CONCLUSION

Height proportions had a lower effect than building depth which was a key factor in the cities with extreme cold and hot climates, Khargah and Berlin. EUI values decreased significantly by the increase in depth due to the decrease of exposed surface area with respect to the indoor air-conditioned volume. This BD effect was less in Cairo and nearly insignificant in Alexandria where temperature differences between indoor and outdoor is small, thus decreasing heat transfer by conduction.

For a fixed depth, a courtyard with lower height proportions consumed less energy in desert cities due to the effect of the heat sink to the ground which became of less impact as height increased, leading to an increase in EUI accompanied by the increase in artificial lighting and its consequent cooling loads. This nearly cancelled the self-shading effect of the courtyard. The opposite effect occurred in Berlin.

Compared to the corresponding solid square, the courtyard building achieved significant savings in the moderate climate of Alexandria especially in case of medium height proportions (1:1) at small BD and in low height at large BD. In khargah and Cairo, that are more hot cities, significant saving were only achieved at large BD (18m-20m) and low height proportions (1:0.25 to 1:1) while a significant increase in consumption occured especially at small BD and higher height proportions in most cases.

Further research is required to quantify the effect of courtyard house with more proportions.

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