

Sustainable Construction Practices

Sustainable Construction Practices – Study Notes

1. What Is Sustainable Construction?

- **Definition** – Building methods that minimize environmental impact, conserve resources, and create healthy, durable structures throughout their life-cycle.
 - **Key Goals**
 1. **Reduce carbon footprint** (materials, energy, transport).
 2. **Conserve natural resources** (water, timber, minerals).
 3. **Enhance occupant health & comfort.**
 4. **Improve economic performance** (lower operating costs, longer service life).
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2. The Life-Cycle Approach

Phase	Sustainable Actions	Typical Metrics
Planning & Design	• Integrated design teams (architects, engineers, contractors, sustainability consultants). • Site analysis (orientation, climate, biodiversity). • Use of Building Information Modelling (BIM) for clash detection and material optimization. • Prioritize low-embodied-energy products (recycled steel, timber, geopolymers).	• Design-stage carbon intensity (kgCO₂e/m²).
Material Selection	• Use locally sourced or regional materials to cut transport emissions. • Verify certifications (FSC, PEFC, Cradle-to-Cradle, EPD).	• Embodied carbon (kgCO₂e per unit). • Recycled content (%).
Construction	• Prefabrication & modularization to reduce waste and on-site time. • Implement waste-segregation plans (target > 90% diversion). • Use low-impact equipment (electric/hybrid machinery).	• Waste generated vs. diverted (tons). • Fuel consumption of equipment (L diesel/yr).

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Phase	Sustainable Actions	Typical Metrics
Operation & Maintenance	• High-performance building envelope (insulation, airtightness). • Energy-efficient HVAC, lighting, and appliances (LED, VFDs, heat recovery). • Water-saving fixtures, rainwater harvesting, greywater reuse.	• Energy use intensity (EUI, kWh/m²·yr). • Water use intensity (L/m²·yr).
	• Design for deconstruction (reversible connections, reusable components). • Material take-back agreements with suppliers. • Documentation of as-built conditions for future recycling.	• Potential recyclability (% of total material).

3. Core Sustainable Strategies

Strategy	Description	Benefits
Passive Design	Leverages site climate: building orientation, shading, natural ventilation, thermal mass.	Reduces heating/cooling loads; improves indoor comfort.
Energy-Efficient Systems	High-efficiency boilers, heat pumps, solar PV/thermal, smart controls.	Lowers operational carbon and utility costs.
Water Management	Low-flow fixtures, dual-flush toilets, leak detection, onsite treatment.	Cuts potable water demand; reduces stormwater runoff.
Material Circularity	Use of reclaimed, recycled, or rapidly renewable materials; design for reuse.	Cuts embodied carbon; reduces landfill waste.
Green Roofs & Walls	Vegetated layers that provide insulation, stormwater retention, habitat.	Improves biodiversity; mitigates heat island effect.
Life-Cycle Assessment (LCA)	Quantitative analysis of environmental impacts from extraction to disposal.	Informs material choices; tracks progress against targets.

**Certification & Standards