



Modified Solar Air Heater with Three Different Methods

Authors

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Abstract

The use of solar air heater is not limited to a single experiment but this non- conventional source is widely useful in many fields. The application of solar air heater is applied to home, industrial buildings, machines and many other places where the air is heated to get the usefulness of the device.

The advancement is going on in getting the maximum efficiency of the solar air heater device but since limited knowledge of air heating limits the efficiency causing the further study.

Many solar air heaters are produced now a day to get the power output with lower input. Solar air heater is simple or complex based on the application and/or area of the application.

INTRODUCTION

Sustainable energy is the sustainable developments that meets the need of the present without compromising the ability of future generations. Technologies that promote sustainable energy, such as hydroelectricity, solar energy, wind energy, wave power, artificial photosynthesis, tidal power and also technologies designed to improve energy efficiency. Sustainable energy produce some pollution of the environment, as long as it is not sufficient to prohibit heavy use of the sources for an indefinite amount of time. It is also distinct from low-carbon energy, which is sustainable only in the sense that it does not add to the CO₂ in the atmosphere.

Green Energy is energy that is extract, generates, and/or consumed without any significant impact to the environment. The planet has natural capability to recover which mean pollution that does not go beyond capability can still be term green.

Green power is a subset of renewable energy and represents those renewable energy resource and technology that provide highest environmental benefits. The Environmental Protection Agency defines green power as electricity produced from solar, wind, biogas, and biomass and low-impact small hydroelectric source. Customer often buys green power for avoided environmental impact and greenhouse gas reduction benefit .Energy is a basic need to sustain life and development. Energy need in various forms to fulfill daily requirements. Solar energy is available freely and clean source of energy.

1.1- Air Heating With Ventilation

Solar air heating systems uses air, the working fluid for absorbing and exchanging solar energy. Solar air collectors can heat individual rooms or can pre-heat air passing into a heat recovery ventilator or through the air coil of air heat pump.

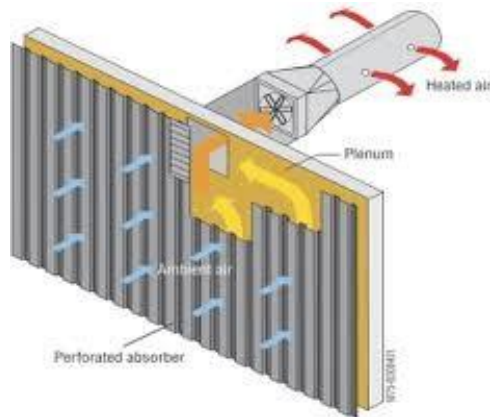


Fig: - Heat Ventilation

Air collectors produce heat faster than liquid systems, so they may produce more usable energy over a heating season compared to a liquid system. Also, a major difference is that, in air systems, minor leaks in the collector or distribution ducts will not cause problems, but they will decrease performance. However, air is a less efficient heat transfer medium than water, that's why solar air collectors operate at lower efficiencies than solar water collectors.

Some solar-heated air passing through a bed of rocks as energy storage, is not recommended because of the inefficiency, potential problems with condensation and the rock bed, and effects of that moisture and mold on indoor air quality.

1.2: Heating Of Room Through Air

Room Collectors have an air-tight metal frame and black-colored front for absorbing heat. Solar radiation heats the plate that heats the air in the collector. An electric fan draws air to the room from the collector and sends it back to the room. Roof-mounted collectors consist of ducts to carry air between the room and the collector. A wall-mounted collector is placed directly on a south-facing

wall, and holes are cut into the wall for the collector air inlet and outlets.

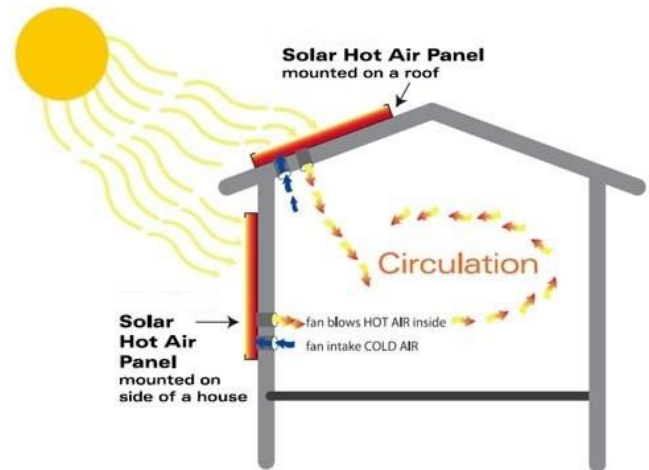


Fig:-Air heat room heater

A simple window box collector is best in an existing window opening. They can be active or passive. In which air enters the bottom of the collector, rises as it is heated, and enters the room. A baffle keeps the room air from flowing back to the panel when the sun is not shining. These systems provide a small amount of heat, because the collector area is relatively small.

Experimental Setup-

Solar Air Heater made by our team consists of a simplest but most effective design. Following are the list of equipment's used in our setup.

Assembly:

Ply box is the structure of solar air heater on which other parts are systematically inserted. Absorber plate is used to absorb the sun light to heat up the air. Aluminum sheet is used to get the maximum efficiency of solar air heater. To cover the device a glass cover is used. Figure:-

S. No.	Equipment	Dimensions	Quantity
1	Thermocol insulation	22mm thickness	1
2	Ply box	1200*600*170mm 12mm thickness	1
3	Absorber plate	30 gauge	1
4	Aluminum sheet	30 gauge	1
5	Glass cover	4mm thickness	1



Fig:- Front View



Fig:- Side View



Fig:- Complete View

Table 1. Single Pass Solar Air Heater

Time(Minutes)	Glass	Between Glass And Absorber	Exit	Inlet	Absorber	Environment	Heat Flux At Horizontal	Heat Flux At Angle 26	Date	Speed At
10:15	63	66	55	40	75	39	1011	987	8/5/2014	6
10:45	73	76	62	42	89	40	1060	1010	8/5/2014	6
11:15	79	82	70	43	97	40	1121	1105	8/5/2014	6
11:45	80	83	75	44	100	41	1206	1151	8/5/2014	6
12:15	86	89	78	45	105	42	1221	1154	8/5/2014	6
12:45	85	88	81	46	105	41	1242	1162	8/5/2014	6
1:15	83	85	81	45	104	42	1248	1188	8/5/2014	6
1:45	71	72	75	44	82	39	810	791	8/5/2014	6
2:15	74	75	76	44	94	41	1160	1080	8/5/2014	6
2:45	77	78	80	45	95	43	961	987	8/5/2014	6
3:1	74	74	80	44	90	41	753	816	8/5/2014	6

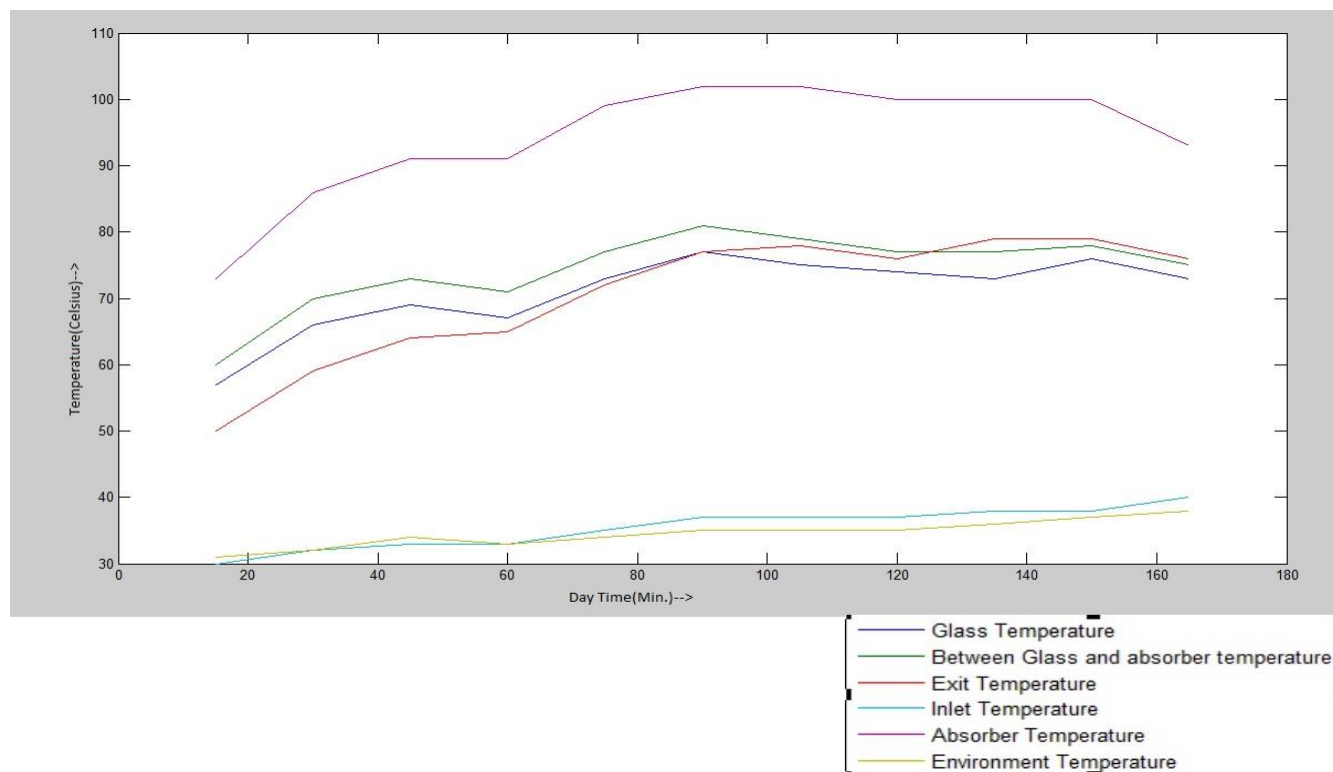


Table 2. Double Pass Solar Air Heater Full Spreads

Date (minutes)	glass	between glass and absorber	exit	inlet	absorber	environment	heat flux at horizontal	heat flux at angle 26	date	speed
10:15	73	76	61	36	84	36	992	872	10/5/2014	5
10:45	77	81	64	39	89	38	1058	970	10/5/2014	5
11:15	80	84	67	37	95	37	1092	1086	10/5/2014	5
11:45	84	88	68	38	99	37	1217	1164	10/5/2014	5
12:15	89	92	72	38	103	38	1284	1262	10/5/2014	5
12:45	88	92	73	39	103	37	1227	1213	10/5/2014	5
1:15	88	91	74	40	102	37	1163	1156	10/5/2014	5
1:45	81	85	72	40	98	40	1109	1122	10/5/2014	5
2:15	84	87	73	40	97	39	1126	1023	10/5/2014	5
2:45	71	75	66	39	83	38	815	874	10/5/2014	5
3:15	66	70	63	38	81	39	860	889	10/5/2014	5

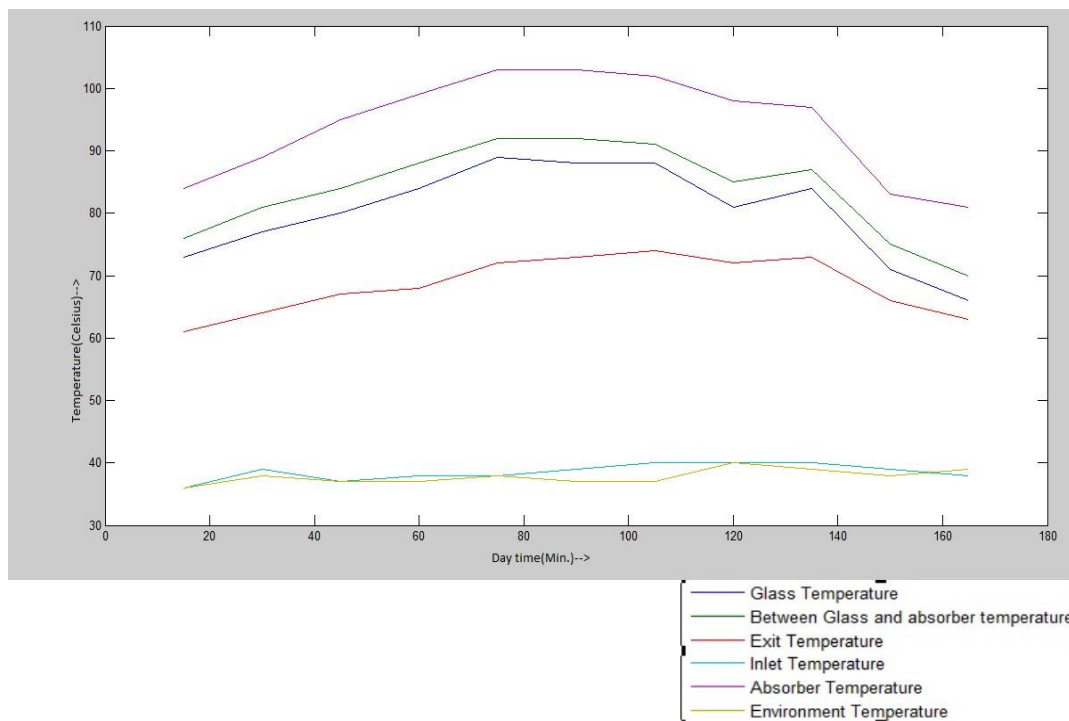
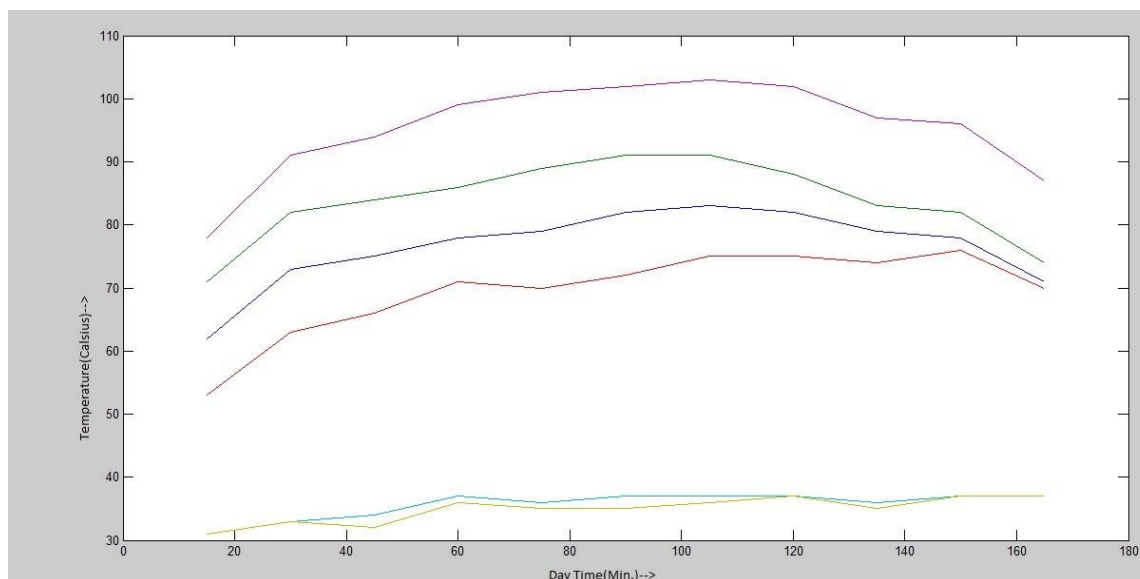


Table 3 Double Pass Solar Air Heater With Rita Seeds

Time (Minutes)	Glass	Between Glass And Absorber	Exit	Inl Et	Absorber	Environ Ment	Heat Flux At Horizontal	Heat Flux At Angle 26	Date	Speed
10:15	62	71	53	31	78	31	1030	914	13/5/14	6
10:45	73	82	63	33	91	33	1138	1068	13/5/14	6
11:15	75	84	66	34	94	32	1226	1104	13/5/14	6
11:45	78	86	71	37	99	36	1336	1275	13/5/14	6
12:15	79	89	70	36	101	35	1245	1178	13/5/14	6
12:45	82	91	72	37	102	35	1198	1173	13/5/14	6
1:15	83	91	75	37	103	36	1226	1230	13/5/14	6
1:45	82	88	75	37	102	37	1182	1168	13/5/14	6
2:15	79	83	74	36	97	35	1134	1126	13/5/14	6
2:45	78	82	76	37	96	37	1029	1044	13/5/14	6
3:15	71	74	70	37	87	37	886	947	13/5/14	6



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