XSICEL 2021

Transición energética en la 4ta revolución industrial

Universidad Tecnológica de Pereira

UNIVERSIDAD NACIONAL DE COLOMBIA

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Energy Management in The Colombian Mining Industry – An approach for Energy Characterization

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Contents

I. Introduction

More with less
Reduce operating costs
with higher quality levels

1) Measure, recording and monitoring.
2) Interpret, decipher and process.
3) Predict through historical records.
4) Create strategies and plans to upgrad
energy efficiency.

II. Methodology

1) **Identify SEUs**

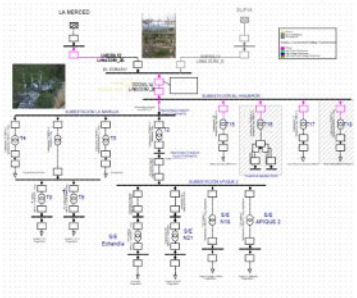
2) **Technology implementation**

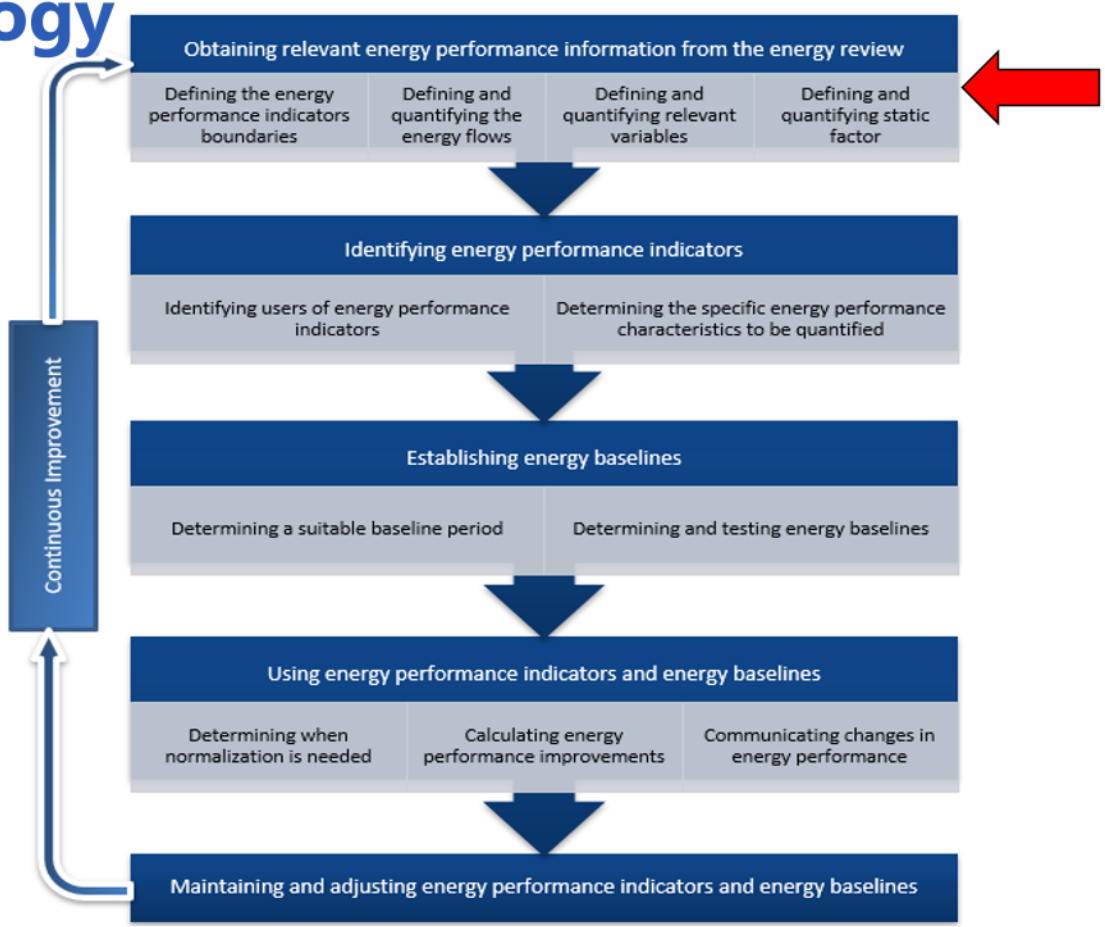
3) **Data collection**

4) **Application of ISO 50006**

Fig. 1: Overview of energy performance and its continuous assessment.

II. Methodology





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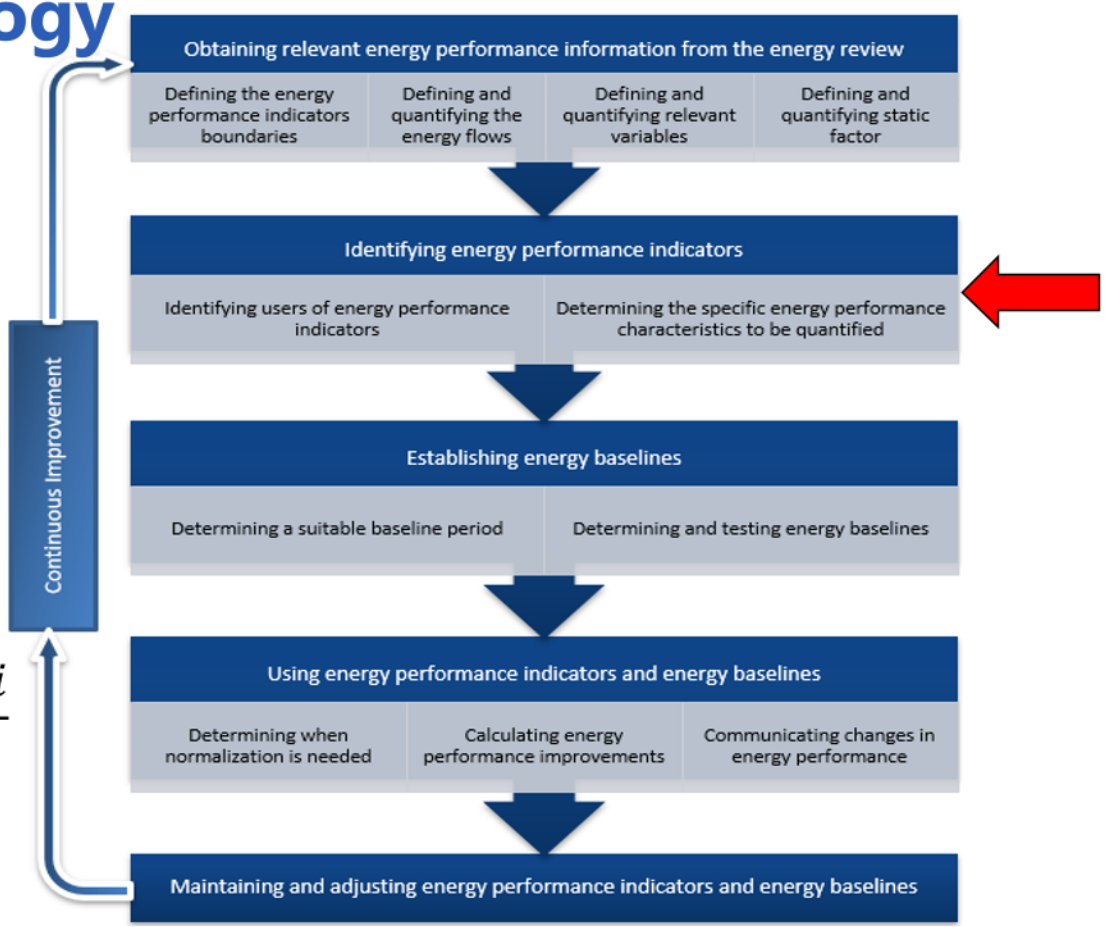
II. Methodology

$$KPI\_1 = \frac{Ton\_extra}{kWh}$$

$$KPI\_2 = \frac{Ton\_trit}{kWh}$$

$$KPI\_3 = \frac{kg\_oro\_fundi}{kWh}$$



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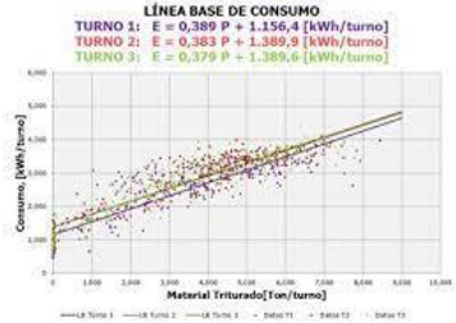

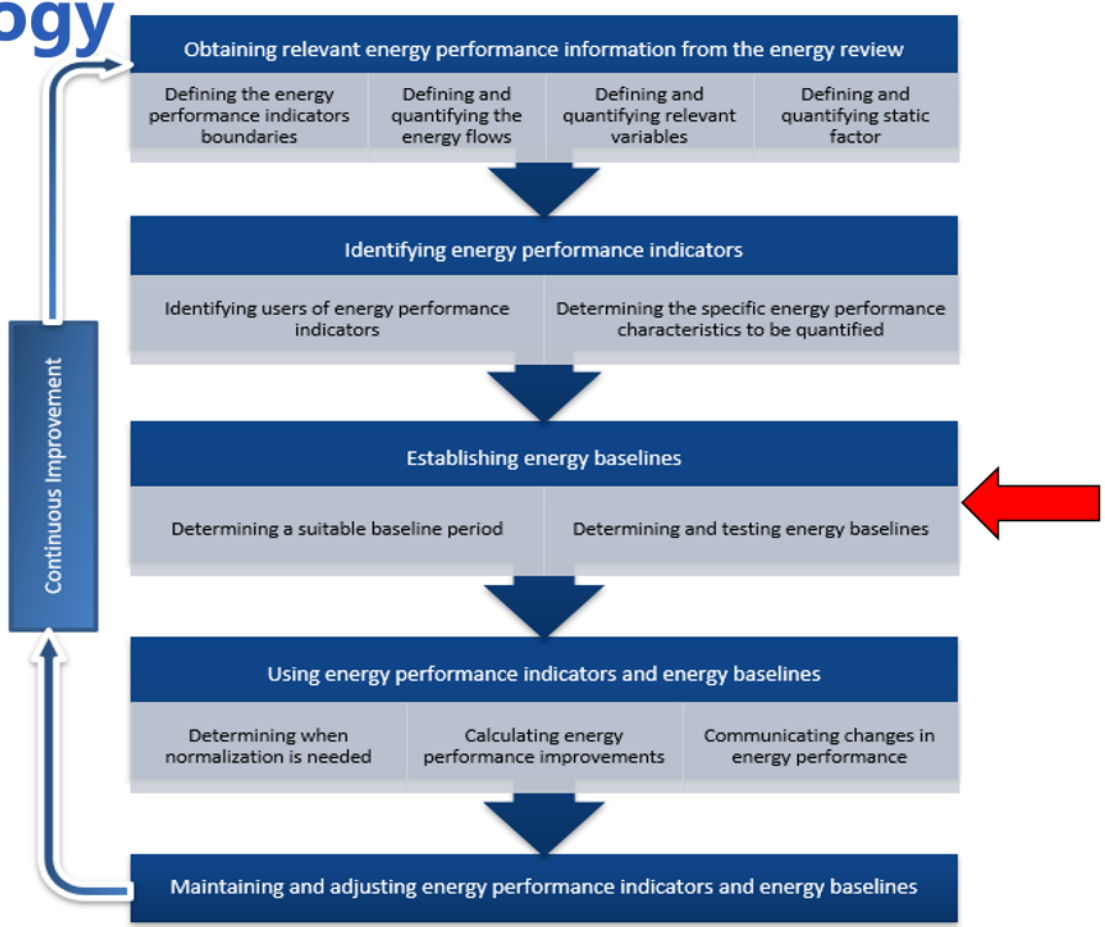

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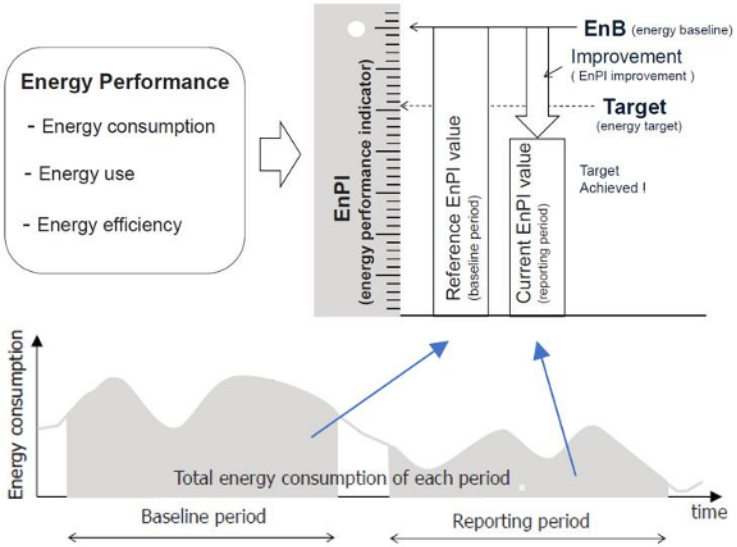
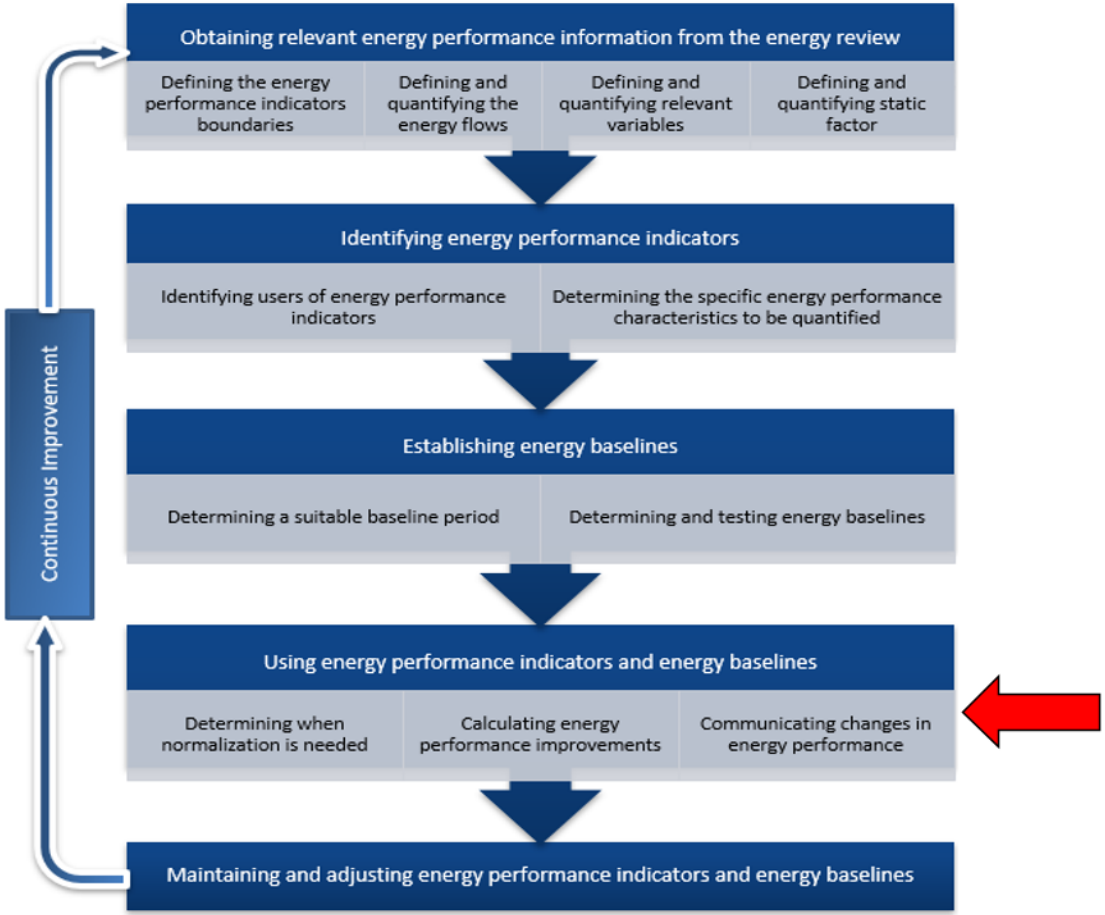


Fig. 2: Relationship between energy performance, EnPIs, EnBs and energy targets



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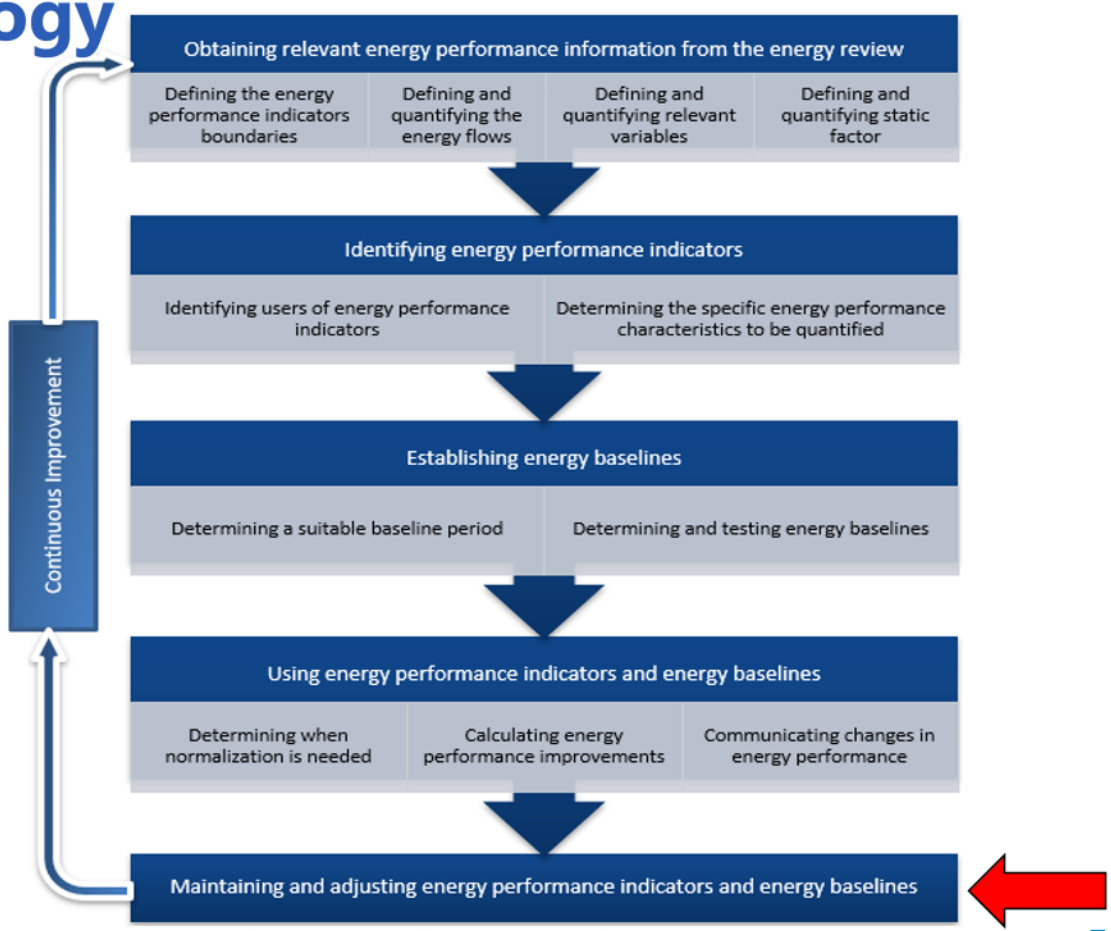

Fig. 1: Overview of energy performance and its continuous assessment.

III. Study Case: Gold Mine

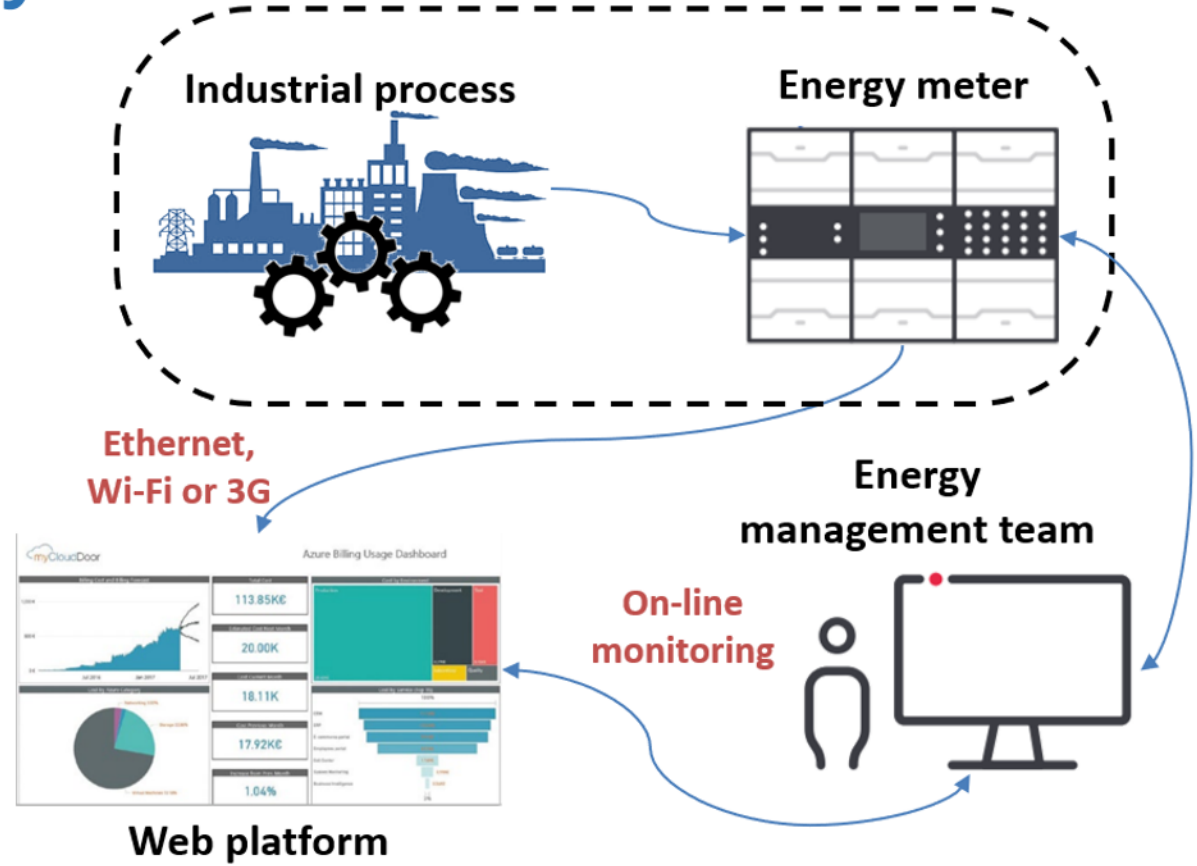

Fig. 3: Architecture of a system for monitoring electricity consumption.

III. Study Case: Gold Mine

Fig. 4: CIRCUTOR Line-EDS-Cloud

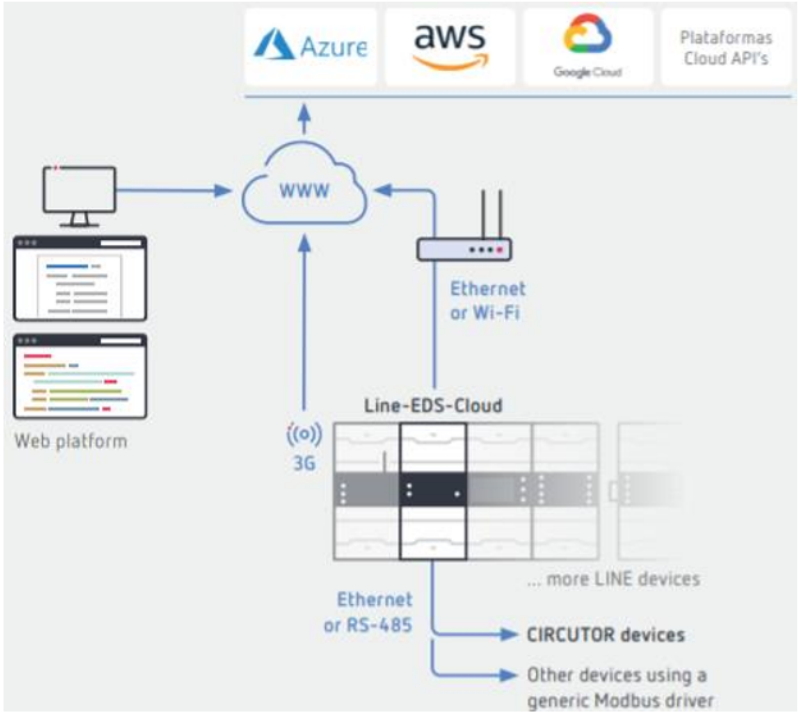

Fig. 5: Connectivity of CIRCUTOR Line-EDS-Cloud

IV. Results

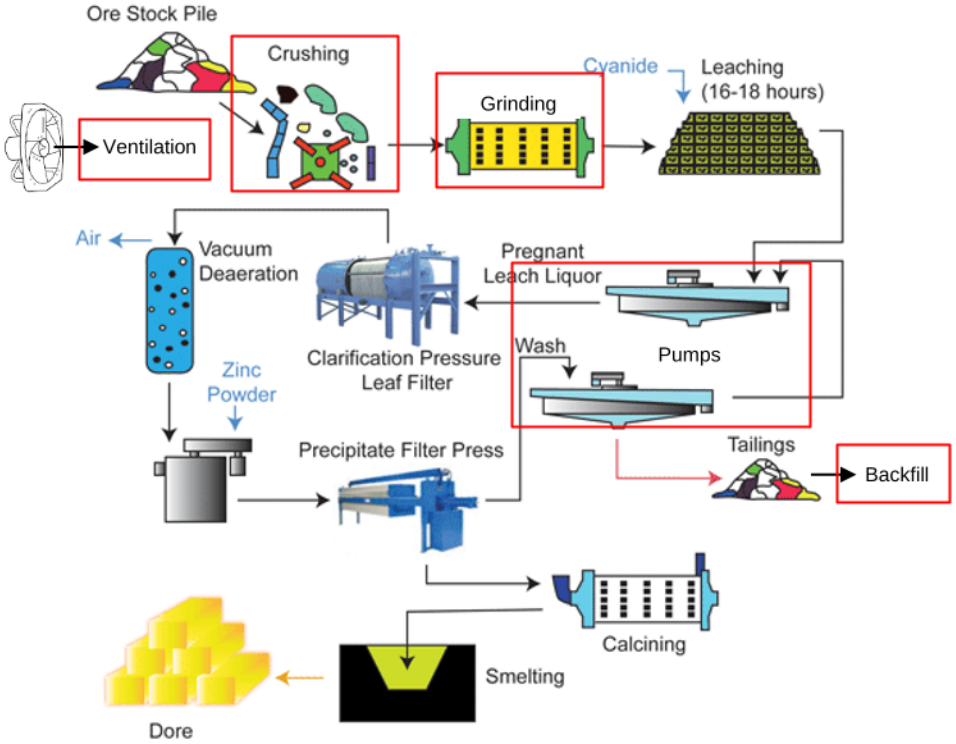

Fig. 6: Gold process description example

Electric users	Average power consumption [kVA]	Percentage of utilization
Pumps	2.183	13,9 %
Gravimetric concentration	23	0,1 %
Leaching	508	3,2 %
Conveyor	300	1,9 %
Backfill	1.693	10,8 %
Mobile and fixed equipment	1.300	8,3 %
Ventilation	1.985	12,7 %
General services	830	5,3 %
Crushing	657	4,2 %
Electrowinning	29	0,2 %
Agitators	490	3,1 %
Grinding	4.630	29,5 %
Filters	256	1,6 %
Compressors	322	2,1 %
Smelting	70	0,4 %
Others	407	2,6 %
Total	**15.684**	**100,0 %**

Table 1: Electrical users of the mining process aggrouped by its activity and their respective percentage of electrical energy consumption (plant and mine).

V. Conclusions

- The SEUs of the process are **grinding**, **backfill**, **ventilation** and **pumps**, which account for about 70% of the total energy.
- Each energy monitoring unit has a cost of US $ 2.300.
- There are many process in the industry mining which use electricity, however its important to follow the adequate processes which represents the major energetic consumption.

VI. Questions