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Analysis of energy consumption improvements of a zero-energy building in a humid mountainous area
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Abstract
The most significant basis for sustainable development, as well as one of the most critical concerns of today's human societies, is energy and how it is consumed. In Iran, about 40% of energy is consumed in residential, commercial, and office buildings. Considering the importance of energy for sustainable development, buildings with zero energy consumption have found a lot of supporters. In the present paper, buildings with zero energy consumption in the north of Iran (Qa'emshahr city) were studied, and the feasibility study for constructing such buildings in this humid mountainous area was done. In this regard, a residential building with a conventional condition was considered as a sample, and energy efficiency parameters were investigated; using different methods, energy consumption of the building was reduced to zero. The research method in this study was based on two principles. At first, using scientific resources, new methods for reducing energy consumption in buildings and how they are managed were researched; in the second step, which is the main part of this paper, using DesignBuilder Software, the energy consumption of the building was determined. In the final step, the power generation capacity and panel area and economic considerations in the payback period were calculated per month. For this purpose, an average of 63 m 2 of the solar panel was considered to be the electrical power of the building, which was able to fully produce the building's electricity requirement in 8 months. According to the results, with activities, the amount of electrical energy used for air conditioning in the building has been released by 80% and has been detracted from 34 MW to 7 MW. In the case of return on investment (R0I), to supply the required power generation for the building, it would be possible to receive about 15 000 $per year from the Iranian Ministry of Energy. © 2019 Author(s).

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