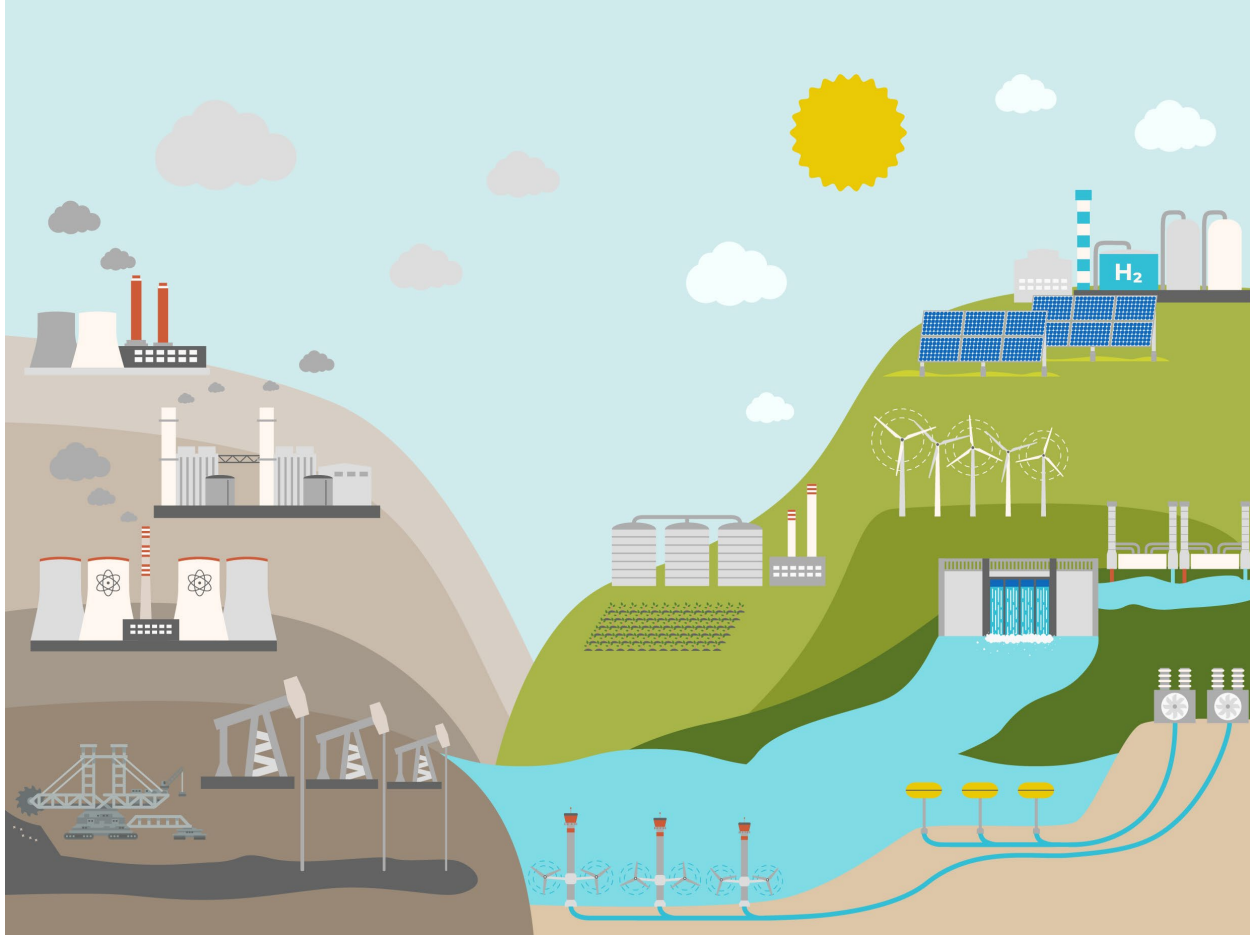
The Case study of CRM Capacity Development In Kazakhstan

Dr. Georgiy Freiman



RESOURCE MANAGEMENT WEEK

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Raw material base of Ni-Co ores of Kazakhstan

Kazakhstan's share in global nickel reserves is **1.4%** (about **1.9 million tons**), ranking **11th** in the world. The bulk of these reserves are represented by difficult-to-process oxidized nickel-cobalt ores of the lateritic type, with an average nickel content of **0.7-1.1%** and cobalt of **0.05%.** In total, **45** deposits of this type are known in the country, which have been explored in Western, Northern and Eastern Kazakhstan.

Main deposits:

(1-Kimpersayskaya gr., 2-Shevchenkovskoe, 3-Shidershinskaya gr., 4-Gornostaevskoe)

Extraction of nickel ores from previous periods

- During the Soviet period, Kazakhstan did not have its own production of metallic nickel and cobalt
- At the same time, in Western Kazakhstan, laterite ores were mined at 12 deposits of the Kimpersai group, which were supplied for processing to Russian metallurgical plants
- The ore was processed using the pyrometallurgical method to produce ferronickel
- Pyrometallurgical technology is extremely energy-consuming and critically harmful to the environment
- In the early 2000s, due to high ore transportation costs, mining of oxidized nickel-cobalt ores ceased

Global trends in the Ni-Co industry

- In recent years, both around the world and in Kazakhstan, the discovery of sulfide copper-nickel deposits has become an extremely rare occurrence, for this reason the main nickel producers are moving to the development of lateritic Ni-Co deposits.
- Lateritic Ni-Co ores have a number of advantages due to the fact that, being located closer to the surface, they allow open-pit mining. What makes these ores especially valuable is the presence of cobalt, which can be extracted together with nickel.
- At the same time, oxidized Ni-Co ores, characterized by a high iron content, are characterized by complex, energy-intensive processing technology that creates a high environmental load. The most traditional is the pyrometallurgical method of processing them to produce ferronickel.

Development of hydrometallurgical technology

- Due to the extremely high energy costs for processing laterite ores by the pyrometallurgical method, with a high environmental load, over the past 10-15 years, Kazakhstanian mining companies (more than 10), which hold licenses for the exploration and production of oxidized nickel-cobalt ores, have been actively conducting research for processing these ores by hydrometallurgical methods
- Most subsoil users comprehensively consider all possible methods of hydrometallurgical ore processing: heap and vat leaching with acids (sulfuric, hydrochloric), as well as underground borehole leaching
- To organize new production facilities, including Ni and Co, Kazakhstan has adopted the State Program for Industrial and Innovative Development, which plans a set of measures to introduce technologies for processing oxidized nickel-cobalt ores

Development of hydrometallurgical technology

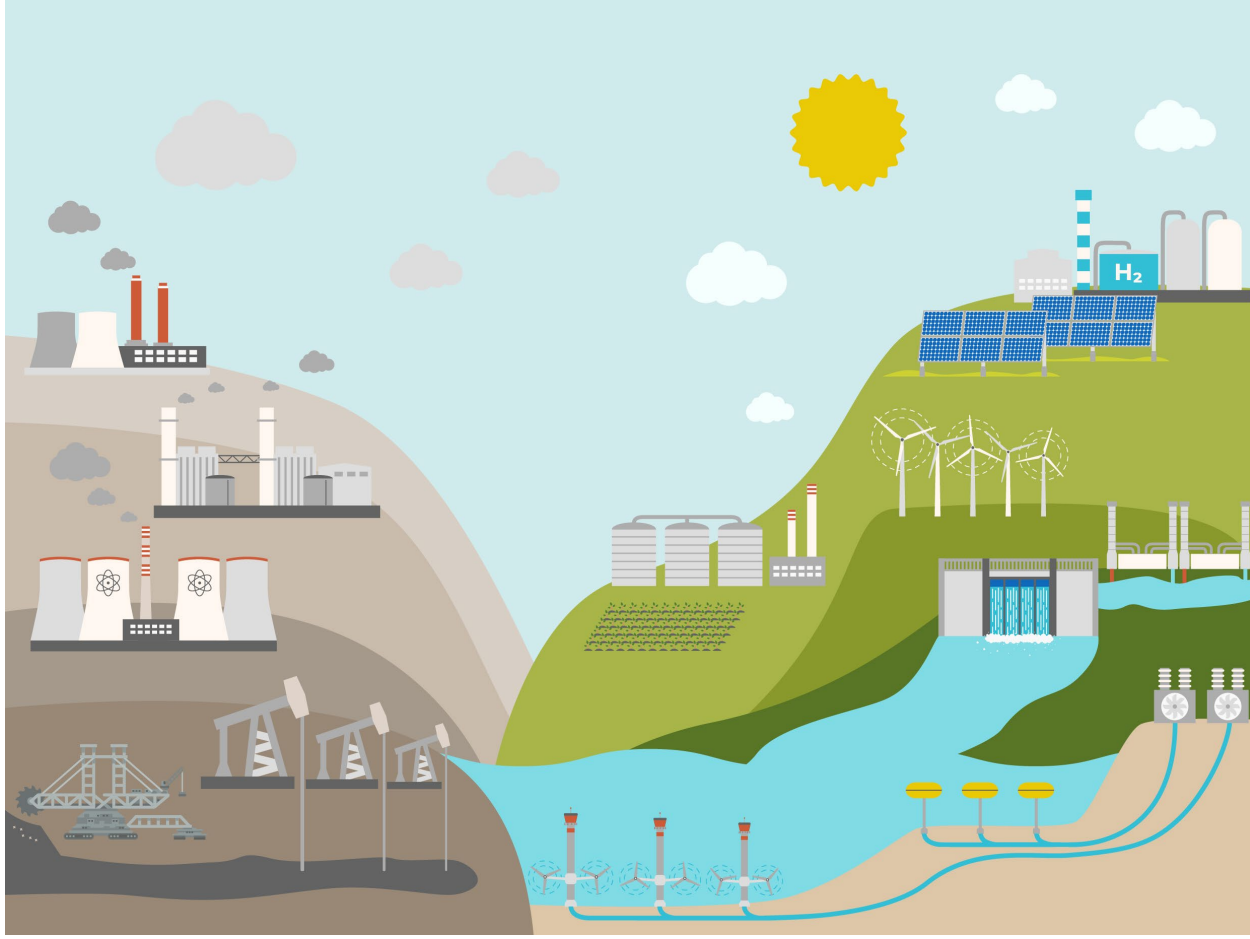
- According to the National Center for Integrated Processing of Mineral Raw Materials of the Republic of Kazakhstan, complex hydrometallurgical technology for processing oxidized nickel-cobalt ores is being tested using electric membrane devices for highly efficient electrical extraction of nickel from ore and obtaining:

  - metal Ni
  - metal Co
  - iron concentrate
  - collective concentrate of Ca, Mg, Al
  - europium concentrate
  - Pilot tests of this technology are planned for several deposits

Position of Nickel-Cobalt Sites in the UNFC

Considering that none of the laterite-type nickel-cobalt ore deposits in Kazakhstan is yet ready for industrial production, at the moment, they can be combined into three groups according to the level of readiness for industrial development, in accordance with the UNFC:

E	F	G	Level of preparedness of processing technology
2	2.1	1, 2	Pilot testing stage
2, 3	2.2	2, 3	Stage of laboratory technological research
3.2-3.3	3	3, 4	Exploration and primary research stage



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Thank you!

Georgiy Freiman
Chairman of EC PONEN of Kazakhstan

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