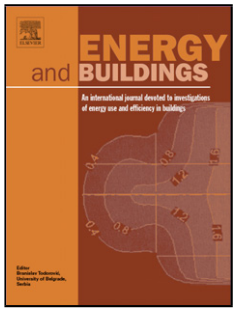

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THE ENERGY AND INDOOR ENVIRONMENTAL PERFORMANCE OF EGYPTIAN OFFICES: PARAMETER ANALYSIS AND FUTURE POLICY

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Highlights

- General energy survey of Egyptian offices categorised by building service type.
- Energy and indoor environment performance for a case study office building.
- Generalisation of the model to represent typical performance.
- modelling framework used to demonstrate relative and combinatorial effects of various input parameters
- To propose possible future measures for Egyptian office buildings to be encouraged by policy.

Abstract

Buildings are a significant contributor to the rapidly increasing electricity demand in Egypt which is straining the existing supply network causing economic and social impacts. There are current initiatives aimed at improved building performance including adoption of international standards. The performance of existing Egyptian buildings is not well understood making the impact of these international standards uncertain. This paper provides insight into performance of current Egyptian office buildings through a multi-building energy survey and a detailed case study. The most common office type in the survey has natural ventilation and local cooling. A process to capture observed performance in a representative model and input parameter set is presented. The model is used to investigate performance impacts of parameters including: location, weather, building envelope, intensity of occupancy, behaviour, and installed systems including the HVAC strategy. HVAC strategy was identified as the most significant factor. Typical Egyptian offices with natural ventilation and local cooling systems under personal control have electricity demand less than 50% of centrally serviced buildings. System efficiencies (HVAC, lights, equipment) and occupant behaviour (e.g. use of systems, temperatures) were also identified as significant factors, each with potential of around 30% saving compared to current typical offices. Possible policy measures to promote energy efficient systems and energy conscious behaviour are proposed which together can reduce the energy demand of typical offices by 50%. Trade-offs between energy use and indoor environmental quality (IEQ) are discussed.

Abbreviations

IEQ	Indoor Environmental Quality
EPBD	Energy Performance of Buildings Directive
EU	European Union
UK	United Kingdom
ECG 19	Energy Conservation Guide 19
HVAC	Heating, Ventilation, & Air Conditioning
ECP	Egyptian Commercial Buildings Energy Code
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
LEED	Leadership in Energy & Environmental Design
EIA	Energy Information Administration