324 EVALUATION OF THE APPLICATION OF ENERGY REGULATIONS FOR BUILDINGS IN COLOMBIA: A CASE STUDY

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INTRODUCTION

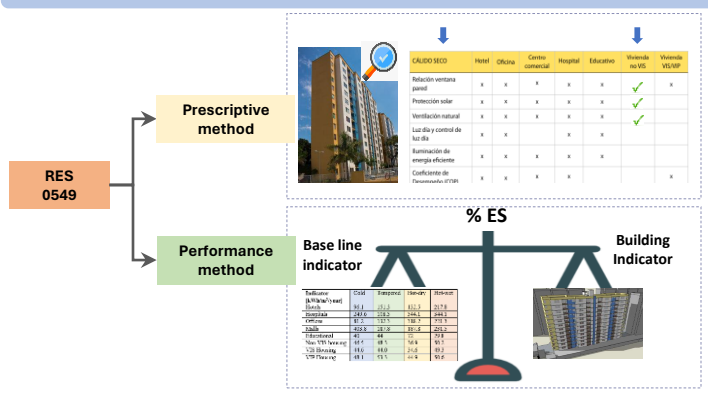
- Buildings are responsible for 37% and 39% of total energy consumption and related polluting emissions. Governments and organizations worldwide have established various regulatory frameworks that promote the integration of energy-saving strategies
- In 2015, the government of Colombia established resolution 0549. Regulation setting the minimum percentages of energy savings for new buildings according to typology and climate.
- There are difficulties in the application of the regulation due to the lack of adequate verification and control instruments that facilitate compliance, and capabilities in construction companies.
- This study seeks to evaluate the impact of the implementation of the regulation on the energy behavior of a residential building located in a hot dry tropical climate.

METHOD

1. **Revision of local regulation (RES 0549)**
   - Prescriptive method
   - Performance method
2. **Energy modeling**
   - Geometric modeling
   - Data assignment
   - Model adjustment
3. **Compliance with regulation 0549**
   - Compliance through the prescriptive method
   - Compliance through the performance method

RESULTS

Methods of compliance with RES 0549



Compliance through prescriptive method

Recommended measurement	Degree of implementation
Window wall relationship	Implemented
Solar radiation	Not implemented
Natural ventilation	Partially implemented

Only **one** of the three measures recommended by the standard is adequately implemented within the building design.

Compliance through performance method: Assesment of real model

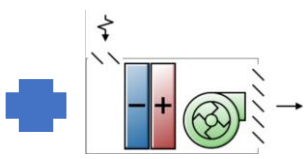
Energy Modeling

Comparison of evaluated building indicator with the base indicator (RES 0549)

Mandatory energy savings = 25%

Case	Annual consumption [kWh/m²]	Energy savings [%]
Real	30.5	17.3
Base line	36.9	

Compliance through the performance method: Use of Virtual Energy for comfort



PTHP System recommended by ASHRAE Appendix G 90.1

Case	Indicator [kWh/m²]	Savings compared to the real case [%]
Real	93.96	0.0
Natural ventilation	78.98	15.9
Horizontal shading	88.50	5.8
Efficient glasses	89.39	4.9
Efficient walls	91.49	2.6
All measurements	70.2	25.6

CONCLUSIONS

- The building under study integrates some energy-saving measures but still needs to satisfy the minimum savings requirements posed by local regulations evaluated based on the prescriptive method and the performance method.
- The energy savings potential of integrating passive measures in middle-income multifamily residential buildings can only be determined from considerations like virtual energy for comfort.
- The results of the evaluation of the different scenarios of integrating measures show that optimizing natural ventilation and solar shading could lead to compliance with the regulation.
- The authors recommend that the relevant entity implement a process to adjust the energy consumption baseline since the existing baseline may omit some aspects of the current dynamics of the multifamily residential building stock.