# RENEWABLE ENERGY (RE) FOR THE MINING INDUSTRY – CASE STUDIES, TRENDS AND DEVELOPMENTS, AND BUSINESS MODELS

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## Abstract

Taking into account statistic of development of RE in the European Union, it is clear that RE has strong priority for government and society. The European Union concentrates on increasing the capacity of RE generation and consumption. It is reflected in the Directive on the promotion of the use of energy from Renewable Energy Sources. The specific objective of this paper is to explore contributions to the implementation of RE sources to the mining industry.

The analysis is conducted across two main categories: On one hand, the authors emphasize the proportion of RE in the ten most developed mining countries and the way how RE could be implemented for mining needs. The technological and economic possibilities and constrains for elaboration of hybrid energy system have been evaluated. On the other hand, the case studies for implementation of RE into the mining industry of some of the major mining countries such as Australia, Canada, South Africa and Chile are considered. The main criteria for a business model for the European mines are given.

The focus is based on the comparative analysis of mining hybrid energy operation systems in Australia, Canada, South Africa and Chile. The analyses proves that there are technological and economic perspectives for development of hybrid energy systems for penetration RE into the mining operational process. Consequently, the main findings concern the peculiarities of RE implementation for European mining companies. Moreover, the benefits for penetration of RE into mining are defined.

## Introduction

The main issue of this paper on the penetration of RE into the mining industry has been raised in different studies. This issue attracts attention from both scientific experts and industrial decision-makers. Mining and metal processing are very energy-intensive processes. Since costs for traditional energy sources increase year by year, European mining companies are looking for new solutions for the substitution of fossil energy sources by renewables. The key point is that the costs of RE generation, grid connection and RE integration system and software for implementation to the mining sector deployment are equivalent to those fossil energy sources. However, the implementation of RE for mining needs still has a lot of constraints in European countries.

- What are the ten most important mining countries in the European Union and the proportion of RE in these countries?
- What are the technological possibilities for implementation of RE into the mining industry in the European Union?
- What are the case studies for penetration of RE into the mining industry in the some of the major mining countries as Australia, Canada, South Africa, Chile as well as Peru?

The overarching goal for the European Union is to intensify the development of renewable energy and bring it into the main energy-consuming industry.

The main goals for mining companies are:

- to get an economically attractive resource of energy for high daily level of energy consumption,
- to avoid resource intermittency in energy consumption,
- to evaluate technological possibilities for RE implementation by means of comparative analyses of the case studies from some of the major mining countries.

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There are potential benefits of implementation of RE in mining:

- Reduction in fuel and electricity costs, including transportation costs;
- A secure and reliable energy system for the private sector;
- Reduced risk of power loss from supply disruptions;
- Enhanced economic competitiveness for the sector;
- Predictable energy costs, and therefore reduced risk from volatile and rising diesel prices;
- Reduction in carbon emissions and overall a less-polluting source of energy for the region;
- Opportunities to repurpose land used by the mining community;
- Growth in domestic renewable energy market;
- Opportunities for cooperation with neighboring industries.