Eco-efficiency assessment of conventional OPC/PPC replacement by LC$^3$ in Cuban residential buildings
Outline

» Introduction
» Objectives, methods and Data
» Results in a nutshell
» To-take key messages
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Cuba embraces sustainable development goals (S.D.G.) within its long term development strategy.

Contextualizing research: where do we stand?

“Satisfy present generations’ need without compromising the satisfaction of future generations’ need”

(Brundtland Report, 1987)
Traditional cements in Cuba vs. LC³: composition

From current situation to LC³ technology
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Purpose and methods

Construction supply chain mapping (overview)

Case studies in Villa Clara province

Concrete block technique

Grand panel system

Forsa technology
From the environmental life cycle to the economic flows

This research covers the *material phase*. Ongoing research covers the *use phase* and future work will explore *end-of-life* scenario.
Cradle-to-gate approach is adopted, as it is defined in ISO 14040 and 14044/2006.
Data inventory: foreground data

Functional unit: m² of usable floor area
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Environmental impact of cements by type of construction technology

- LC³ was found to dramatically drop emissions at housing level
- Grand Panel exhibits environmental advantage

GWP100-IPCC (kgCO₂/m² usable floor area)
Energy consumption efficiency

Conventional cements’ replacement by LC³ leads to reduce energy carriers around 33-37,5 %
Eco-efficiency performance of buildings: the economic impact of a cleaner technology

- Concrete block technology appears to be the least eco-efficient
- LC3 is greening investments

Eco-efficiency indicator as the ratio of CO₂ released vs construction costs
\[ \text{(CO}_2 \text{ per USD)} \]
Exploring beyond eco-efficiency: sustainability entails trade-offs

Sustainable decision-making process has to be rooted on a holistic assessment towards effective LC3 applications.
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Concluding remarks

- A low carbon cement strategy in Cuba was found to be economically beneficial and environmentally cleaner than BAU.

- Grand panel appears to be the cost-effective benchmark amongst available construction techniques in Cuba. It is not superior *per se*, though.

- Sustainable decision-making in the construction supply chain lies beyond eco-efficiency indicators. It requires a fundamental understanding of multicriteria system thinking to be aligned with case-specific policy orientation.
Thank you, for your attention

Acknowledgments
The authors would like to thank the Swiss Agency for Development and Cooperation for funding LC³ project, the Cuban cement industry and the construction companies in Villa Clara for their support.