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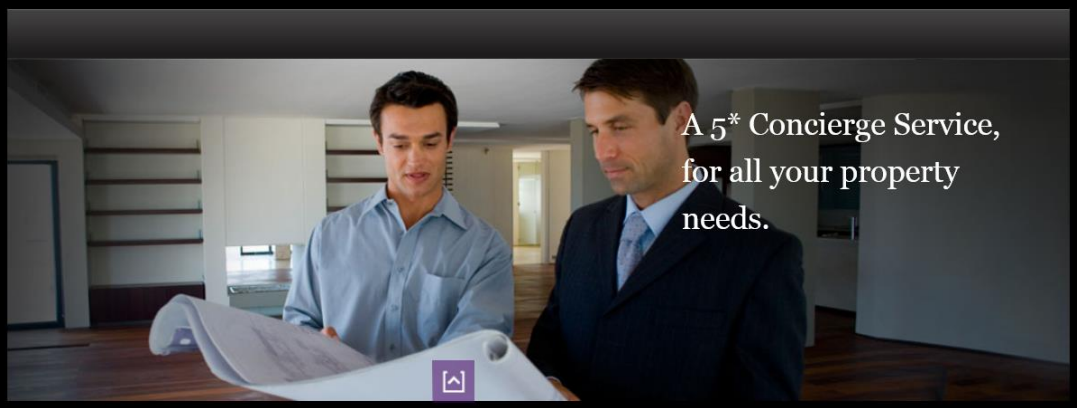
Sustainable Urban Design
BedZed Development



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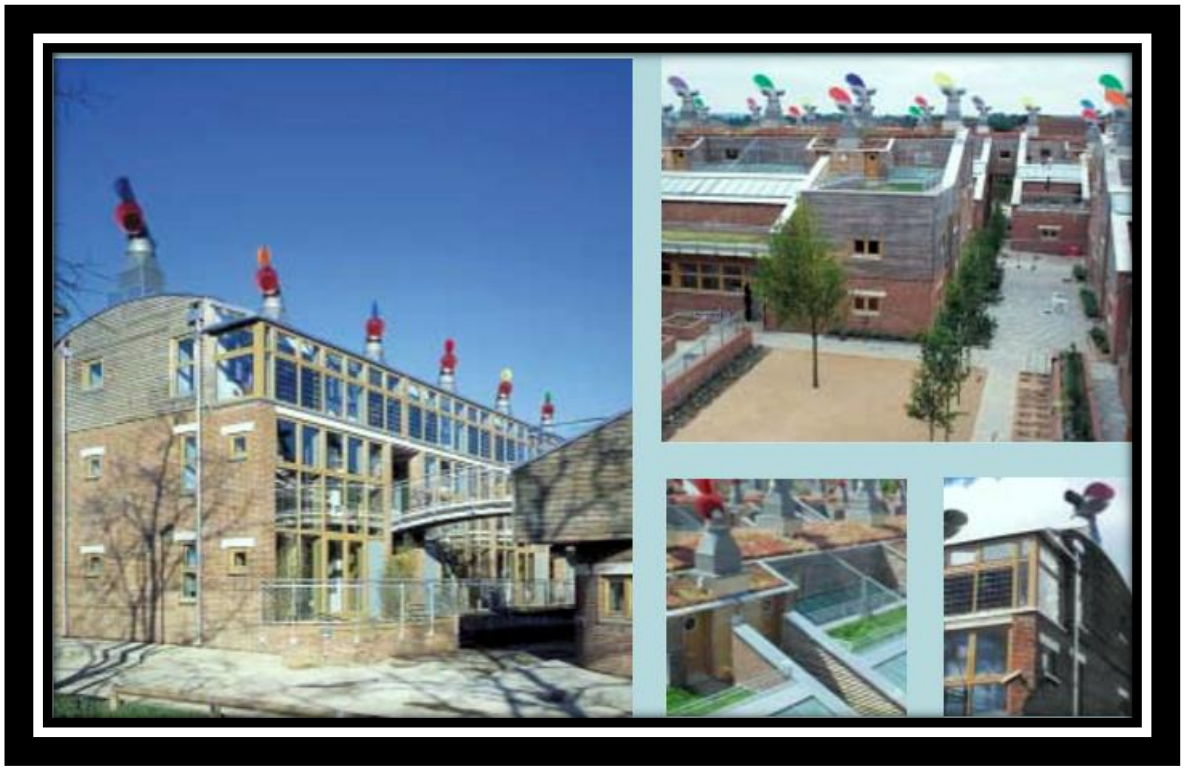
SUSTAINABLE URBAN DESIGN

BEDDINGTON ZERO ENERGY DEVELOPMENT, SUTTON, UK

BedZED



1. **Overview**. Beddington Zero Energy Development (BedZED)[1], consists of 82 units catering for social housing, shared ownership, key-worker units and private houses, developed for the Peabody Trust Housing Association[2], in conjunction with the Bio Regional Development Group[3], who located the site, in Sutton (UK). The architect Bill Dunster[4], has also incorporated office space and 'live-work' units overarched by a commitment to provide 'green' lifestyle services, through energy efficiency, renewable energy, water conservation, car club and local organic food deliveries. The build strives to achieve environmental, social and economic sustainability and is the UK's largest Eco Village. In addition, it promotes sustainable 'Social Housing' through its three main bastions of; Sustainable communities, sustainable tenancies and sustainable buildings.

2. **BedZED Targets**. The following targets were established within the 'Urban Design' and followed the 'Design Process', that of Master Plan, Urban Design, Space – Built Analysis, Form – Massing and Architectural Details, with note to; Transportation, Landscape, Infrastructure, Social, Physical and Economic forms, attempting to provide an Urban Utopia against the backdrop of Urban Sprawl within Sutton.

a. Sustainable Development Planning

- Create a community comprising residential and workspaces with as diverse a mix of uses as possible.
- Provide mixed tenure (private and social) housing and affordable housing.
- Consider providing community facilities e.g. shared multipurpose indoor community space, health facilities, nursery and shop/café.
- High development density.
- Consider using ZED as a flagship for regenerating depressed areas.
- Consider consulting with key stakeholders from neighbouring communities in relation to providing shared community facilities.

- Avoid adding eco-friendly elements piecemeal to a conventional scheme.

b. **Sustainability**

- **Environmental**: low energy and renewable fuel, including biomass combined heat and power (CHP) and photovoltaics (PV), zero net carbon emissions, integrated water conservation strategies, reclaimed materials, Green Travel Plan, and biodiversity measures.
- **Social**: mixed tenure, two-thirds affordable or social housing, lower fuel and water costs, community space, sports pitch, child-care facilities, 'village square', private gardens for most units.
- **Economic**: Locally sourced materials, workspace for local employment and enterprise, locally available renewable energy resources.

c. **Transport and Travel**

- Establish a Green Transport Plan early to use as a tool in the planning process.
- Target to reduce fossil fuel car miles.
- Consider the introduction of a car club.
- Consider reducing parking provision.
- Promotion of cycling and walking though facilities and designated routes.
- Consider co-ordinating local organic food/supermarket delivery service.
- Consider sustainable travel advice as part of resident induction.
- Communities should be designated and designed as Home Zones.

d. **Water**

- Typical mains water consumption of 140 litres per person per day to be reduced by one-third.
- Consider harvesting rainwater to reduce mains water demand.
- Consider making provision to treat foul water on site.
- Development fitted with water saving appliances and low demand fittings.
- Porous paving should be specified to hard-landscaped areas.
- Water conservation should form part of resident induction.

e. **Built Environment**

- All construction materials selected to minimise embodied energy and CO2.
- All materials should be sourced "locally" (at BedZED it was within a 35 mile radius).
- Target should be set for amount of recycled/reclaimed materials (at BedZED it was 5%).
- If project includes demolition, maximise of use of reclaimed materials.
- Timber will be used in preference to steel, aluminium or uPVC where possible.
- All timber from sustainably managed woodlands, preferably certified by the FSC.
- "Unhealthy" materials should be avoided in accordance with AECB and BRE guidance.
- Construction methods and materials will be selected to maximise durability and recyclability at the end of the building's life.
- Details are to be contained within building contract documents to ensure targets are met with records kept for verification.
- The development should meet the EcoHomes 'Excellent' standard.
- Carefully consider the reuse of existing buildings.
- New build - Target to reduce energy demand by 30%.
- New build - Ventilation should be provided by passive systems.
- New build - Target to reduce total CO^2 output per dwelling by 60%.
- New build - U-values to be achieved in excess of current Building Regulations.
- Refurbishment - Target to reduce total CO^2 output per dwelling by 60%.
- Refurbishment - U-values should meet current Building Regulations where possible.
- Consider target for heat and power supply: 30% to be supplied by renewable sources.
- Energy conservation should form part of resident induction.

f. **Waste**

- Best practice in waste minimisation during construction by following CIRIA guidelines.
- Target for waste during construction is to be set at 5% of total construction material.
- Recycling and composting facilities incorporated at design phase.
- Waste reduction should form part of resident induction.

g. **Local Environment**

- Quality of natural amenity should be conserved and enhanced.
- Consider providing community play and sports areas.
- Develop a strategy for reducing pollution during construction.
- Develop a strategy for reducing light and noise pollution from the occupied development.
- A Biodiversity Action Plan should be produced where appropriate.
- Nature conservation should form part of resident induction.

3. **Analysis**. Sustainability analysis of this project can be broken down under that of Social, Economic and Environmental, but is overarched by the Governments; National Strategy For Sustainable Development[5], with its 10 principles and 147 indicators, of which 70 are linked to housing, for which BedZED complies.

a. **Environmental**. At present 6.3 Hectares of biologically productive land is required per capita in the UK (This includes Rain Forest absorption of CO^2), at present this planet can only support 2.2 Hectares per capita and thus this figure has to be reduced by $^2/_3$. A large facet of this is the construction industry / built environment which requires 5% of world energy to construct, however 45% of world energy to maintain, in the form of heating, lighting etc. Therefore, it is obvious that better ecological and sustainable units are built, with a joined up approach to construction. The BedZED project goes some way to address this issue, through;

- 50% Reduction in Fossils Fuels required for car use, achieved by Carpooling / Car Sharing and more importantly Asset Hiring, rather than owning. This in addition, performs an economic function. This leads to the reduction in traffic, although it is noteworthy that this is not an isolated community and thus spare traffic capacity in the area, is likely to be taken up with regular commuters finding an unobstructed fur a fare on their commute.
- Further traffic has been reduced by encouraging online shopping and mass deliveries to the community. Thus alleviating some of the 7% pa CO^2 emissions given to Road Haulage. Although a minor saving, it can be attributed to 'Marginal Gains', but does not negate the top tier of delivering of produce from the port of entry, via the distribution warehouses to the consumer / retail outlet.
- Employment opportunities within BedZED have been brought to the employee and thus reduces the environmental impact, with the average commute, external to this project of 1 hour, significant GHG's can be saved. However, it is incumbent on the residents of BedZED to be content with their 'Work – Life' balance, for which human nature is against us and financially driven individuals will aspire outside of the community. Hence financial necessity may overtake environmental positivity. This can be negated by an improved public transport infrastructure surrounding BedZED.
- Local environment has been factored in, with the green spaces and naturalised flaura and forna added, thus converting CO2 back to oxygen and providing a natural habitat for British wildlife to thrive.
- This development is carbon neutral and is achieved through energy-efficient design of the buildings (SAP Rating 150) - reducing heat losses and utilising solar gain to the point where it is feasible to eliminate conventional heating systems altogether. With the added benefit of an income stream back to the housing Association / Tenants / Owners.
- It utilises energy efficient appliances and bulbs, thus reducing its energy demands, this in addition to the environment leads to financial savings.
- Through water harvesting, it attempts to reduce average daily consumption (160 Litres per day per individual) by 50% on the national water infrastructure.

- Landfill waste on construction was reduced to 5% compared to the national average of 48%.

b. **Social**. This concept champions itself as a sustainable community, due to the following;

- It is in use 24 hours a day, as offices, restaurants and dwellings are mixed within the community and thus, self-polices, under the ethos of it is never empty. Caution should be aired, as it sometimes becomes a closed community, which can ostracize individuals quickly, with an everybody knows all ethos.
- It reduces work stress, in the guise of travel time, location, convenience.
- Feel good lift to individuals participating in the scheme, with a sense of community, working towards a sustainable planet.
- More recycling achieved through improved household waste categorisation and recycling.

c. **Economic**. In conjunction with the economic benefits highlighted within the environmental paragraph (3a), the following economic benefits can be seen;

- Travel expenses reduced.
- Build costs reduced, through environmental grants.
- Utility bills reduced.

4. **Conclusion**.

This Sustainable Urban Development (SUD) is the largest in the UK and champions the idea of sustainable design, through the key nodes of Social, Economic and Environmental Sustainability. It is at a micro level, with 82 Units but has the potential to be 'Best Practice' for macro SUD. Whilst the 'Built Environment' after construction is extant, having gained all of its sustainable benefits, through the design and build process, BedZED continues to produce environmental savings, through the 'Sense of Community' and its willingness to continue to work towards a sustainable planet.

[E Signed]

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