

ABSTRACT

DESIGNING SOLAR HOT WATER SUPPLY SYSTEM USING F-CHART METHOD. APPLICATION TO STUDENT RESIDENCE.

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The purpose of this thesis is the creation of an Excel spreadsheet in which the annual thermal efficiency of a solar hot water supply system and the economic parameters would be calculated, by which conclusions can be drawn, regarding the economic viability and the depreciation time of such a system.

Through the literature review, general subjects as solar energy, solar collector types and the *f*-chart method are analysed. In Addition, the *f*-chart's method equations are presented, as well as the economic analysis using methods P1, P2. After the spreadsheet was created, different cases for installing a solar hot water supply system were investigated and the results are presented comparatively.

In conclusion, although that the *f*-chart method contains large amount of calculations, it is simple, easy understandable and it can be adapted in a big range of systems. Apart from that, the creation of spreadsheet makes the process of calculation even simpler since the system's designer needs to just import the technical aspects of the system in various cells. The system which has been designed as part of that project, for a student residence of 32 studio apartments, it covers the 84% of the thermal load for the hot water supply while it saves €12.828 until the end of its life cycle. Most importantly, before the solar system's installation with high initial costs, accurate measurements for the hot water usage should be done so as to extract even more reliable results. Therefore, those specific conclusions will provide guidance for selecting the best collector area compared to the amount of money savings during the system's life cycle. Therefore, those specific conclusions will provide guidance for selecting the best collector area compared to the amount of money savings during the system's life cycle.

Key words: Solar systems, F-chart, Economic analysis, Optimization.