

# Rare and Rare Earth Metals Technologies & Production Project

Technology Transfer or Joint Project of rare metal exploration and production in Kazakhstan.

## Market Inside

The globalization of the world economy and scientific and technological progress in recent decades have intensified the use of mineral raw materials, especially rare (RM) and rare earth (REM) metals - the necessary basis for the production of both high-tech products (computers, cars, aircraft, electrical and electronic products and much more), as well as goods of rapidly growing everyday demand: mobile phones, various gadgets, lithium-ion batteries, batteries, etc.

By 2025, the REM market may grow to the level of 14-15 billion US dollars with an average annual growth rate of 8.6%. The volume of the global market for high-tech products, the production of which requires RM and REM, can be about 2.5 trillion. US dollars, which corresponds to 13% of world trade.

## Market forecast

Dependence on one manufacturing country with a large market share will remain, which is seen as a certain risk.

Supply in the rare metals market is likely to continue to exceed demand, but this will come at the expense of an excess of lanthanum, cerium and other light rare metals. In turn, medium and heavy lanthanides (samarium, europium, gadolinium, dysprosium, terbium, holmium, erbium, thulium, as well as ytterbium, lutetium and yttrium) will remain scarce and even severely scarce for the largest industrialized countries.

## Directions for possible cooperation

- 1 The first is to attract companies to Kazakhstan with experience in the development, processing and production of rare metal ores.
- 2 The second is exploration, "additional exploration" and involvement in the development of deposits of rare earth elements with the organization of complex processing of raw materials, including the associated mining of rare metal components contained in ore, as well as the organization of processing man-made waste and obtaining products in demand on the market.
- 3 The third is the production of semi-finished products and products from rare earth metals with a higher added value.

## Rare and Rare Earth Metals suggested for the production

In Kazakhstan, it is possible to produce the following rare earth metals, semi-finished products and products from them:

**lithium, cobalt, titanium, vanadium, niobium, tantalum, molybdenum, tungsten, osmium, rhenium, zirconium, cadmium, selenium, yttrium, indium, thallium, tellurium.**



## Rare and Rare Earth Metals Technologies interested in

1. Technologies for the integrated extraction of rare and precious metals from spent sulfuric acid from copper smelters;
2. Technology for the production of rhenium sulfide;
3. Technologies for the separation of rare-earth metals of the cerium and yttrium groups and the technology of oxidative roasting of rare-earth metals containing ores;
4. Technologies for cleaning rare-earth metals concentrates from radiation.



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