

Life Cycle Assessment

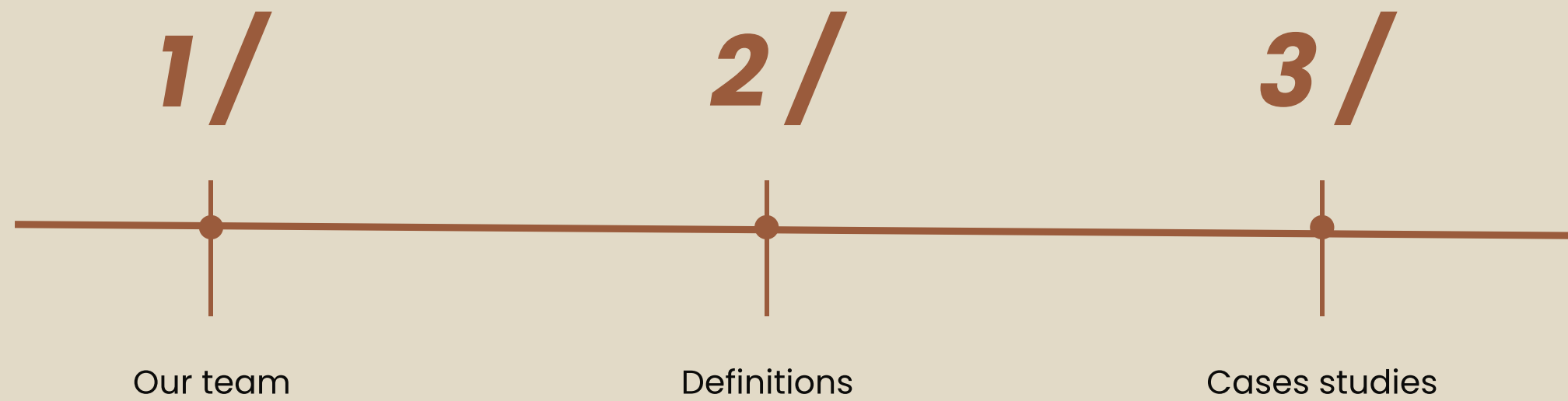
Aalto ARTS Summer School 2023
Pre-assignment 2 – concepts

Politecnico di Milano

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INTRODUCTION

Structure of our work



1 / *Our team*

OUR TEAM

Who are we?



Valentina Callegari

Digital Interaction
Design



Camilla Indelicato

Integrated
Product Design



Emma Michel

Integrated
Product Design



Samuele Sala Veni

Product Service
System Design



Jiayu Wu

Industrial Design &
Product Service
System Design

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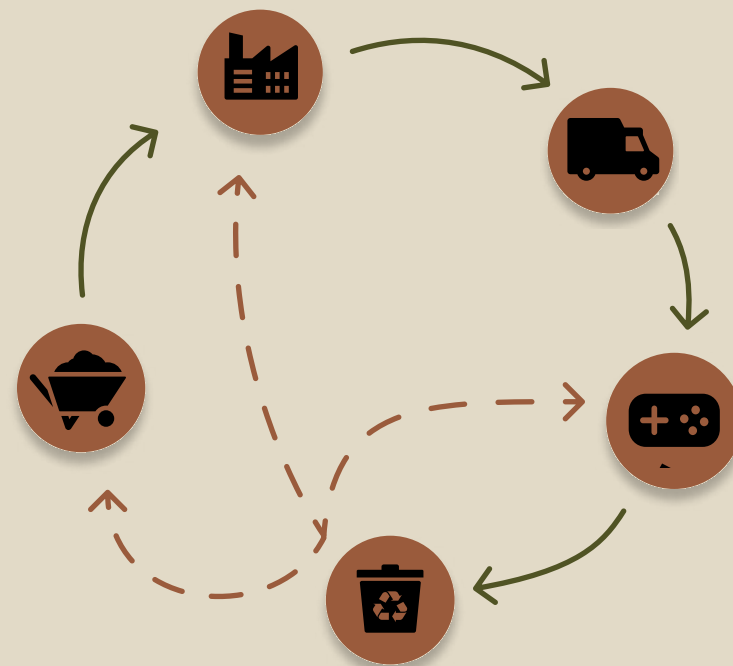
Definition



Definition

Life Cycle Assessment

Life Cycle Assessment is a systematic approach **to evaluating the environmental impacts associated with all stages of a product's life.**



Goal

To provide a comprehensive view of the environmental interactions, thereby allowing for more informed and **sustainable decision-making.**

LCA can be

- A PROCESS
- A CONCEPTUAL FRAMEWORK
- A PRACTICE
- A METHODOLOGY
- A MEASUREMENT

“Keep in mind that whatever situation you find yourself in, you need to consider reducing all new incoming resources and reusing existing ones. Position that attitude with a mission to detail your buildings as material banks for the future and your clients may not even notice a difference. But the natural world will”

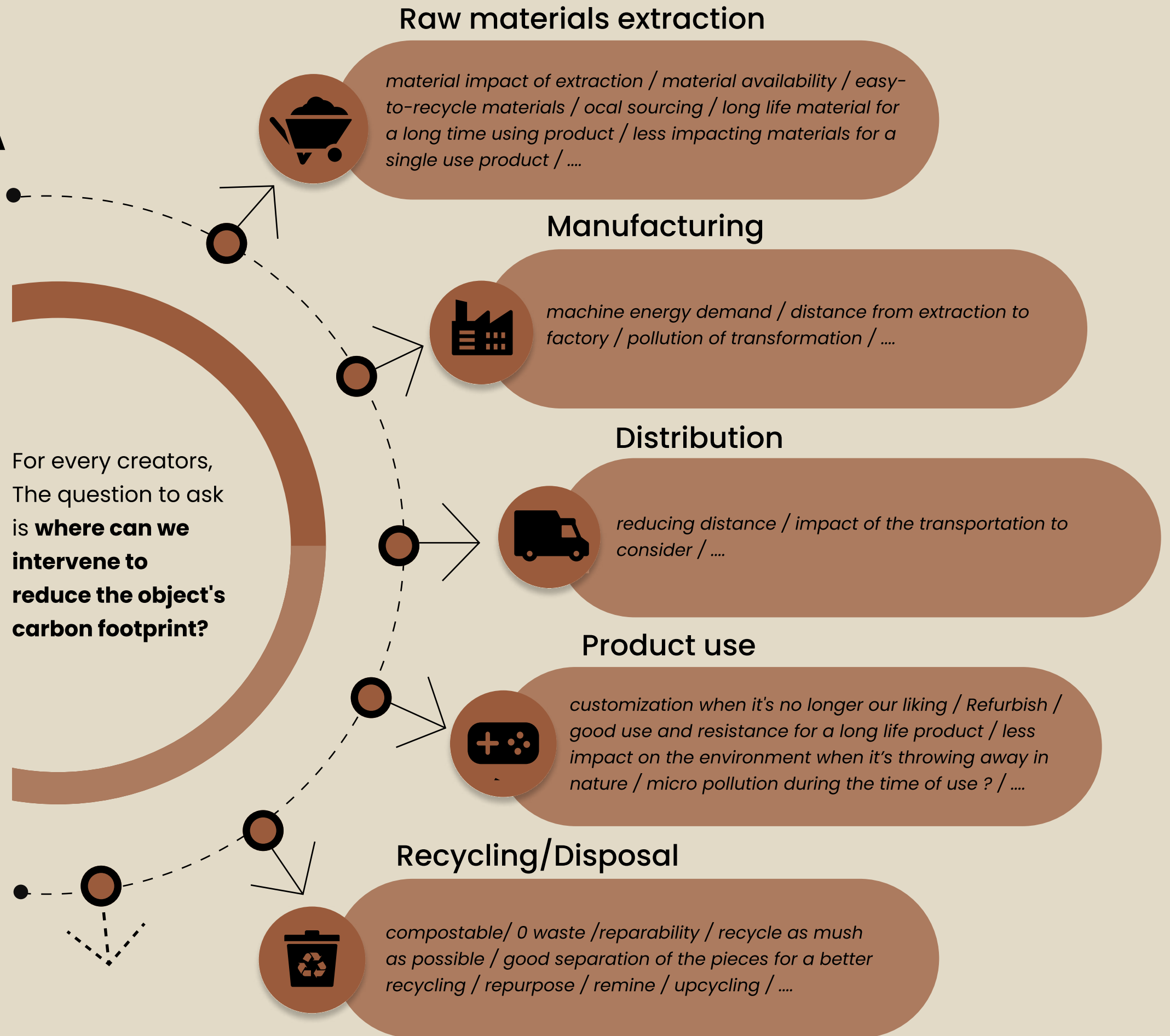
Duncan Baker-Brown (2019)

Definition

Applying LCA

“The power of LCA is that it expands the debate on environmental concerns beyond a single issue, and attempts to address a broad range of environmental issues, **by using a quantitative methodology**, thus providing an objective basis for decision making.”

For every creators,
The question to ask is **where can we intervene to reduce the object's carbon footprint?**



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Case studies



Full grown chair

+ Improvement in :



Introduction

- Designed by Gavin Munro in UK in 2013
- A kind of sustainable furniture production by growing, molding and pruning the trees into specific shapes
- Types of trees: ash, hazel, sycamore, beech, and oak
- Growing time: 4 to 8 years

Application on LCA

- **Minimal Resource Use:** utilizing only growing trees, eliminating the need for additional materials
- **Carbon Absorption:** trees absorb CO2 during growth, contributing to climate change mitigation
- **Low Energy Consumption:** the main energy source is natural sunlight, reducing energy footprints.
- **Waste Management:** post-use, the furniture can be composted or utilized as biomass, closing the lifecycle loop



#slowproduction nature scale
#NOpollution production

#low-energy production
#100%biodegradable

Mud Brick Houses

+ Improvement in :

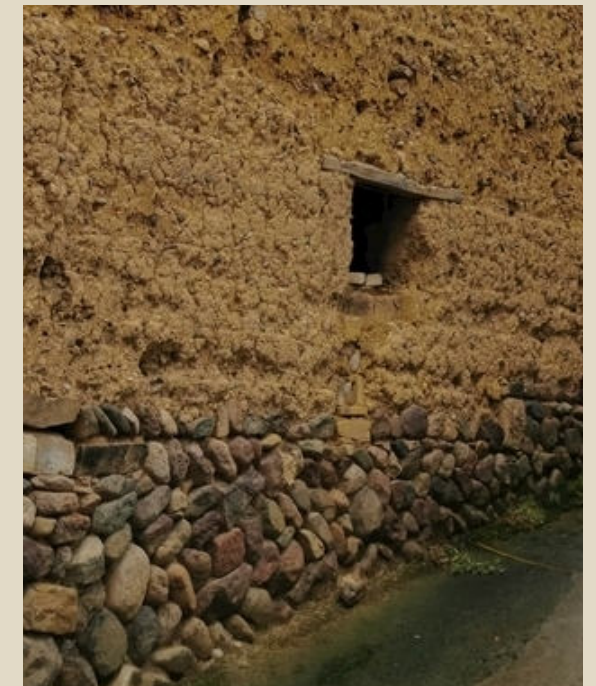


Introduction

- Dating back to the Tang Dynasty, from China's Lingnan region
- A time-honored sustainable building practice which utilizes locally-sourced materials like mud and straw
- Lasting time: no fixed average life, but can last up to 300 years with proper maintenance

Application on LCA

- **Local Sourcing:** the use of local materials reduces the environmental impact of transportation
- **Recyclability:** eroded bricks are repurposed as valuable fertilizer, ensuring minimal waste
- **Climate Adaptability:** the houses are constructed to endure the region's specific climate conditions, including a flood-resistant foundation, reducing the need for additional resources for maintenance and repair
- **Historical Sustainability:** the houses represent a historical model of LCA, demonstrating the feasibility of considering environmental impact across the entire product lifecycle



#low end-of-life impact #localized #localmaterials
#low-energy material production #organicmaterials

Casa Quattro

+ Improvement in :

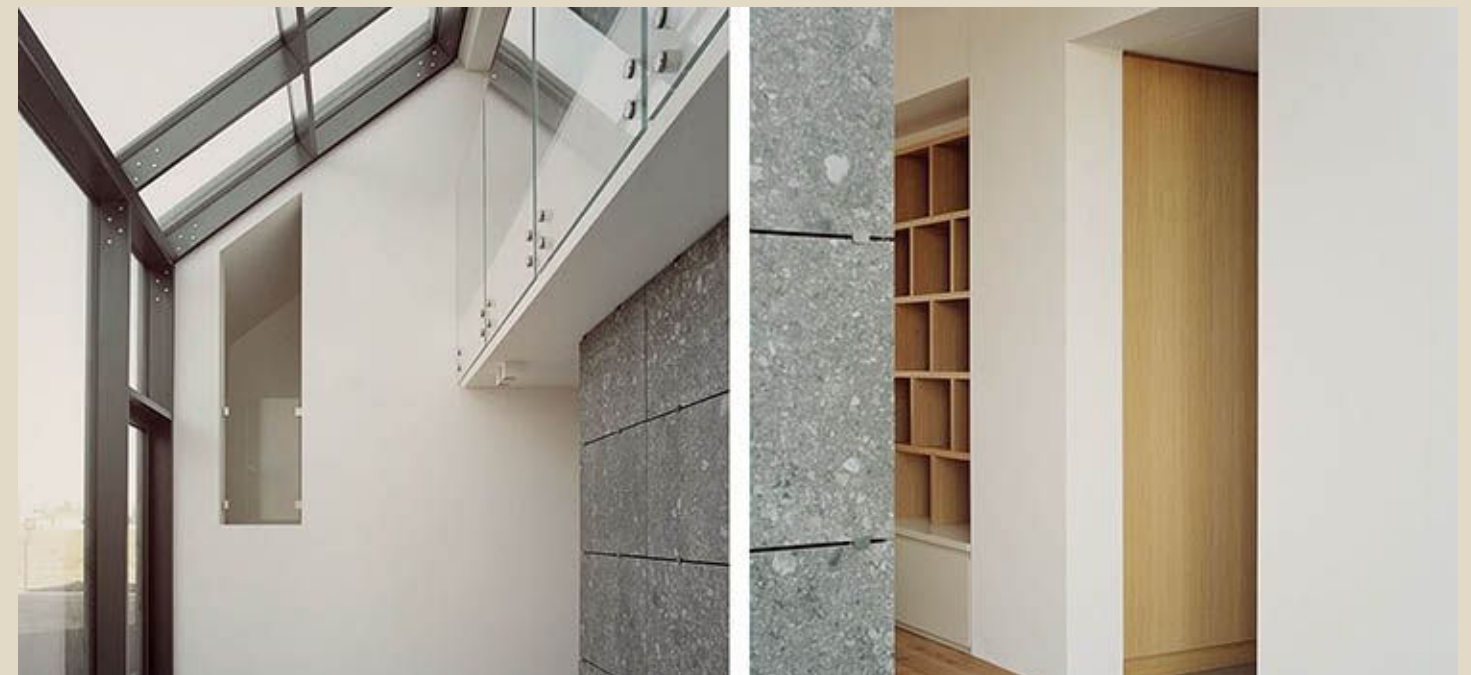


Introduction

- Designed by Luca Compri Architects in Italy in 2020
- A sustainable architecture project which reflects the local agrarian heritage, embodying bio-ecological ethics by incorporating locally-sourced materials.
- Also a Nearly Zero-Energy Building, epitomizing the blend of aesthetics and sustainability.

Application on LCA

- **Local Sourcing:** the use of simple, locally-sourced materials like wood, rice straw, cork, stone, and oak reduces the environmental impact of transportation and supports local economies
- **Recyclability:** the materials used are fully recyclable at the end of their lifecycle, reducing waste and promoting circular economy
- **Energy Efficiency:** as a Nearly Zero-Energy Building, Casa Quattro has low energy consumption
- **Harmonious Integration:** the building serves as an example of integrating LCA principles into contemporary architecture, accounting for the environmental impact across the entire lifecycle of a building while aligning with local conditions and resources



#NZEB #zeroimpact #localized #localmaterials
#recyclablematerials #self-energy-sufficient building

Half A House Builds A Whole Community

+ Improvement in :



Introduction

- Designed by the Chilean firm Elemental in 2010 in Chile
- An innovative approach to low-income housing that allows residents to personalize and expand semi-finished spaces according to their needs and resources.
- Core elements like concrete floors, plumbing, and electricity are provided

Application on LCA

- **Optimized Resource Use:** by offering semi-finished houses, upfront resource consumption is reduced
- **Extension of Lifecycle:** the ability for residents to expand and personalize their houses extends the home's lifecycle
- **Community Engagement:** the 'half a house' approach nurtures community engagement and empowers residents to shape their surroundings
- **Addressing Scarcity:** Elemental's approach uses scarcity as a catalyst for building sustainable, empowered communities, embodying LCA principles and contributing to sustainable low-income housing solutions



#socialsustainability #optimizedproduction #empower
#longlifebuilding #openendeddesign #customizedneeds

Satellite Stations

+ Improvement in :



Introduction

- Conceived by Michele De Lucchi and his AMDL CIRCLE
- Temporary structures set in various remote locations, constructed predominantly from wood and designed to be reabsorbed back into the environment over time in an effort to reconnect human activities with nature's rhythm.

Application on LCA

- **Sustainable Material Use:** primarily uses wood, a renewable resource, minimizing the environmental impact during extraction and production stages
- **Minimal Impact Design:** incorporates a philosophy of harmony with nature, as seen in the design of structures that integrate seamlessly with their surroundings, reducing environmental impact during the usage phase
- **Natural Decomposition:** planned to be temporary and reabsorbed back into the environment at the end of their lifecycle, reducing waste and potential disposal impact, and thus completing a sustainable lifecycle loop



#speculativdesign #backtonature #biodegradable
#naturescale production #impactlessproduction



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