Building Carbone footprint
Αποτύπωμα άνθρακα κτιρίου

Calculating the carbon footprint of a building on its terrain involves evaluating both **operational emissions** (emissions during the building's usage phase) and **embodied emissions** (emissions from construction materials, processes, and site activities)

1. Define the Scope of Assessment
•**Operational Carbon Footprint**: Energy consumption during the building's use (e.g., heating, cooling, lighting, appliances).
•**Embodied Carbon Footprint**: Emissions from materials, transportation, construction, and end-of-life disposal.
•**Land-Use Changes**: Carbon emissions from activities like deforestation or land clearing.

2. Collect Data

a. Building Materials and Construction Process

•Quantity and type of materials (concrete, steel, wood, etc.).

•Emission factors for materials (available in Environmental Product Declarations or databases like ICE, Ecoinvent).

•Emissions from transportation of materials to the site.

•Energy used during construction (machinery, tools, etc.).

b. Energy Consumption

•Annual energy consumption for lighting, HVAC systems, appliances, etc.

Use energy consumption data and multiply by the emission factor of the energy source:

Operational Carbon (Annual)=Energy Use×Emission Factor

•Energy sources (renewables, natural gas, electricity, etc.) and their emission factors.

c. Land Use

•Terrain size and vegetation cleared.

•Soil disturbance, which can release stored carbon.

•Existing vegetation that offsets carbon through sequestration.

d. Waste

•Construction and demolition waste.

•Recycling rates and disposal methods.

4. Calculate Embodied Carbon

•Sum up emissions for each material:

Embodied Carbon=

$\sum$(Material Quantity×Emission Factor

•Add emissions from transportation and construction energy use.

5. Calculate Operational Carbon

•Use energy consumption data and multiply by the emission factor of the energy source:

Operational Carbon (Annual)=

•Energy Use×Emission Factor

•For lifetime emissions, multiply by the building's projected lifespan.

6. Include Land-Use Change

•Estimate emissions from vegetation loss:

Carbon Emission=

Area Cleared×Vegetation Carbon Density

•Account for soil carbon loss and reduced carbon sequestration.

7. Summarize Results

•Add all components:

Total Carbon Footprint=

Embodied Carbon +Operational Carbon + Land-Use Emissions

Example:

A single-story house on a cleared 1000 m^2 terrain:

•**Embodied Carbon**: 200 tons of CO_2 (materials and construction).

•**Operational Carbon**: 10 tons/year for heating, cooling, etc.

•**Land-Use Emissions**: 50 tons of CO_2 (trees cleared).

•**Total for 50 years**:

$200+(10×50)+50=750$ tons of CO_2

Biodiversity & Architecture
Βιοποικιλότητα& Αρχιτεκτονική

@planet architecture

PLANETARY
ARCHITECTURE

1. Green Space and Ecological Quality

- **Percentage of green space on the site:**
  - The proportion of the site dedicated to green areas compared to the total area.
  - Example: *At least 30% of the site must be green space*, a common target in urban planning guidelines.
- **Area of preserved or restored natural habitats:**
  - Measured in square meters or hectares, this assesses the extent of natural areas maintained or recreated.
- **Native vegetation percentage:**
  - The share of plants that are indigenous to the area, to ensure ecological compatibility and avoid invasive species.

2. Biodiversity Indices

Some methodologies employ biodiversity indices to provide a quantitative overview:

- **Potential Biodiversity Index (PBI):**
  - Assesses a habitat's capacity to support diverse species based on factors such as structural and floristic variety.
  - Example: A woodland edge with multiple vegetation layers would score higher than a simple lawn.
- **Habitat Quality Index (HQI):**
  - Rates the ecological quality of habitats before and after the project to track changes.

3. Ecological Connectivity

•**Length of ecological corridors maintained or created:**
  • Measured in meters, it tracks pathways for wildlife such as hedgerows, greenways, or riparian buffers.

•**Buffer zone areas:**
  • In square meters, these measure transition zones that protect sensitive habitats from disturbances.

4. Species Richness and Abundance

•**Number of species recorded before and after development:**
  • Quantifies the change in biodiversity by counting plant and animal species.

•**Species richness index:**
  • The number of different species in a specific area (e.g., per square meter or hectare).

•**Presence of protected or priority species:**
  • Counts the occurrence of species with legal or conservation significance (e.g., endangered or threatened).

5. Carbon and Biodiversity Metrics

- **Ecological footprint or land use impact:**
  - Measures the project's consumption of natural resources in terms of global hectares.
- **Reduction in soil sealing:**
  - Quantifies the decrease in impervious surfaces (e.g., asphalt or concrete) to allow natural water infiltration and habitat preservation.

6. Features Supporting Wildlife

- **Area of green roofs and walls:**
  - Measured in square meters or as a percentage of total building surface.
- **Area of wetlands or ponds:**
  - Quantified in square meters or cubic meters to assess their contribution to supporting aquatic biodiversity.
- **Number of wildlife-friendly installations:**
  - Includes features like bird boxes, bat boxes, insect hotels, and log piles, which are counted individually.