BEST PRACTICES FOR NET ZERO ENERGY BUILDINGS DESIGN IN MIXED AND COOLING DOMINATED CLIMATES

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ABSTRACT

High performance buildings including net zero energy buildings (NZEB) are facing difficulty to become market mainstream in warm and hot climates. Beside the economic there are serious technical and design challenges that hampers design teams design, construct and operate NZEB in mixed and cooling dominated climates. There is a difficulty to make the Passive House standard cross the heating dominated climatic zones in Northern and Central Europe to get implemented in mixed or cooling dominated climates as an ultra-energy efficient building concept. There is a need for setting new climate adaptive energy efficiency target metrics for NZEBs in warm and hot climates. This paper presents guidance and recommendations on the necessary performance target metrics for NZEBs and makes them explicit. Results are based on cross analysis of several case studies, presenting an overview of challenges and providing recommendations based on available empirical evidence to further lower those barriers Worldwide with a focus on the European construction sector. By defining the performance thresholds for NZEBs including the metrics we offer design team the possibility of verification and design assessment during early design decision making phases to instil a kind of practical, evidence based and quantifiable guidance for high performance buildings and in particular NZEBs.

Keywords: *Passive House, carbon neutral, learned lessons*

INTRODUCTION

The European Union (EU) sustainability strategy is based on large scale deployment of nearly zero energy buildings (nZEB) and net zero energy buildings (NZEBs) implying high resource efficiency and renewable energy dependence. The Climate-Energy Framework 2020 sets three key targets to cut 20% in green gas emissions (compared to 1990 levels), increase the EU renewables share by 20% and improve energy efficiency by 20% (EU 2010). The main instrument to achieve those targets in the building sector is the Energy Performance of Building Directive (EPBD) recast that sets the standards for new and renovated buildings across Europe. The Directive 2010/31/EU (EPBD) indicates that EU Member States must ensure that by 2021 all new buildings, and already by 2019 all new public buildings, are nZEBs (Atanasiu et al. 2011). Accordingly most member states revised recently the existing