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## DESIGN ISSUES FOR NET ZERO-ENERGY BUILDINGS.

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### Abstract

Net Zero-Energy Buildings (NZEBs) have received increased attention in recent years as a result of constant concerns about energy supply constraints, decreasing energy resources, increasing energy costs and the rising impact of greenhouse gases on world climate. Promoting whole building strategies that employ passive measures together with energy efficient systems and technologies using renewable energy became a European political strategy following the publication of the Energy Performance of Buildings Directive recast in May 2010 by the European Parliament and Council. However designing successful NZEBs represents a challenge because the definitions are somewhat generic while assessment methods and monitoring approaches remain under development and the literature is relatively scarce about the best sets of solutions for different typologies and climates likely to deliver an actual and reliable performance in terms of energy balance (consumed vs generated) on a cost-effective basis. Additionally the lessons learned from existing NZEB examples are relatively scarce. The authors of this paper, who are participants in the IEA SHC Task 40-ECBCS Annex 52, "Towards Net Zero Energy Solar Buildings", are willing to share insights from on-going research work on some best practice leading NZEB residential buildings. Although there is no standard approach for designing a Net Zero-Energy Building (there are many different possible combinations of passive and efficient active measures, utility equipment and on-site energy generation technologies able to achieve the net-zero energy performance), a close examination of the chosen strategies and the relative performance indicators of the selected case studies reveal that it is possible to achieve zero-energy performance using well known strategies adjusted so as to balance climate driven demand for space heating/cooling, lighting, ventilation and other energy uses with climate-driven supply from renewable energy resources.

Keywords: Zero Energy Building, Residential Building, Passive Measures, Energy Efficiency, Renewable Energy Generation.

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