

V. MINING AND MINERALS SECTOR

SUSTAINABLE MINING IN MINERAL RESOURCES DEVELOPMENT

Call Overview

The Philippines is one of the few countries richly blessed with mineral resources. Metals, nonmetals, and mineral resources abound in mountains, plains, coasts, and even in shoreline areas. It is among the world's most richly endowed in gold, copper, nickel, iron and chromite. It is also rich in other minerals like coal, cobalt, gypsum, silver and sulfur. Thus, making the mining and minerals industry a potential driver of the country's economy.

The processing of metallic and nonmetallic minerals has been an important part of the economy of many natural resource-rich countries. The impact of mining has been one of the major factors to the continuing positive overall contribution of the mining and quarrying industry sector to the national economy for the last 10 years. Mining industries provide most of the materials we rely on to build infrastructures and to obtain large amounts of energy. At the same time, mining is the human activity that has been more disturbing to environment and is linked to large social impacts. The current mining practices need to be enhanced and contribute to community development to protect better natural resources and ecosystems in order to be environmentally acceptable and compliant with sustainable development objectives.

Call Objectives

- To further revitalize the mining industry and accelerate its economic development without comprising the environment and the health of the people, the country has to continue to conduct researches on metallic and non-metallic minerals and technologies in support of the rehabilitation and remediation of mined-area. This will also capacitate the researchers on mining related researches as well as enhance competitiveness of SUCs and RDIs laboratories and facilities to conduct the researches.

Call Scope

- The researches would cover the following programs:
 1. Value-adding of Metallic Minerals
 2. Value-adding of Non-metallic Minerals
 3. Technologies in Support to Environmental Protection, Conservation and Rehabilitation of Mined-out Area

A. Value-adding of Metallic Minerals (CY: 2023-2025)

Call Rationale

The Philippines is richly blessed with metallic mineral resources. Among the metallic minerals found locally are chromite, copper, gold, iron, lead, manganese, mercury, molybdenum, nickel,

and zinc. The mining industry in the Philippines produces wide variety of minerals from precious metals to iron and ferro-alloy metals and base metals. Miners in the Philippines consist principally of gold, nickel, and chromite producers. Gold is mined by 11 primary producers and by an undetermined number of small-scale players. Metals mined in the Philippines consist of gold, silver, copper, nickel, chromite and zinc.

However, majority of the companies are operating via Direct Shipping Ore (DSO) scheme. With such scheme, the government is not benefiting that much due to the lower price offered for the ores. Moreover, Executive Order 79 mandates the development of value-adding activities and downstream industries for strategic metallic ores.

To support *EO 79 Institutionalizing and Implementing Reforms in the Philippine Mining Sector, Providing Policies and Guidelines to Ensure Environmental Protection and Responsible Mining in the Utilization of Mineral Resources*, particularly Section 8 *Value-Adding Activities and the Development of Downstream Industries for the Mineral Sector*, the PCIEERD will be calling for proposals covering extraction technologies and processing methods that are environment friendly and develop value-adding activities for strategic metallic ores.

Call Objective

- To develop technologies on extractive and adaptive metallurgy for metallic minerals to produce competitive intermediate products for emerging technology applications

Call Scope

The Call for Proposals will include R&D for the following metallic minerals:

A. Nickel

As one of the top exporters of Nickel globally, it is appropriate that the country engages in advance level of researches utilizing our own local resources which are highly demanded abroad, and upgrade technological knowledge and skills in science and technology to ensure continuing competitiveness of our industries. As such, the PCIEERD would be calling for proposals on the following:

- Extraction technology for clean battery-grade Nickel, Cobalt and Lithium materials for batteries and energy storage application (clean Nickel Sulphate and/or metallic powder)
 - Budget: Php 30M (Strategic Call)
 - Timeline: 2023-2025
- Nickel Pig Iron (NPI) and Ferronickel from saprolite (high grade nickel) for stainless steel and other industrial application
 - Budget: Php 10M (Mission Call)
 - Timeline: 2023-2025

B. Iron (2023-2025)

The country is richly endowed with iron ore with an estimated reserve of lump magnetite of almost 56 million MT, magnetite sand of less than 2 billion MT and laterite ores of less than 2 billion MT. To support companies interested to process iron ores to produce pellets for ironmaking, the

country needs to have a testing facility that offers technical assistance to mining companies to test their iron ore and come-up with pellets with quality compliant for ironmaking. Moreover, magnetite sand, as with the previous research, was found to have significant amount of vanadium, an expensive metal used for several industrial applications. As such, the PCIEERD would be calling for proposal on the following:

- Establishment of a Ferrous Metallurgical Processing Laboratory for Magnetite Sand for Iron and Steelmaking
 - Budget: Php 100M (Strategic Call)
 - Timeline: 2023-2025
- Extraction of vanadium from magnetite sand or slag
 - Budget: Php 10M (Open Call)
 - Timeline: 2023-2024

C. Copper

Copper is one of the metallic minerals available in the country with an estimated reserves of 4 Billion MT making Philippines the 4th largest country in the world in terms of copper reserves. Copper products are used in transportation vehicles, power generation, construction of building, industrial machinery, electronic products, coinage, etc. In support to the strategic vision for the industry such as *“Full integration of copper industry in the Philippines from mining to manufacturing by 2030”*(BOI: *Copper Industry Roadmap*), the PCIEERD will be calling for a program proposal covering the following:

- Technology to produce copper concentrate and smelted copper
- Extraction of Copper with 99.9999% purity for industrial use
- Technology to produce Copper cathodes for rods, wires and cables and other high value products
 - Budget: Php 20M (Mission Call)
 - Timeline: 2023-2025

B. Value-adding of Non-metallic Minerals (CY:2023-2025)

Call Rationale

Non-metallic minerals refer to minerals which do not contain any metal substances in them. Nonmetallic minerals found in the country are bauxite, cement raw materials, clay, and coal. Also in bounty are other minerals often used as construction materials such as, diatomite, feldspar, guano, gypsum, limestone, magnesite, marble, perlite, phosphate rock, pyrite, rock asphalt, silica sand, sulfur, and talc.

Nonmetallic minerals may be used directly and/or processed before their application. Because of its various industrial use, local nonmetallic minerals should be utilized and be given additional value.

Call Objective

- To develop technologies that will add value to non-metallic minerals

Call Scope

The PCIEERD would like to call for proposals particularly on the following:

A. Value-adding of limestone

- Quality assessment of limestone for industry application (Resource assessment, characterization, beneficiation improvement and/or product development for various industrial application)
 - Budget: Php 5M (Open Call)
 - Timeline: 2023-2025

B. Recovery of Uranium from Phosphoric Acid

- Advance solvent extraction technology for the recovery of uranium from phosphoric acid
 - Budget: Php 10M (Mission Call)
 - Timeline: 2023-2025

C. Technologies in Support to Environmental Protection, Conservation and Rehabilitation of Mined-out Area (CY: 2023-2025)

Call Rationale

Mining if irresponsibly done, contribute to serious environmental and social problems. Long-term damage to soil and groundwater can pose health risks not only to the ecosystem but also to the community. With proper remediation and rehabilitation of the area, this would restore the conditions of the area as closely as possible to its original state, convert the area to a safe and stable condition and make the land suitable to productive uses to support sustainability of the site.

Call Objective

- To develop appropriate technologies to reduce negative environmental impacts and improve mine rehabilitation techniques

Call Scope

The PCIEERD would like to call for proposals covering the following:

A. Assessment of Small-scale Gold Mining (SSGM) (2023-2024)

- Integrated assessment of mercury contamination and mercury speciation in artisanal and small-scale gold mining areas in the Philippines

- Budget: Php 10M (Mission Call)
- Timeline: 2023-2024

B. Tailings and Waste Rock (2023-2024)

- Utilization of tailings/wastes from mining and processing it into valuable industrial products
 - Budget: Php 5M (Open Call)
 - Timeline: 2023-2024

REQUIREMENTS

The following are the requirements during proposal submission to ensure consideration for funding:

1. All proposals must submit at least one (1) **Commitment Letter/Letter of Cooperation** from an Industry Partner. Failure to submit this is a ground for disapproval or non consideration.
2. The research proposal should have a potential to be transferrable to the industry and locality.
3. The proposal should exhibit clear Social and Economic Impact and should answer any of the seventeen (17) Sustainable Development Goals (SDGs)
4. The **Line-item Budget (LIB)** should include a **20% counterpart funding** from the private industry or cooperator. Only eligible and allowable costs may be used for **counterpart fund** and/or **in-kind contribution** (ex. utility costs, office space rental, etc.), as determined by DOST-PCIEERD. The proposal must describe how the applicant will provide the counterpart fund/in-kind contribution.