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# Technical and Economic Evaluation of Fluorescent and LED Luminaires in Underground Mining

A case study: New Mine Level of El Teniente

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## Abstract

This paper establishes the methodology used for lighting system planning in underground mining, shows local data and lighting levels required by the mining industry, and examines and compares the results of the technical and economic evaluation of using fluorescent and LED luminaires in underground mining in Chile. A case study for a new expansion of the mine called “New Mine Level” of El Teniente, Codelco, the biggest underground copper mine in the world, is analyzed, where a large amount of luminaires are used to illuminate work and transit areas in the mine. Technical comparison among different brands and both technologies is performed using DIALux software. Cost-effectiveness and sensitivity analysis is calculated using prices and economic data from this case study.

**Keywords:** Lighting, LED, Fluorescent, Underground Mining, Energy Efficiency

## 1. Introduction

In the last decades, underground mining has been widely illuminated by fluorescent tubes; other technologies such as metal-halide and high pressure sodium light fixtures are also used to illuminate working areas, but currently, fluorescent tubes are the most frequently used in facilities, tunnels, and drifts.

At present, the project “New Mine Level” El Teniente, Codelco [1], the biggest copper underground mine in the world, is under expansion to replace the current mine production with 137,000 tons per day (t/d). This new infrastructure will keep the mine operations for the next 50 years. The expansion will include different levels and facilities. Undercut level, Production level, Haulage level, Crushing, Transportation level, Ventilation, and Drainage levels will require facilities like civic quarters where there are dressing and locker rooms, shower rooms, food preparation and dining rooms, offices and medical-attention areas

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