



Kandidatarbete
Examenskod ACEX10



A holistic review of energy performance and indoor environmental quality in hospital buildings in Europe

Hospitals is one of the top energy-consuming building categories and is estimated to account for the largest portion of purchasing power in the public sector. They produce approximately 5 percent of the EU's carbon dioxide emissions per year (HCWH Europe, 2017). Furthermore, in a typical hospital, over 50% of the building energy consumptions is used to keep the quality of the indoor environment through heating, cooling, ventilation, and lighting. However, in hospitals patients' welfare and healing is of first priority. Many studies have shown that good indoor air condition can promote occupants' well-being and reduce the length of stay in hospitals (Azizpour et al., 2013). Thus, reducing energy consumption without compromising indoor environment is an urgent task. To better build the low-energy and convalescence-care hospitals for the future, we need to first get an overall view of how patients are satisfied with the building conditions today and then map what are the influential factors of the indoor environment for patients' comfort, convalescence and well-being.

Based on the on-going research project in collaboration with one of the largest university hospitals in Germany, in this bachelor thesis, the candidates will conduct a holistic review of the status of hospital energy use and patients' satisfaction with the indoor environment quality, and gain a good understanding of the influential factors on

Target group of students

Samhällsbyggnadsteknik, Civilingenjör
Arkitektur och teknik, Arkitektur

Group size

3-6

Special requirements

No

Suggestion from

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Can the project be duplicated?

Yes / No



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patients' convalescence and well-being. Firstly, the candidates have to scan the existing studies on patients' satisfaction on the perceived indoor environment including thermal environment, air quality, lighting and daylight, and acoustics. Summarize the environmental factors related to convalescence and well-being from the evidence learned. Secondly, a review of the energy consumption status in hospitals has to be conducted. Thirdly, design guidelines for sustainable hospital building shall be collected. Lastly, the potential linkages among energy use, sustainable technologies, and patients' well-being in hospitals shall be mapped. At the end of the thesis, it would be expected to describe best practices of future hospitals design and a thorough review of post-occupancy surveys in hospital buildings is expected, e.g. as an appendix.

This thesis topic is a good opportunity for the students to touch upon and understand the challenges in the future development of healthcare and hospital buildings, which are expected to gain importance in the future and get even higher importance in the building sector. This specific knowledge is very beneficial for the building design and construction industries and also appreciated by building owners and policymakers. Moreover, it will help students who are interested in conducting research in the field of sustainable buildings. It can pave a road to future studies in the academic field as well

Aim: Conduct a holistic review of the status of hospital energy use and patients' satisfaction with the indoor environment quality, and in depth understand the influential factors on patients' convalescence and well-being.

Methods: Systematic literature review, questionnaire design.

Literature:

Azizpour F., Moghimi S., Salleh E., Mat S., Lim C.H., Sopian K. (2013) Thermal Comfort and Indoor Air Quality Evaluation of Hospital Patient Ward in Malaysia.

Yuna G.Y., Kima J.T. (2014) Creating sustainable building through exploiting human comfort. *Energy Procedia* 62: 590-59.

Roberto Z. Freire, Gustavo H. C. Oliveira, Nathan Mendes Cheng, Jui-Hung Chien. (2008) Predictive controllers for thermal comfort optimization and energy saving. *Energy and Buildings*, 40 (7): 1353-1365.

HCWH Europe. (2016) The Energy Efficiency Directive: A HCWH Europe position paper. Available at: https://noharm-europe.org/sites/default/files/documents-files/5047/2017-10-09HCWHEurope_Energy_Efficiency_Position_Paper.pdf.

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