LIFE CYCLE ASSESSMENT OF LOW COST RETROFIT OPTIONS OF EDUCATIONAL BUILDING CONSIDERING RENEWABLE AND NON-RENEWABLE ENERGIES

Akram Avami, Energy engineering faculty, Sharif University of Technology, Tehran, I. R. Iran
Email: avami@shari.ir
Atiyeh Soleimani Javid, Energy engineering systems group, Energy engineering faculty, Sharif University of Technology, Tehran, I. R. Iran

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Commercial and building sectors account for 34% of total energy consumption in Iran. Increasing demand of the level of comfort along with population growth necessitate much more attention about energy requirements in the country. Such phenomena have already raised concerns about the security of energy supply and heavy environmental impacts. These concerns can significantly be reduced by implementing retrofit options in existing buildings.

The Department of Energy Engineering of Sharif University of Technology is selected as the case study with 181 KWh/m² annual heating and cooling demand, 29 KWh/m² annual lightening and 15 KWh/m² electrical appliances energy demand. Environmental concerns are accounted by means of Life Cycle Assessment (LCA) principles that evaluate the impacts associated with burning natural gas along with the electricity consumed for meeting building comfort demand.

In this paper, three scenarios are evaluated and compared by considering life cycle assessment. The first scenario considers the retrofit strategies which affects the building demand like shading effect and infiltration rate. The other scenarios consider the retrofit options of the supply building energy system to meet the energy demand, like elevating efficiency of equipment and also operational scheduling and planning of the HVAC systems and utilizing renewable energy for supplying part of building energy with regards to the working time of the building. Utilizing LCA for these scenarios provide better information about the impact of applied strategies through the whole supply chain of the system under study. This will facilitate the decision making process of retrofit project.