These savings are due to the reduction of direct solar gain which is being blocked by the automated shading device and the reduced transmitted heat the usage of low E glass. The variation of the thermal performance between orientations ranged from 1 to 3% compared to 8.85% between east-facing and west-facing house in the base case.

CONCLUSION

This research has investigated the thermal optimization of windows components in relation to orientation in a representative governmental housing project in the UAE. The thermal performance of the dominant house type was first tested in relation to the cardinal orientation. The west facing house carried almost 9% more annual energy consumption than the east orientation. Then, single window components were tested for the energy savings potential. A vinyl frame with thermal break and three efficient glass alternatives were identified, and tested including: double reflective glass, double Low-E glass and double squared Low-E. The latter provided optimum performance with savings ranging from 3% to 8% of the total annual energy consumption, repectively for the east and west orientations while the vinyl frame with the original glass type yielded between 4% and 5% energy savings. Subsequently, the most effieicnt components were combined and tested. The double squared Low-E tinted glass and vinyl frame yielded savings ranging from 6 % to11.7% respectively for the east and west orientation. More importantly, the optimal window components highlighted similar performance independently from orientation, thus enabling flexibility in housing planning projects with increased thermal efficiency and energy savings.

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