

Renewable Energy Solutions for the Built Environment in Urban Cities

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Abstract

Energy is vital to life in cities and the way we use it has huge implications for our environment, for economic regeneration and in terms of social equity. Sustainability design can help reduce cities' contribution to global climate change, tackle the problem of fuel poverty and at the same time promote cities' economic development. With more dense urban cities emerging nowadays, means to better integrate sustainability design and renewables into the buildings have become a new worldwide agenda.

This paper aims to investigate the renewable energy and sustainability solutions for the built environment through use of sustainable energy resources, reduction of building energy use and minimization of impacts to building outdoor environment. The interface between the built environment and its ambient is one important factor in this research. Building microclimate analysis is conducted to find the building interface solution with its environment, for a sustainable building design considering renewable integration and less building energy use through solar access analysis, prevailing wind analysis, thermal environment, daylight and outdoor air quality analysis, etc. This research proposes a solution approach for an appropriate integrated balance, of solar thermal, solar photovoltaic, day lighting, wind power, geothermal energy, air movement, natural ventilation, hydrogen and fuel cells, and other renewable sources, to whole building design. The integrated balance helps reduce the production of greenhouse gases, smog, and acid rain, preserve natural resource and slow the depleting of fossil fuel reserves.