

Neighborhood housing design using fifth generation manifesto towards nearly zero energy urban developments

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Abstract. Since cities are growing faster than ever before, this paper traces directly that the fifth generation of sustainable city dimensions is not a prosperous idea or a welfare mode of sustainability but a vital effective way to adapt to Climate change, provide energy production, increase carbon reduction, and enhance pedestrian-occupant thermal comfort. It is a systematic method to alleviate urban canyon temperatures, maximize shading in summer, enhance energy production, and minimize heat transfer. It shows better results than designing apartment buildings with parcel planning with its four wall surfaces absorbing heat all day long. Early from schematic design, the emphasis is based on freehand sketching, adjusting urban aspect ratio, courtyard housing closure ratio, compactness degree, and microclimatic orientation, then adding a layer of humanization with green corridors, and tree species numerically modeled based on microclimate with courtyarded passive housing clusters, moving towards detailed design execution with SCEB bearing wall construction having the majority of its mixture of clay which enhances thermal mass insulation, climate adaptation, indoor thermal comfort, and a green job opportunity. Afterward adding energy plus BIPV on the whole constructed microclimatic-based roof to twist the neighborhood into a power bank saving energy consumption, and to work as a double roof shading. It shows on the other urbanism coin side walkability, sequential visual order, urban identity, and architectural character. Numerical outdoor-indoor coupled simulations took place using Envi-met and DesignBuilder while meteorological and biometeorological parameters were measured. The new recipe ignites a sense of harmonizing results in enhancing environmental sustainability measures.

Keywords: Neo-arid City – Passive Housing – SCEB – BIPV – Nearly Zero Energy

