounds of copper, the enrichment process depends. In Uzbekistan, the sulfide form and mineral compounds of copper range **from 70% to 85%.** As a result of the beneficiation process and the content (concentration) of copper in the ore is **0.345%.**

**The cost of the final copper product** depends to a large extent on the content (concentration) of copper in the ore and its extraction from the ore. The higher the content, as well as obtaining copper the cost of the final product is less. The cost of copper in the Republic of Uzbekistan is **$3,800-4,200** per ton. The average cost of copper of copper in the world is **$3,200-3,500** per ton.

**Mining and using**

China remains the world's main consumer of copper, with a share of **54%** in 2020. China's refined copper imports in 2020 were **4.5 million** tons, up **30%** from 2019. Imports of copper scrap **fell by 35%**, to **0.8 million** tons, due to China's new regulatory requirements for stricter quality control of imported scrap.



**СРЕДНЕГОДОВЫЕ ЦЕНЫ НА МЕДЬ (ДОЛЛ. США / Т)**

| 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| 5 494 | 4 863 | 6 166 | 6 523 | 6 000 | 6 181 |

*Источник: Лондонская биржа металлов*

A copper industry cluster is being created in Uzbekistan. Over the past five years, the volume of copper production in the country has increased almost **1.5 times** and was reaches **148 thousand tons in 2020.**

But work in the republic on the production of high value-added products is insufficient . In particular, **about 60 percent** of copper is exported as raw material.

The main market for AGMK's external sales today is Turkey, where **60 to 70** percent of the product is exported. Then come China, the CIS countries and Eastern Europe. In addition, exports of copper products to Qatar, Australia, Indonesia, Poland are being set up, shipments to the UAE are being prepared, and North American markets are being explored.

AGMK is the flagship of non-ferrous metallurgy in the entire CIS; it ranks third with an annual output of **148 thousand tons** of copper (in Russia - **973 thousand**, in Kazakhstan - **500 thousand**).

International experts estimate Global demand for copper is expected to grow by **40 percent** by 2030 y. due to the growth of electric vehicles, electrical engineering, and the development of renewable energy sources.

At the same time, AGMK focuses not just on increasing exports of copper products, but also on exports of products with high added value.

**Areas of use**

Copper is a ductile and malleable metal that is an excellent conductor of heat and electricity, it is also resistant corrosion-resistant and has antimicrobial properties. Alloyed with other metals such as zinc (brass), aluminum or tin (bronze) or nickel, copper can acquire new characteristics necessary for use in highly specialized applications.

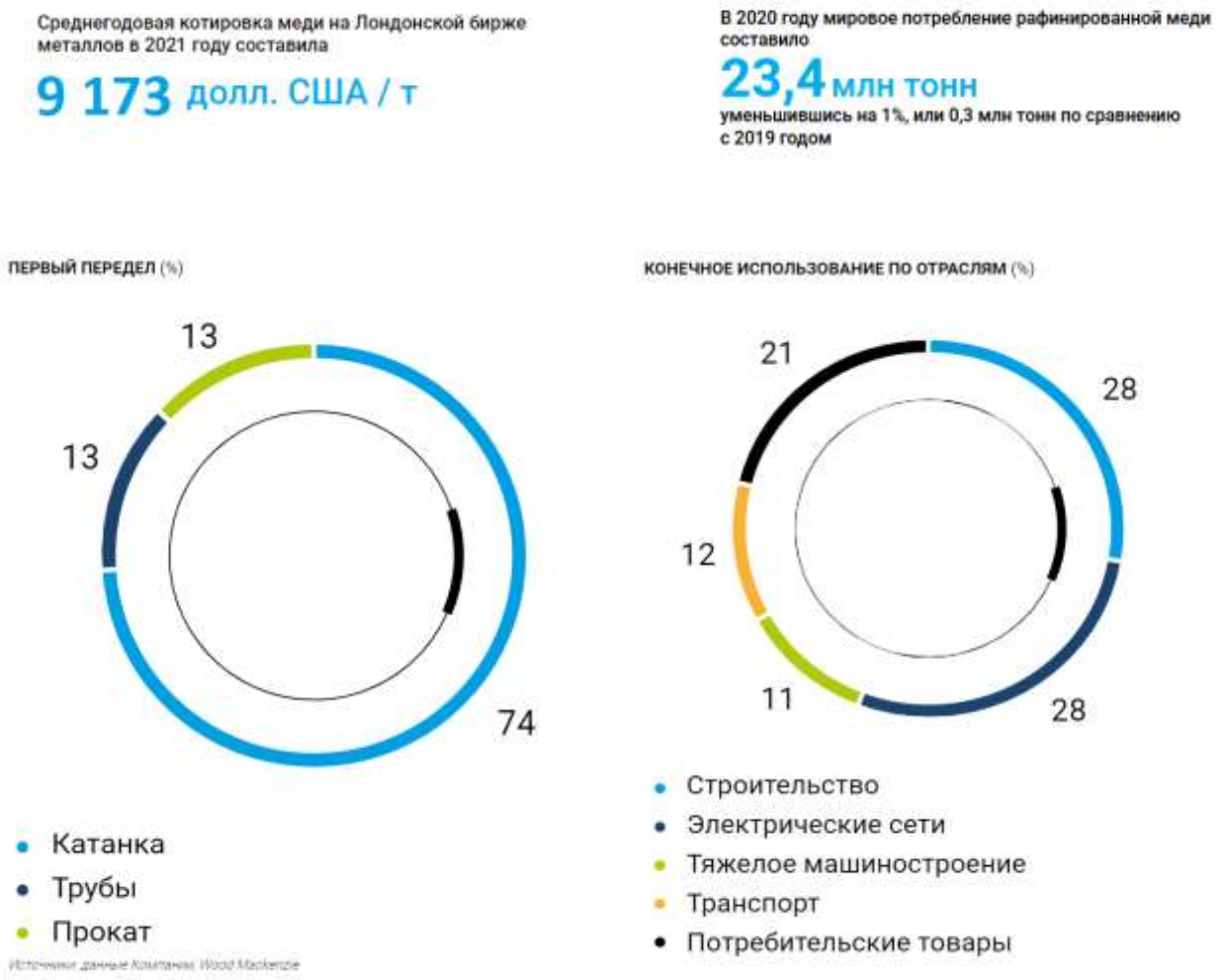
On the basis of the analyzed material, it is possible to draw conclusions about the positive trends in the development copper mining industry of the world. Current reserves and production capacity, as well as available primary and refined copper production technologies, suggest favorable prospects for copper production in the future.

Copper, a non-renewable natural resource, is already in the coming decades could turn into one of the most scarce materials. In terms of abundance in the Earth's crust, copper is **25th** in abundance in the Earth's crust.

As of today, reliable recoverable copper reserves, i.e. reserves that can be mined at the current level of technological development and economic

viability, amount to only **340 million** tons. In the absence of reserve additions and improvements in mining and production technology copper **recoverable reserves will only last until 2040.**

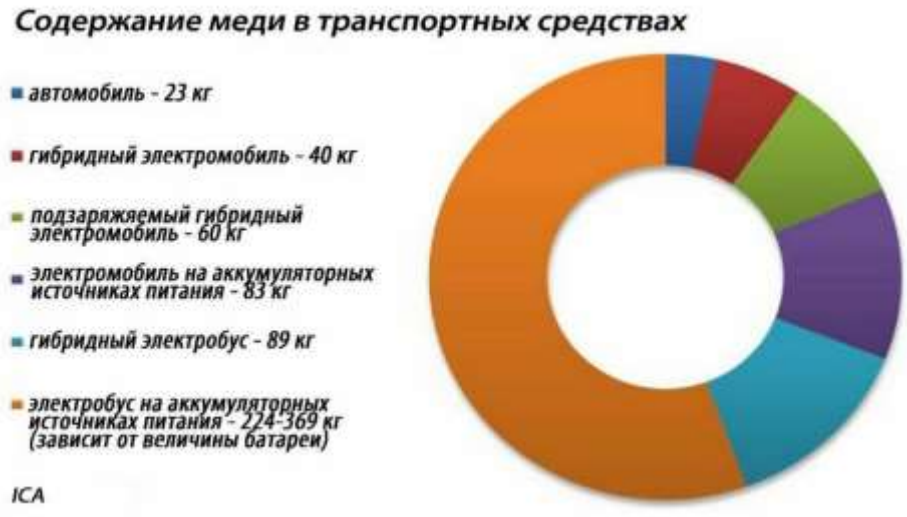
Due to its properties, including ductility, corrosion resistance, electrical conductivity, high aesthetic properties and relatively low cost of production and extraction of copper, it can be used in various industries, being from medicine and finished to electronics.




According to the International Copper Association (ICA), copper is used most in building construction building at **28%**, and in infrastructure at **28%, 11%** in heavy engineering and **12%** in transportation. There comes a turning point, however, when the automotive industry begins to dramatically expand its use of copper.

By 2030, copper consumption for the production of passenger electric vehicles will increase by 3 times compared to today's level. *(According to the forecasts of the International Energy Agency, by 2030 there will be 145 million electric vehicles in the world, including trucks and buses).*

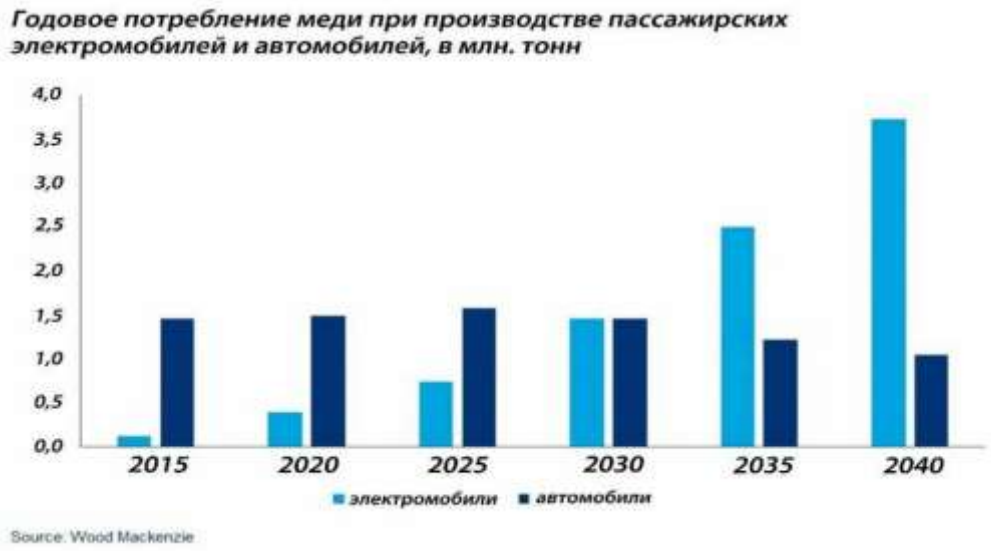
*Electric cars contain about four times more copper than conventional cars.* It is used in batteries, windings and copper rotors of electric motors, electrical wiring, tires and in charging infrastructure. The amount of copper used increases with the size of the vehicle: a fully electric bus has **11-16 times more** copper in it than a passenger car of an internal combustion engine.




The electric vehicle market will eventually represent over 3 million tons of copper. In an electric car, copper is used everywhere because of its high electrical conductivity, durability and ductility. But even more of it is used in charging stations and in the supporting power grid infrastructure. Copper also plays an important role in the development of wind energy and in solar thermal power plants. Copper will also be required for the widespread introduction of clean energy.

In the future, copper will become the king in the world of fast electric filling stations. With the help of fast charging stations, the electric car can be "refueled" to 80% of the full charge in just 20 minutes. But these devices will be able to be as electrically efficient as possible only with the help of copper.

It is expected that by 2030, more than 20 million charging points of electric vehicles will be deployed worldwide, which will cause the consumption of copper for electric filling stations by 250% more than in 2019 (each electric filling station is 0.7 kg of copper, and a fast electric filling station is about 8 kg of copper).




**PROPOSALS:**

1. Consider the issue of organizing the development of production of electric charging stations for electric cars on the basis of the Copper Cluster together (AGMK) with the Association "Uzeltechprom" and JSC "Uzavtoprom" for deep processing of copper.

(***For information***: at present **more than 25 electric filling stations** have already been installed in throughout the republic, and by the end of the year the number of electric filling stations will reach **about 50 units**.

*International experts estimate that global demand for copper is expected to increase **by 40 percent** by 2030 due to the growth in the production of electric vehicles, electrical engineering, and the development of renewable energy sources).*

2. In order to establish cooperative ties with the Copper Cluster, it is necessary to study the issue of organizing the production of electric cars and electric buses in Uzbekistan.

(***For information***: In accordance with the Decree of the President of the Republic of Uzbekistan dated 04.10.2019 No. PP-4477 *(Strategy for the transition of Uzbekistan on a "green" economy in the period 2019-2030).* Expansion of production and use of motor fuel and vehicles with improved energy efficiency and environmental performance, as well as the development of electric transport and others.

This approach is firm evidence to the transition on the principles of "green economy of development" and will give impetus to the expansion of opportunities to attract "green finance" to the republic).

3. Currently, revenues from the sale of copper are amount to **2.5 billion dollars**. With an increase in copper production up **to 400 thousand tons** and implementation of projects on deep processing of copper in the next 5 years, this figure, taking into account allied industries, can reach **7-8 billion dollars**.

***Murodulla Anarbayev - Head of Department for the Implementation of the Industrial Development Strategy***