Simulation Of Solar Water Heating System In Single Family House In Various Weather By Using Polysun Programs

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Abstract: This study is concerned with modeling and simulating clean sun energy and using it to heat water for the family using a program that depends on a set of basic parts, including (the storage tank, Flat plate collector). Where this study included temperatures ranging from 20 - 50 degrees Celsius and was found through the results, We note that the maximum temperature can reach 56 degrees Celsius between the sixth and seventh months and that the amount of heat losses reaches approximately 72KW in the seventh month and the amount of energy reaches 12KW / h.

Keywords: Solar energy, heat losses ,polysun, circulation energy.

I.INTRODUCTION

The process of research and exploration of alternative and environmentally friendly energies has become one of the matters that occupy the developed countries industrially, especially those that rely on regular fuels in energy production, including oil, gas oil and other materials that cause damage in one way or another to nature, in addition to the important factor which is the economic cost[1]. Solar energy is one of the alternative, clean and environmentally friendly energies in addition to other energies, including wind energy, oceans and other energies used. Through studies, it was found that most of the energy used in buildings is for heating[2] cooling and hot water Solar water heaters area unit the foremost fashionable means that to use solar power thanks to technological practicability, vasoconstrictive A conditions as compared to different varieties of solar energy empolyment. This technics has been well advanced and may well be merely achieved [3]. Fortunately, the value of solar power should then be minimized in cold climate places in order to make type thermal collectors competitive [4].use solar power in hot water was one among foremost necessary sensible applications, as the use of solar energy collectors increased by more than 18% annually different process tools are designed to assess the long-term performance on star as well as outcomes trend of parameters [5]. When starting an academic degree investigation of potential using star power, it's important in determining which energy method is more appropriate for the investigation [6, 8] In fact, the use of this type of energy is a good choice from the best options, as it can save 40 - 60% of the total energy used in buildings. Although this alternative energy is useful, there are many problems that face its use, including expected problems, including (numbers of individuals and their instantaneous uses), and there are unexpected problems, including (weather conditions and weather data). For these reasons, the data modeling and the use of programs, including of Simulation Program (Polysun), which is used for power systems, as it helps in estimating the amount of energy and its length in the system and the possibility of estimating design variables.

Anderson et al. [9] looked at how different colored solar dishes performed. various colored collectors' transmittance-absorptance commodity was sponsored Using the hottel, the theoretical performances of those collectors were determined.

Kalogirou [10] proposed (ANN) models to predicting ordinary collector equation properties, with and without wind conditions, incident angle modifier properties in longitudinal also crosswise, time constant, stagnation temperature, and capacity. its found that steady-state were preferable.

Fan et al. [11] studied the flow and temperature distribution in a very solar dish panel with an absorbent material consisting of horizontally inclined fins in an associate degree experiment and in theory. The flow and heat transfer inside the collector panel were numerically investigated using CFD calculations. The flow distribution through the absorbent material evaluated by indicates temperature measurements on the backside of the absorbent material tubes, according to an experiment. At high flow rates, their results showed a good agreement between the process Fluid Dynamics (CFD) result and thus the experimental data. However, for low flow rates, huge differences between computed and measured temperatures appeared. This discrepancy was most likely caused by the solar dish model's oversimplification..

So many researches have been conducted in the area of solar water heater in terms of optimization and performance but the problem of improving efficiency has always been the problem because most of the designs were not simulated to certify their suitability before construction. This then leads to making solar water heater with very low efficiency and performance. This work describes an analytical method of modelling and predicting the daily performance of the rmosyphon solar predicament system mistreatment Polysun Simulation package. The program developed for this purpose is but general and may be accustomed predict the performance of system employing a type of data inputs as different options for any given location.

II. POLYSUN SOFTWARE

The Polysun software runs annual dynamic simulations of alternative energy systems and assists in their optimization [12]. The software is easy to use, and the graphical interface allows for precise and direct feedback device. the simulation were assisted by physical systems that performed without the use of empirical terms [13,14]. The defined information is entered in a very simple manner and is drained from ready-made of graphical environment. Additionally, models conducts an feasibility analytical and an ecological balance, which includes emissions from the eight most important greenhouse gasses, allowing the emissions of conventional and renewable energy systems to be compared. Gantner (2000) considered Polysun to be valid, and it was found to be right to within 5–10% [15,16]. The computer code Polysun was chosen for conduct study alternative power systems, with simulation period one minute to an annual simulation.

III. CONDITION SYSTEM

3.1. Load profile

Single-family home is depicted in the case study. The power needed to prepare decent water was 3825 kWh/a. Average daily DHW consumption was fifty liters for human. As a result, the SWH system was found for generate 200 L of quandary in day at 50 °C in a alone family home.

3.2. System configuration

Star thermal power collectors, a circulating pump, vessel, auxiliary source, shut and management valves, and a variable temperature controller make up the system.The most important characteristics of the flat-plate collector in operation. The majority of the system's components are depicted in Figure 2 and are represented below. The eight M2 of flat-plate star collectors, as well as the addition heat supply and a heating 5.0 kW, provide warmth for DHW preparation, as shown in Figure 2. One array is made up of three units of star collectors. Throughout the Gregorian calendar month of August, the total gross space of star collectors was predicted to find about 100 percent coverage to warmth. The star collectors' associate in nursing orientation is to the south. A 25° angle is presumed, as well as a vessel of one M3. A circulation pump with a power rating of 32 W was anticipated. precise rate in solar furnace loop was forty liters per hour per square meter, as shown in table 1. of the extra heater's coil system inside the vessel (layer seventh numeration from the storage bottom). As shown in Fig. 1 and table I, the controller controls the different in temperature for the fresh water end and vessel.

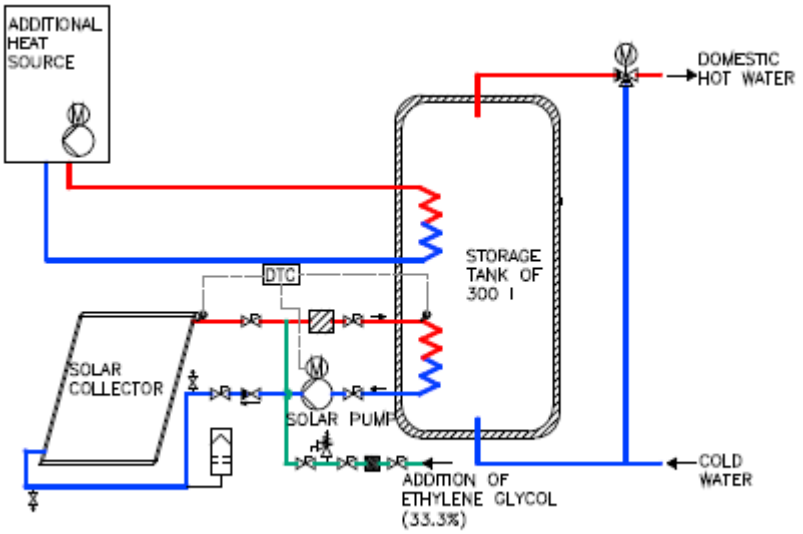


TABLE I

Parameters	Value
Flat plate collector	
Collector area m^2	8
Total absorber area m^2	5
Fluid specific heat KJ/Kg.K	4.19
Collector slope	13
Storage tank m^3	1
Height m	1
Material	Stainless steel
Wall thickness mm	2
Insulation	Foam
Thickness of insulation mm	50

3.3. zone conditions

The maximum temperature in summer is 45 and the winter temperature is 5 5. In Iraq in general. The basic coordinates in Baghdad are (latitude 33.33 degrees north and longitude 44.44 degrees east) as shown in table II.

TABLE II

Month	Temp.(c^o)	Solar Reflection
Jen	13	2
Feb	20	3
March	25	4
April	33	5
May	39	6
Jun	45	6.5
July	50	6.5
Aug	43	6
Sep	32	5
Oct	24	4
Nov	18	3
Dec	12	2

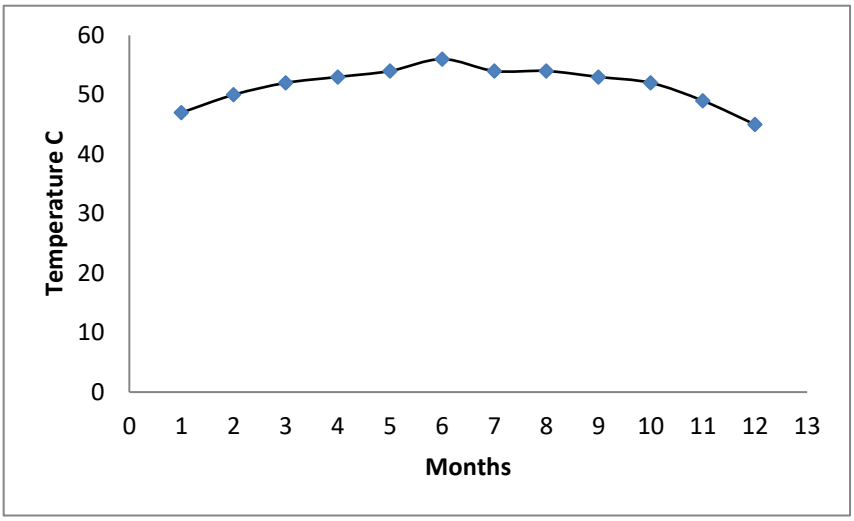
III. RESULTS AND INTERPRETATION

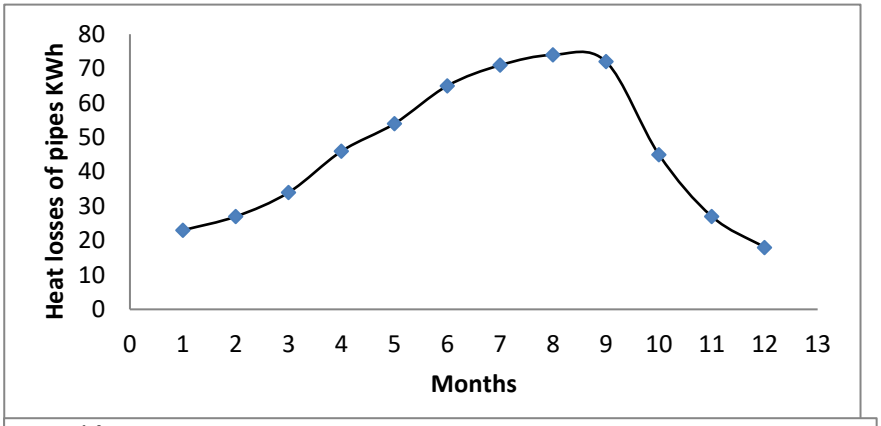
water temperatures among vessel, A standard monthly water temperature was analyzed as in Fig.1 and table III .As could also be seen from Fig.1, A Polysun results only if common monthly water temperature within the vessel is maintained nearly constant and different from forty seven °C to fifty six °C throughout the year. From this results, auxiliary heater was operated plenty of usually to stay up the constant water temperature within the vessel. the warmth losses of pipes and power designed by circulation pump of SC system area unit thought-about throughout study. simulation data area unit among Fig.2. As could also be seen from Fig.2, heat losses in pipes in Polysun found seventy four KWh in August and eighteen KWh in Dec. This distinction looks as a result of high temperatures of the heat-transfer medium among SWH loop. energy demand of the circulation pump of SC, a value found twelve KWh in Jun as shown in Fig.3, the foremost distinctive of the values is as a result of the management of the circulation pumps. The simulation data indicate to annual thermal efficiency on a flat-plate star collectors changes from half-hour to 12 months and agreement with the founds given for completely different authors [17, 19].

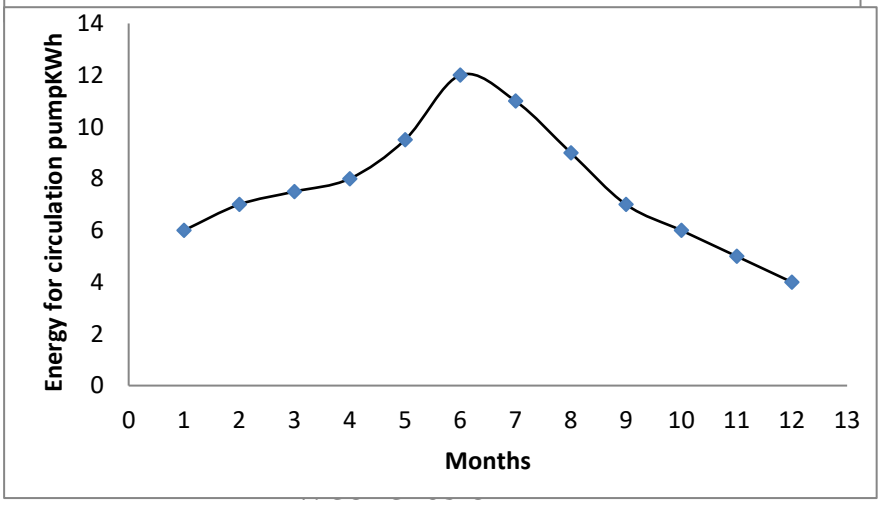
TABLE III

Months	Temperature c^o	Heat losses KWh	Energy KWh
Jan	47	23	6
Fab	50	27	7
March	52	34	7.5
April	53	46	8
May	54	54	9.5
Jun	56	65	12
July	54	71	11
Aug	54	74	9
Sep	53	72	7
Oct	52	45	6
Nov	49	27	5

Dec	45	18	4







Considering the employment of Polysun software system for analysis star DHW utility of one family house in cold climate, the subsequent inferences are often infer:

The primary conclusion from the simulation ends up in this paper is that just about all Iraq cities have substantial potential in applying star water heating systems. The simulations gift the next performance of the star water utility (SDHW) if the domestic quandary consumption is low. The valid Polysun model will predict star thermal systems' performance at numerous locations and conditions of operation.

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