

# XSICEL 2021

Transición energética en la 4ta revolución industrial



Universidad  
Tecnológica  
de Pereira



UNIVERSIDAD  
**NACIONAL**  
DE COLOMBIA

# **Approach of energy indicator by end use to improve energy performance at the National University of Colombia - Bogotá, under the parameters of the ISO 50001 standard**

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# I. Introduction

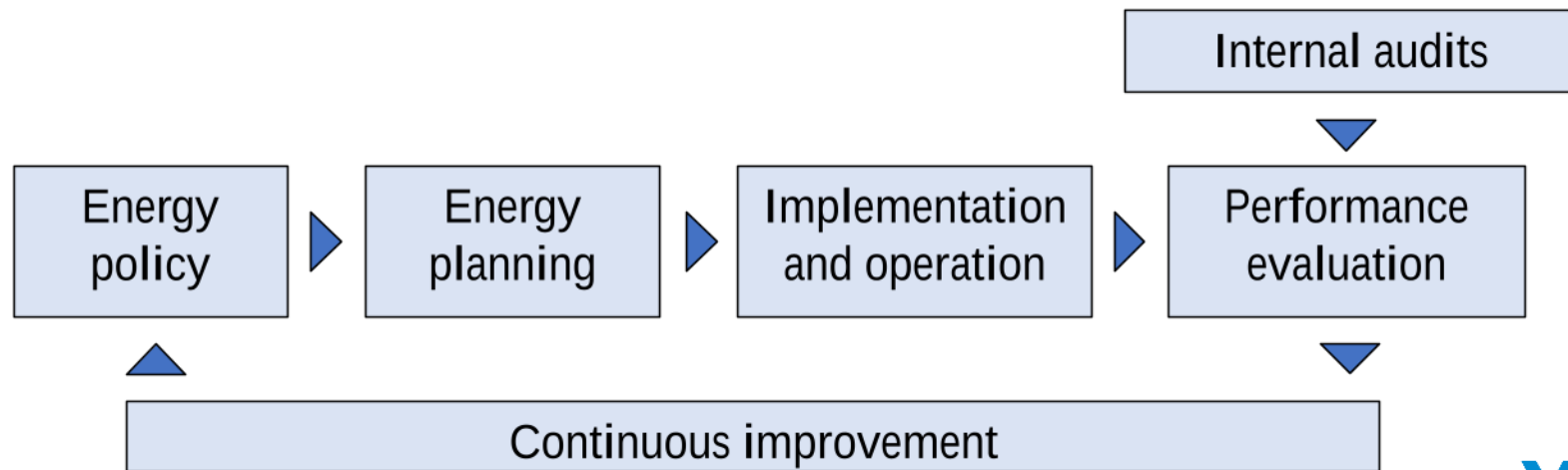
## Energy Management systems

The SGEs are born by the need of the entities to contemplate the use of energy from a complete perspective and that shows leadership with the interaction between all the levels of a certain organization, as well as support techniques to achieve continuous improvement of energy performance.

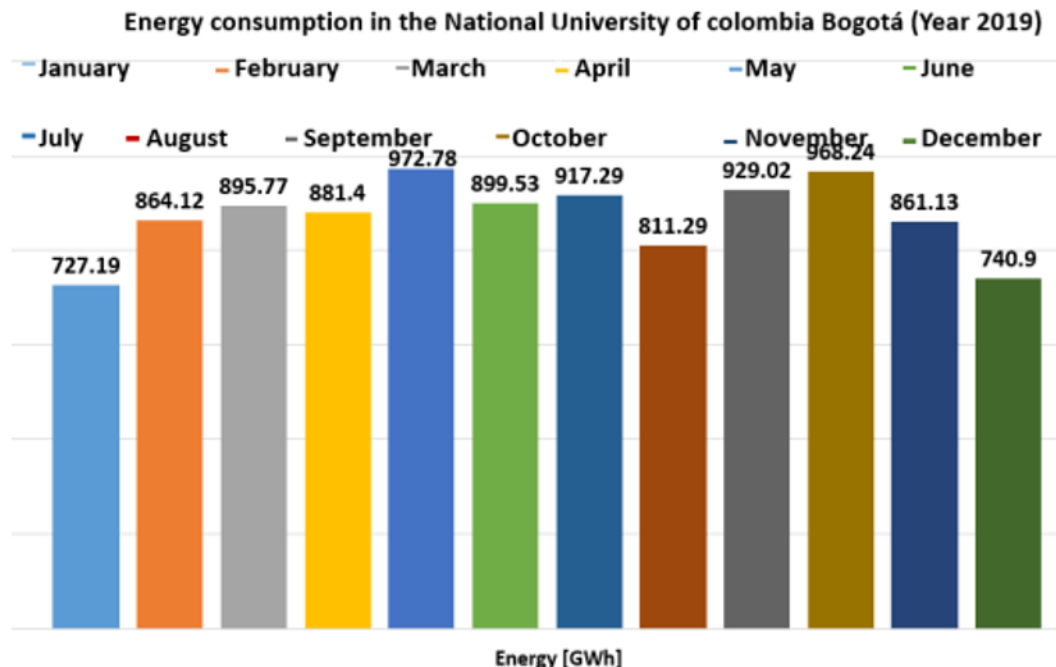
# I. Introduction

## ISO 50001 standard

In the regulatory aspect, the main reference is the ISO 50001 standard, which proposes parameters to establish an Energy Management System (EnMS) in an organization.



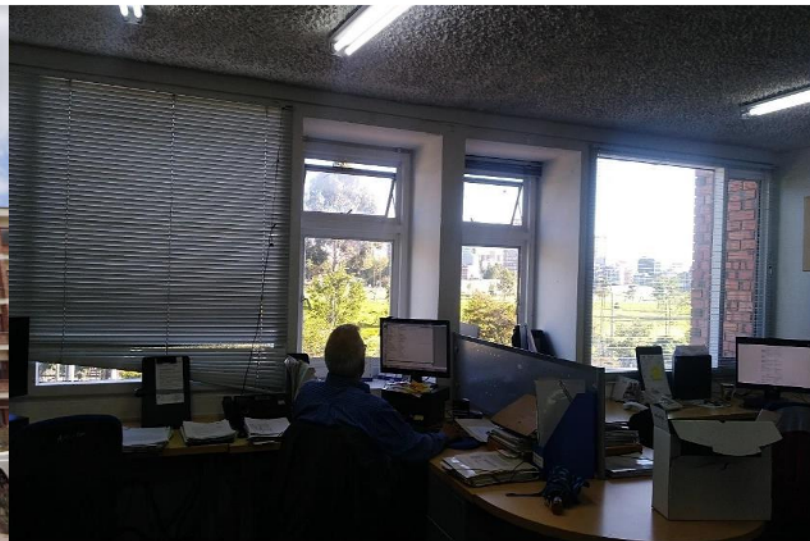
## II. Energy Consumption in the University





# II. Energy Consumption in the University

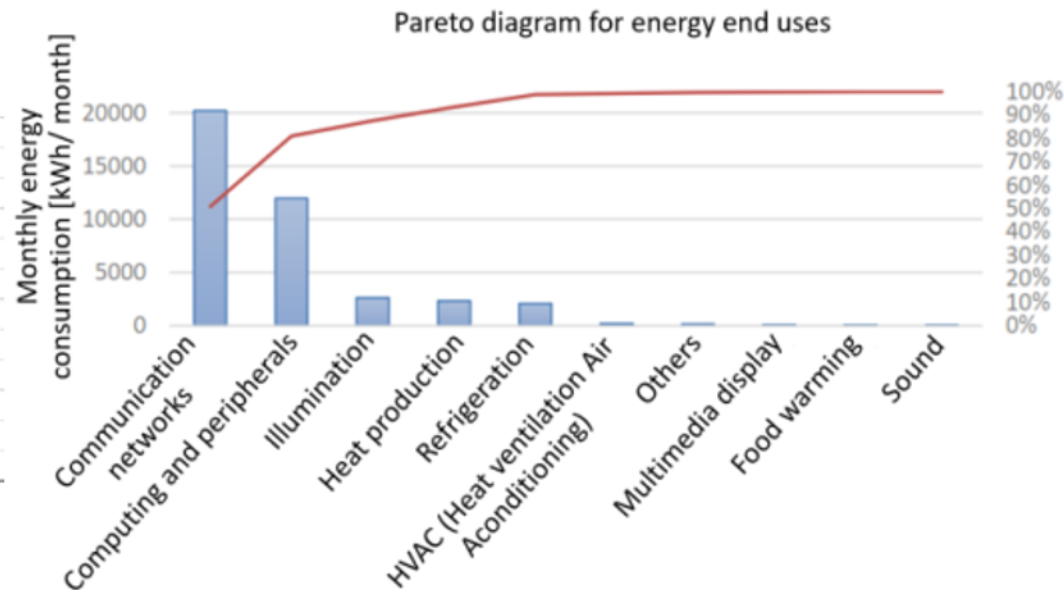
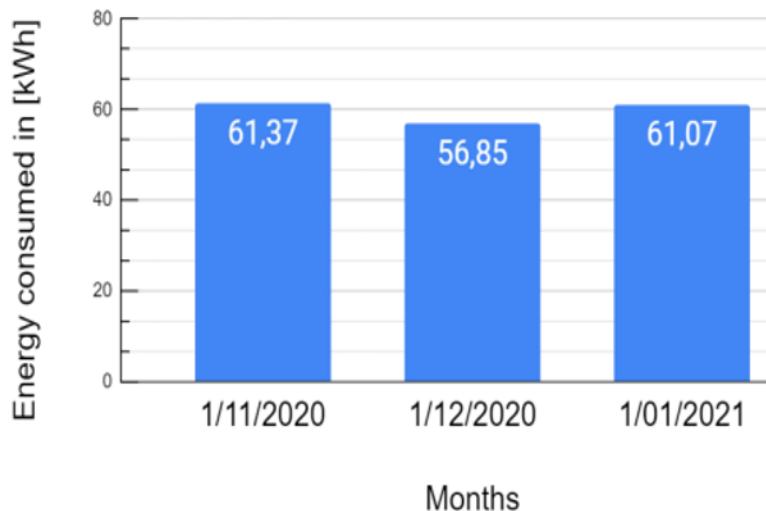
## Energy consumption in building Uriel Gutierrez



## II. Energy Consumption in the University

### Energy consumption in building Uriel Gutierrez

Uriel Gutierrez's energy consumption for the year 2021





## II. Energy Consumption in the University

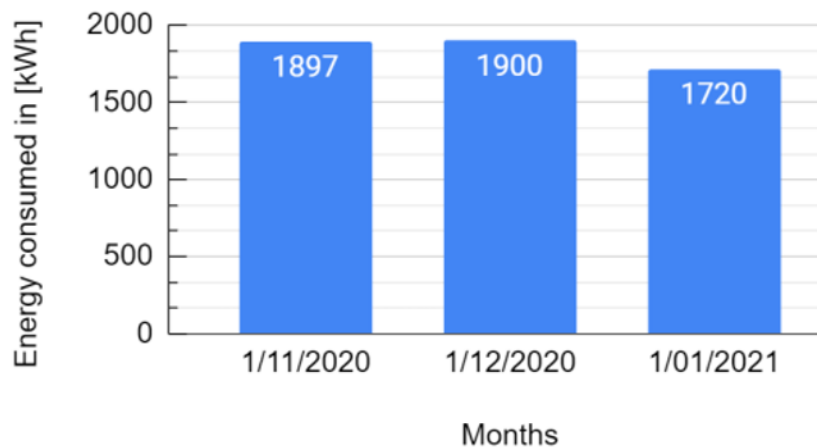
### Energy consumption for Roberto Franco Station



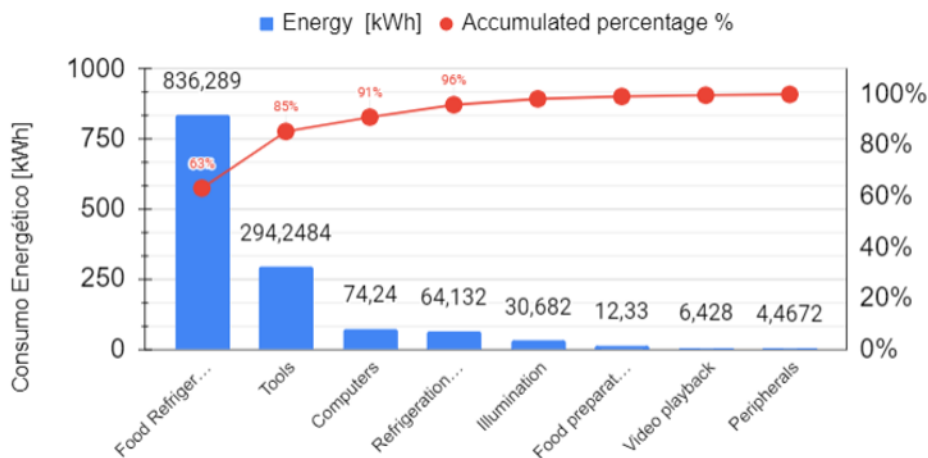
# II. Energy Consumption in the University

## Energy consumption for Roberto Franco Station

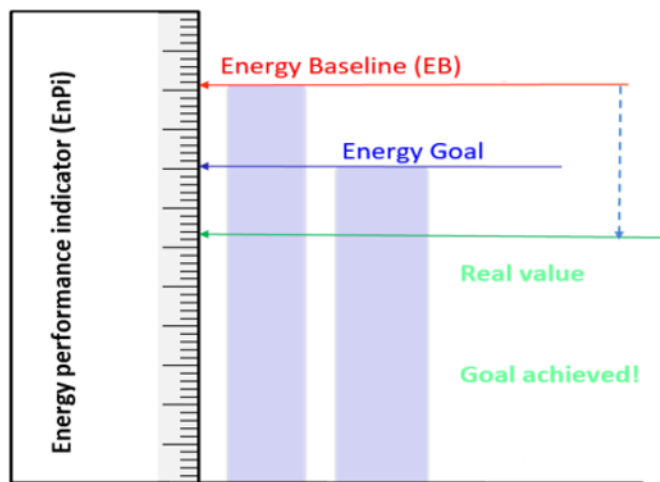
Station's energy consumption for the year 2021



Pareto's diagram for final uses of energy in Roberto Franco Station



## IV. Defining the evaluation indicator by type of building



$$\text{Total energy period} = \sum_{i=1}^n (d_i * E_{\text{daily}_i})$$

Where:

$d_i$ : Number of days' type  $i$  in the period

$E_{\text{daily}_i}$ : Daily energy consumed on day type  $i$

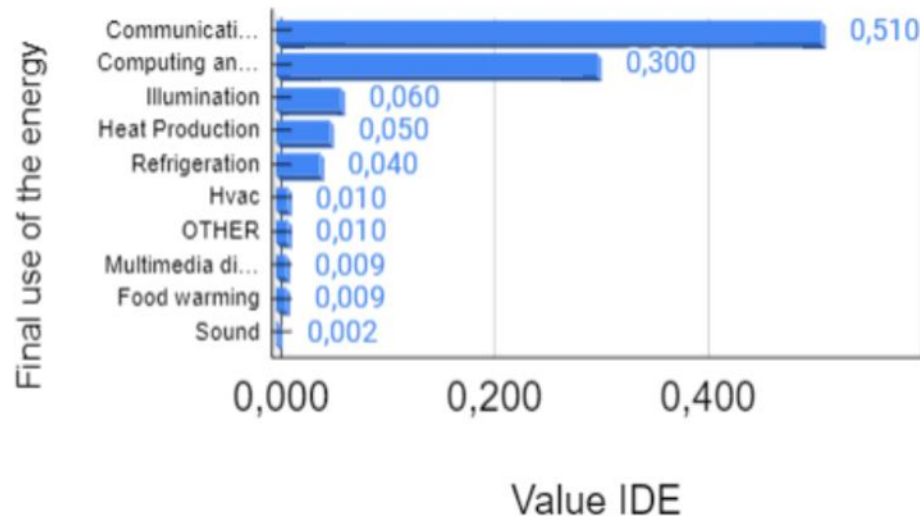
Energy performance improvement measurement using energy baselines and energy performance indicators (adapted from GTC ISO 50006)

$$IDE (E_{\text{use}}) = \frac{\text{Energy}_{\text{final use}} [\text{kWh}]}{\text{Energy}_{\text{total}}}$$

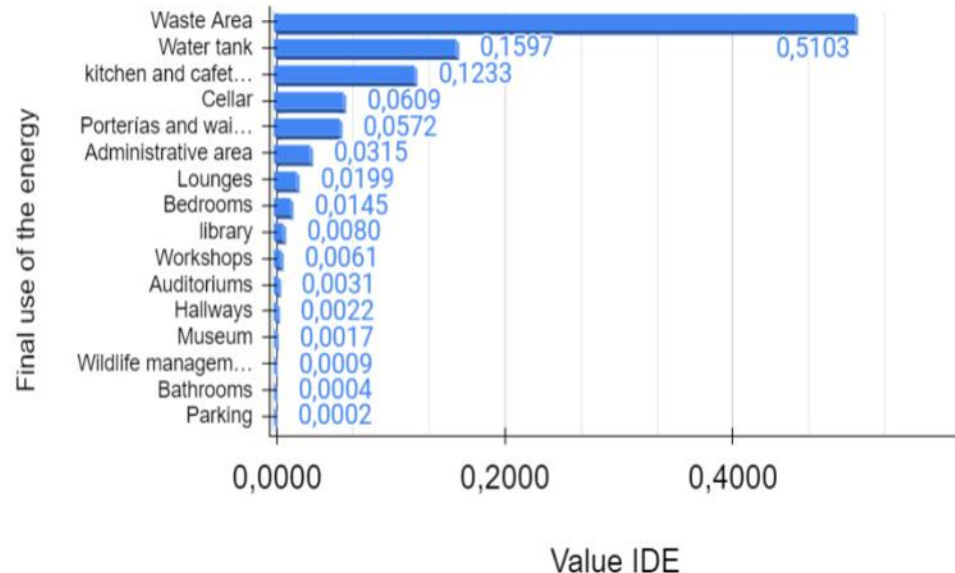
## IV. Results

### IDE for Building Uriel Gutierrez and Roberto Franco Station

IDE final use in Uriel Gutierrez Building



IDE energy consumption areas in Roberto Franco Station



## V. Conclusions

In order for the university campus to have an energy management system implemented and in operation in the future, an intelligent energy measurement system is required that feeds the energy performance indicators, in the same way, to be able to implement the IDE by uses it is necessary that a load survey of each building is carried out at the university and the typology of each building, must be known. The per-use IDE should not change if the end-use percentages do not change over time References.

## VI. Questions