

# 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 for energy supply constraints, increasing energy costs and rising impact of greenhouse gases on world climate. Promoting whole, building strategies that employ passive measures with energy efficient systems and technologies using renewable energy, became a European political strategy since the publication of the Energy Performance of Buildings Directive recast in May 2010 by the European parliament and council. Designing successful NZEBs however, represents a challenge since the definitions are yet generic assessment method and monitoring approach are 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 (used vs produced) on a cost-effective basis. Beside even the experiences from already built NZEB examples are relatively rare.

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 ongoing research work on some best practice leading NZEBs residential buildings. Although there is no exact approach for designing a Net Zero-Energy Building (there are many different possible combinations of passive and efficiency measures, utility equipment and on-site energy generation technologies able to achieve the net-zero energy performance), a close inspection of the chosen strategies and indicators of the relative performance of the selected case studies reveal that it is possible to achieve zero-energy performance using well known strategies adjusted accordingly to balance climate driven-demand for space heating/cooling, lighting, ventilation and others energy uses with climate-driven supply for renewable energy resources.