"Good design is *sustainable* design"

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Sustainable Design

Practical Guide

This Practical Guide covers key principles of sustainable design in the built environment

IN A SNAPSHOT

Sustainable design is the purposeful design of buildings and places that minimise harmful environmental impacts, drastically reduces carbon emissions, and positively increase health, wellbeing, nature and biodiversity, and social value, **throughout their lifecyles**.

WHY IS IT IMPORTANT?

Sustainability considerations are multifaceted and include the efficient use of energy, water and materials, the promotion of human health and wellbeing, the protection of habitats and biodiversity. The need to futureproof our buildings and maximise their useful lifespan while also meeting commercial objectives further adds to the complexity of the challenge.

Design helps us integrate complex requirements and navigate trade-offs to achieve the best overall outcomes. Carbon reductions and other sustainability objectives should be considered from the earliest project stages and embedded as an integral part of the design process to minimise costs and enable optimal outcomes. **Treating sustainability as an add-on or afterthought will result in higher costs and likely undesirable compromises.**

Designing sustainably ensures that buildings are future-proofed to perform at a level commensurate with our national Net Zero target and are resilient to future climate scenarios. The WorldGBC Whole Life Carbon Vision states that by 2030 all new bulidings should be net zero operational carbon.

For the purpose of this guide, we focus primarily on the individual building level while acknowledging that urban design, placemaking and nature-based solutions are fundamental to achieving wider sustainability goals.

PRINCIPLES OF SUSTAINABLE DESIGN

The UN Sustainable Development Goals set out the principles underpinning holistic sustainable design. The RIBA Sustainable Outcomes Guide derives a set of measurable targets from these principles for project teams and clients to use. The National Institute of Building Sciences defines six fundamental principles of sustainable design:

Optimise Site Potential
Site selection and analysis is key to sustainable design. This includes the re-use of existing buildings and development on brownfield sites. Building location, orientation, local climate and landscaping all influence energy requirements, access to public transport and impacts on ecosystems.

Optimise Energy Use
Increasing energy efficiency and maximising renewable energy use is one of the highest priorities in sustainable design. Adopting passive design principles and a fabric first approach greatly reduces the need for mechanical heating or cooling. Building services should be integrated early in the design process to optimise outcomes.

Protect and Conserve Water
A sustainable building should limit water pollution and conserve water through designing in water efficiency and re-use. Maximising permeable surfaces on site can support rain water absorption and prevent flooding.

Optimise Building Space and Material Use
Materials should be chosen and used in an intelligent way that minimises carbon, resource use and pollution. Sustainable buildings should be designed to re-use materials and be adaptable throughout its lifecycle. Circular Economy principles should be followed.

Enhance Indoor Environmental Quality
Indoor environmental quality significantly impacts building occupier's health, comfort, and productivity. A sustainable building should seek to achieve good levels of daylight, internal air quality, humidity, thermal and acoustic comfort. Healthy products and materials should be used.

Optimise Operational and Maintenance Practices
Sustainable design should consider a building's operating and maintenance requirements across its lifecycle. Contractors, facility managers and occupiers should have a deep understanding of the sustainable design features.

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HOW CAN IT BE DONE?

Each building project is unique and will require different design solutions depending on its context. However, below are some considerations that should be thought through on any sustainable design.

Clients

Clients are organisations or individuals who commission building projects including retrofits and renovations. They have a key role to play in setting a project's sustainability ambitions. Actions they can take include:

- **Question if a new building is the most sustainable solution** before commissioning work. Re-use and refurbishments should be prioritised where possible.
- **Embed sustainability as a non-negotiable** in any project briefs, and define measurable outcome targets.
- **Select a project team** who support the sustainability vision and can see it through successfully.
- **Adopt a Soft Landings strategy** to ensure the building will be used, operated and managed as intended.
- **Commission post-occupancy evaluations** to learn if the building performs as designed.

Design teams

Design teams typically include architects, structural and services engineers and often a range of other specialists such as landscape architects. Actions they can take include:

- **Interrogate and challenge the brief.** Support the client in developing a holistic sustainability vision.
- **Advocate for the re-use and retention** of existing buildings or structures.
- **Avoid working in silos.** Collaborate early and often across areas of expertise to achieve the best outcomes.
- **Adopt a lifecycle perspective** and undertake whole-life carbon assessments throughout the design process.
- **Analyse the local climate** to inform the design.
- **Implement a robust handover process** for building managers and users.
- **Undertake post-occupancy evaluations** to learn lessons for future projects.

Construction teams

Construction teams deliver the design in accordance with the brief. Contractors, suppliers, manufacturers and project managers are key members. Actions they can take include:

- **Foster a collaborative mindset** and no blame culture
- **Engage deeply with the design team** to understand and if needed help de-risk, low carbon designs.
- **Support designers** in identifying opportunities for carbon reductions and incorporating re-use materials.
- **Safeguard sustainability ambitions** and targets from any value engineering exercises.
- **Embrace modern methods of construction** and optimise procurement.
- **Implement training and capacity building** internally and for key suppliers and sub-contractors.
- **Minimise construction waste.**

DESIGNING FOR NET ZERO CARBON

The UKGBC Whole Life Carbon Roadmap outlines a trajectory for the UK built environment to be to net zero by 2050. It highlights some areas that can improve the sustainability of a design:

1. Design for Performance: A common problem in designing sustainable buildings is the 'performance gap', where there is a disparity between the energy consumption predicted in the design stage and the energy use in actual operation. An outcome focused Design-for Performance approach should therefore be prioritised, and increasingly embedded into design processes.

2. Prioritise Re-use: 80% of buildings in 2050 have already been built. By prioritising re-use of existing structures or sub-structures, carbon savings can be achieved whilst still achieving site development potential.

3. Design Efficiency for Reduced Embodied Carbon: Increased design efficiency of projects (i.e., the overall quantum and choice of materials used in projects), can contribute to a large reduction in their embodied carbon.

IN SUMMARY...

Sustainable design plays a fundamental role in ensuring that buildings and infrastructure meet future climate scenarios and are resilient. There are many different players involved in the sustainable design of a project, and each have a role to play in influencing its sustainability credentials.

READ MORE ABOUT SUSTAINABLE DESIGN

UKGBC: Design Archives
WorldGBC: Whole Life Carbon Vision
LETI: Climate Emergency Design Guide