

briefing note 32

briefing note
contents

Sustainable Design

Version 1: December 2010

This Briefing Note was produced on behalf of Willmott Dixon by WD Re-Thinking Ltd

WILLMOTT DIXON

Introduction

Building design, construction and operation have extensive direct and indirect impacts on the environment, economy and society; the triple bottom line that embraces sustainability. Buildings use resources such as land, energy, water and raw materials. They generate waste (during construction, operation and at end-of-life) and emit potentially harmful emissions to the occupants, land, water and atmosphere. Building owners, designers and builders face a unique challenge to meet demands for buildings that are accessible, secure, healthy, and productive while minimising their impact on the environment, economy and society.

History shows how important the links between environment and health can be. The emergence of the discipline of town planning came out of an understanding of the impact of the environment and capital development on human health. For many years this link was dismissed until the Planning and Compulsory Purchase Act 2004 redefined the role of planning to take account of social, economic and environmental impacts of development.

These challenges call for an integrated, synergistic approach that considers all phases of the buildings life cycle. This sustainable design approach supports an increased commitment to environmental stewardship and conservation, and results in an optimal balance of cost, environmental, societal, and human benefits while meeting the mission and function of the intended building or infrastructure; in-tune with the Brundtland definition of sustainable development; development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Considering the current economic challenges, retrofitting an existing building can be more cost effective than building a new facility. We must therefore design major renovations and retrofits for existing buildings to include sustainability initiatives thereby reducing operation costs and environmental impacts, and increasing the building resiliency to our changing climate and social requirements.

The main objectives of sustainable design are to avoid unnecessary resource depletion of energy, water, and raw materials; prevent environmental degradation caused by buildings and infrastructure throughout their life cycle; and create built environments that are liveable, comfortable, healthy, safe, and productive. While the definition of sustainable building design is constantly changing, six fundamental principles persist.

1. Optimise Site

Sustainable buildings start with proper site selection, including consideration of the reuse of existing buildings. The location, orientation, and landscaping of a building affect the local ecosystems, transportation methods, and energy use characteristics of the building. Smart growth principles should be incorporated in the project development process, whatever the scale of development. Whether designing a new building or retrofitting an existing building, site design must integrate with sustainable design to achieve a successful project.

2. Optimise Energy Use

With supplies of fossil fuel dwindling, concerns for energy cost, independence and security increasing, and the impacts of global climate change, it is essential to reduce demand, increase efficiency, and utilise renewable energy. The use of passive measures such as orientation, air tightness, solar shading, thermal mass, natural ventilation, and stratification must be considered from the outset; we must work with the natural environment, rather than against it.

3. Protect and Conserve Water

Changes to rainfall and runoff patterns due to global climate change and the interaction between this and the built environment has significantly perturbed our hydrological system. We are seeing reduced infiltration rates in catchments due to urbanisation and increased catchment response to rainfall events, leading to significant increases in peak flow, leading to over-bank flow and urban flooding. This lack of recharge to the aquifers and over extraction due to increased water demand is impacting on both ground and surface water resources, reducing water quality and threatening long term supply due to saline intrusion.

Fresh water is therefore an increasingly scarce resource. A sustainable building should reduce, control, and/or treat site runoff, use water efficiently, and reuse or recycle water for on-site use when feasible.

4. Use Sustainable Products

A sustainable building must be constructed of materials that minimise life-cycle environmental, social and economic impacts such as climate change, resource depletion, and human toxicity and have been produced in a responsible and ethical way. Sustainable materials have a reduced effect on human health and the environment and contribute to improved worker safety and health, reduced disposal costs, and achievement of sustainability targets. Unfortunately these products may have a slightly higher capital cost but we must always consider this against the whole life cost and the whole life value of the building legacy.

5. Enhance Indoor Environmental Quality

The Indoor Environmental Quality of a building has a significant impact on occupant health, comfort, and productivity. Among other attributes, a sustainable building maximises day lighting; has appropriate ventilation, acoustic and moisture control; and avoids the use of materials with high Volatile Organic Compounds (VOCs) and ionising radiation emissions.

6. Optimise Operational and Maintenance Practices

Considering a building's operating and maintenance issues during the preliminary design phase by encourage building operators and maintenance personnel to participate in the design and development phases to ensure optimal operations and maintenance of the building, will contribute to improved working environments, higher productivity, reduced energy and resource costs, and prevent system failures. Whole Life Costing (WLC) and Life Cycle Assessment (LCA) principles must be applied and facilities should be designed to include meters to monitor energy and water use and waste generation, in the building and on site. This data can then be used to set reduction targets, measure and report results to all stakeholders. This must be supported by a Soft Landings approach and Post Occupancy Evaluation (POE).

Conclusion

The buildings we construct today must be able to cope with tomorrow's climate, continuing to function under extreme temperatures, flooding, wildfire, wind impact damage, etc. To minimise resource depletion we must also build adaptability into the building at the design stage to ensure the building has the capacity to be used for multiple uses and in multiple ways over its life. For example, designing a building with movable walls/partitions allows for different users to change the space. Additionally, using sustainable design allows for a building to adapt to different environments and conditions.

To this end Willmott Dixon have developed the 10 point sustainable project criteria, based both on our visions of becoming zero waste to landfill and Carbon Neutral by 2012 and the other measures we believe are important for delivering sustainable buildings.

With the clients support, we aim to achieve all 10 criteria on every project.

WDC

	Criteria	2010	2011	2012	2013	2014
1	Client commitment to making it a sustainable project	Yes	Yes	Yes	Yes	Yes
2	BREEAM	Excellent	Excellent	Outstanding	Outstanding	Outstanding
3	Sustainability workshop	Yes	Yes	Yes	Yes	Yes
4	Energy Performance Certificate - Rating	B	B	A	A	A
5	Recycled content by value	>25%	>25%	>30%	>30%	>30%
6	Waste - % diverted from landfill	>85%	>90%	100%	100%	100%
7	Sustainability healthchecks & POE	Yes	Yes	Yes	Yes	Yes
8	WLC & LCA undertaken	Yes	Yes	Yes	Yes	Yes
9	Considerate Constructor Scheme - Score	>34	>34	>34	>35	>35
10	Directly associated community project	Yes	Yes	Yes	Yes	Yes
	Percentage of projects that must comply:	20%	30%	40%	50%	60%

To support this sustainability workshops are held on project award to investigate sustainability issues. They cover a number of areas: waste, materials, energy, community, building life cycle, biodiversity etc; to set aims and objectives to be achieved on the project. The workshop produces an action plan which is reviewed at subsequent design team and construction meeting s to ensure they are progressed.

WILLMOTT DIXON