

Evaluation of Global Warming Potential in a Living Wall System in Medellín using Life Cycle Assessment

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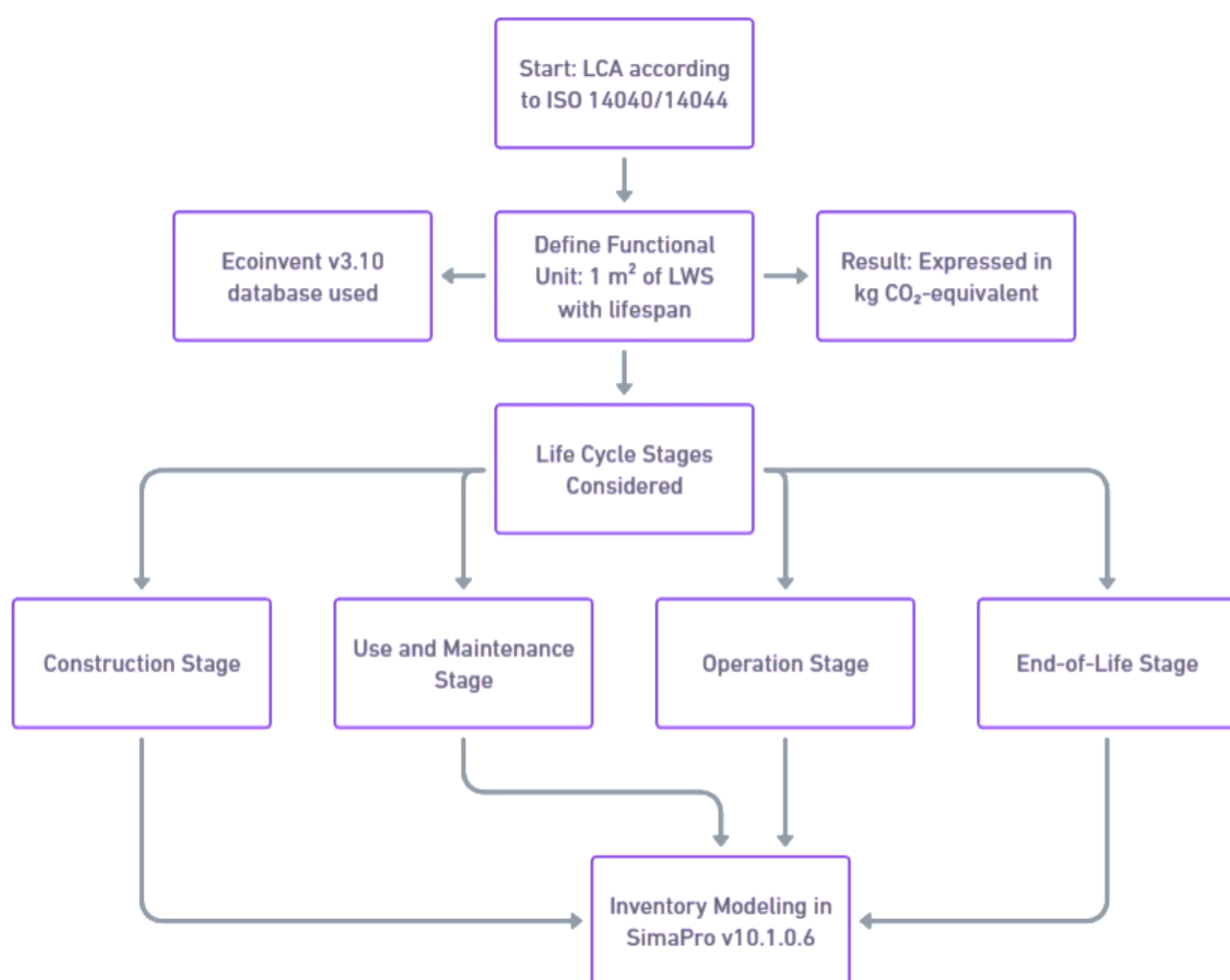
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INTRODUCTION & AIM

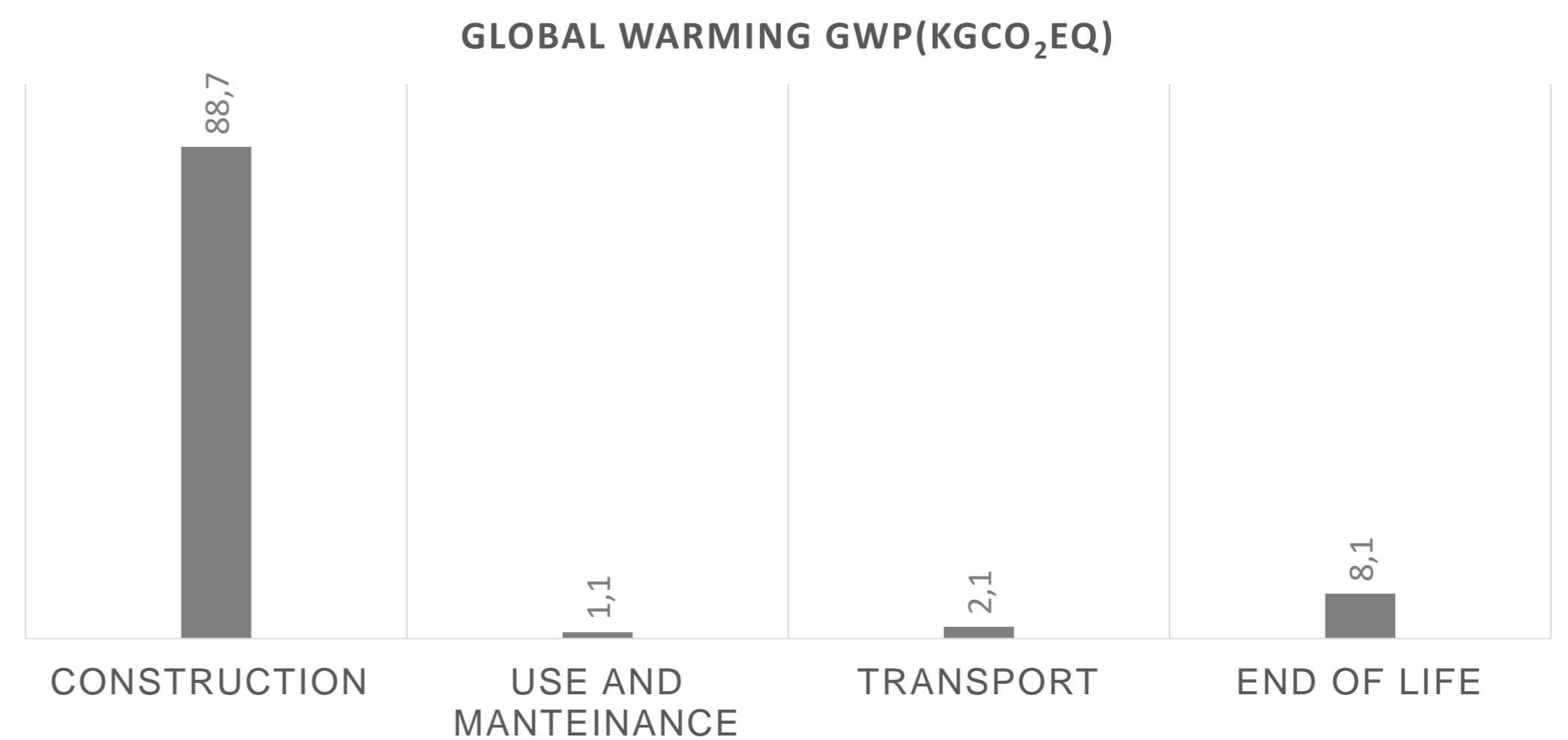
Life Cycle Assessment (LCA) is a scientific method used to evaluate environmental impacts throughout the life cycle of a product or system. In the built environment, Living Wall Systems (LWS) are conceived as sustainable technologies that contribute to improving urban microclimates and mitigating carbon emissions. However, tropical contexts require specific assessments to understand their real environmental performance. This study aims to evaluate the Global Warming Potential (GWP) of a Living Wall System (LWS) implemented in Medellín, Colombia, through life cycle modeling using SimaPro software.

METHOD

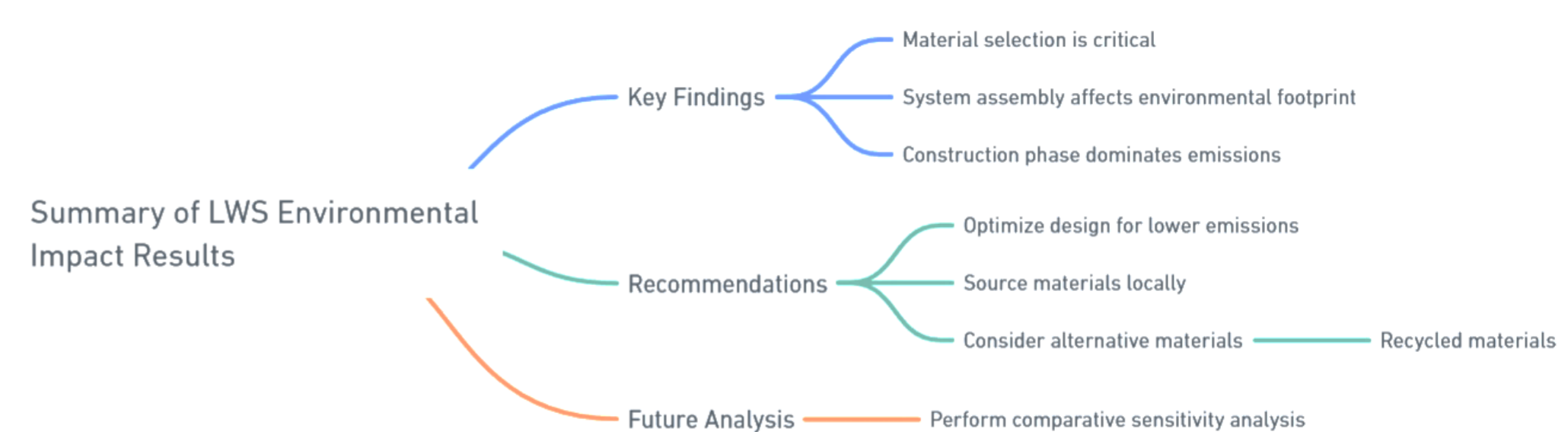
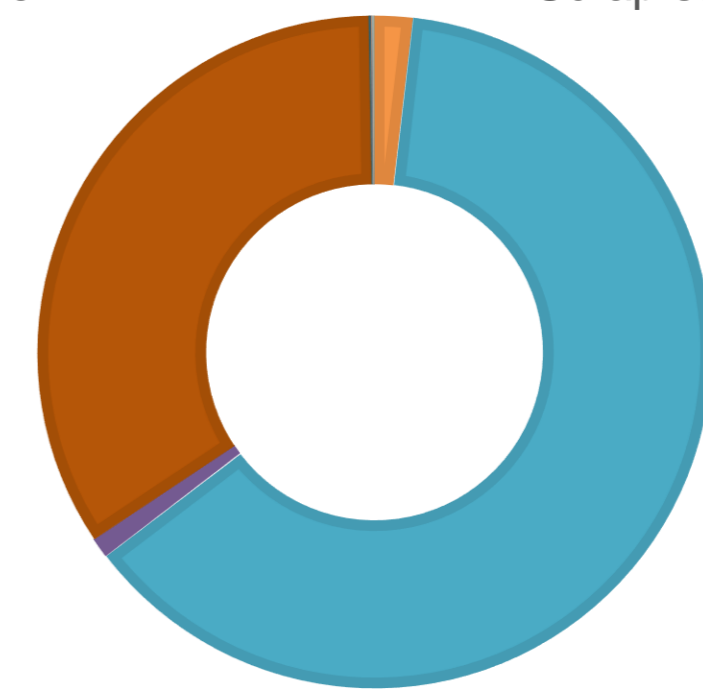
The LCA was conducted following ISO 14040 and ISO 14044 standards, considering the stages of construction, operation, and end-of-life. The inventory was modeled in SimaPro v10.1.0.6, using the Ecoinvent® v3.10 database to account for material production, energy use, transportation, and disposal. The functional unit corresponds to one square meter of LWS with a defined lifespan. Impact assessment focused on the Global Warming Potential (GWP) category, expressed in kilograms of CO₂ equivalent.



RESULTS & DISCUSSION



- Textile, nonwoven polyester
- Electricity, low voltage
- Compost
- Waste polyethylene
- Polyethylene pipe, DN 200
- Reinforcing steel
- Waste yarn and waste textile
- Scrap steel



CONCLUSION

The construction phase represents the main environmental hotspot, accounting for nearly 90% of total GWP. Strategies to minimize the impact include replacing high-emission materials such as polyethylene and steel with more sustainable alternatives, as well as integrating renewable energy for system operation. Understanding the life cycle stages of LWS enables better decision-making for sustainable building practices in tropical regions.

FUTURE WORK / REFERENCES

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