Indoor Applicability of Solar PVT System

Dr.Swati Arora
Cluster Innovation Centre

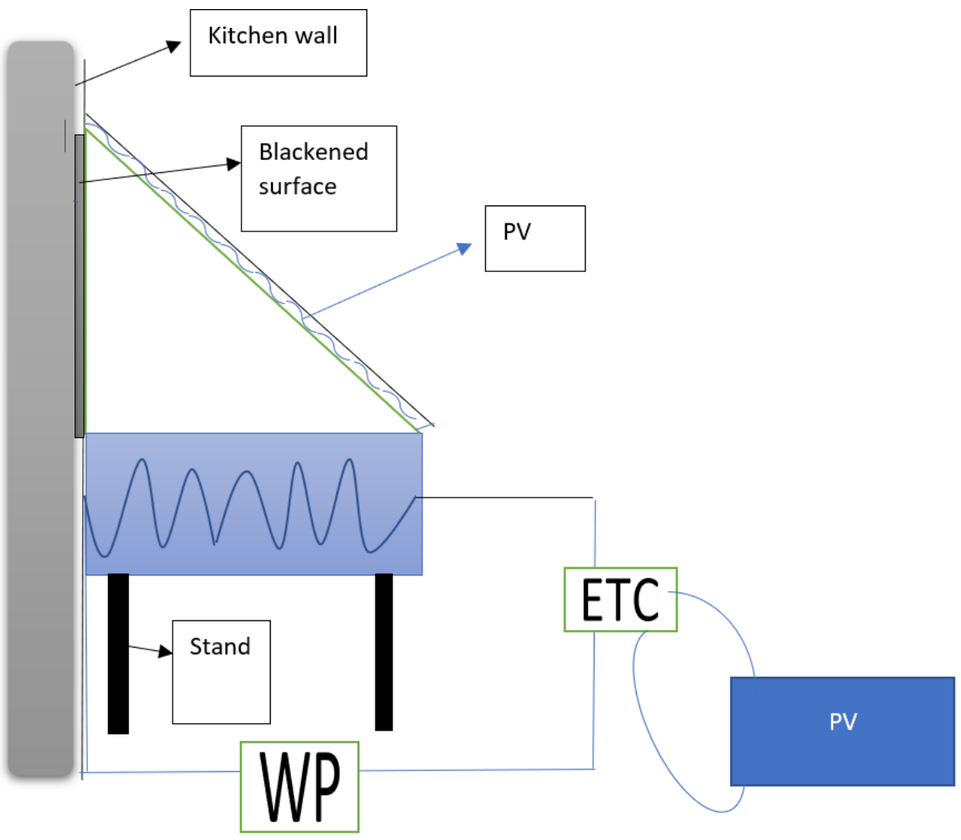
Dr. Harendra Pal Singh
Cluster Innovation Centre

Jatin(12025) | Ojus(12035) | Raman(12044)

ABSTRACT

This paper tries to cover how solar PVT can be implemented in an indoor set up.Some minor modifications in the present models of the solar PVT systems can enable us to use the model indoors.The present models take in use the glass panels with blackened surface,but we will be replacing it with PV modules.Similarly the mounting wall will also be replaced with a blackened surface.We will also be using N series Evacuated Tubular collectors. for make this model fast we have use ETC model , which is connected by PV system . There is a cylinderical coil which is connected by ETC model to heat the basin water.

System Description



Methodology

The main motive of this research is how we can convert tap water into pure form.We have used some instruments in this model like:

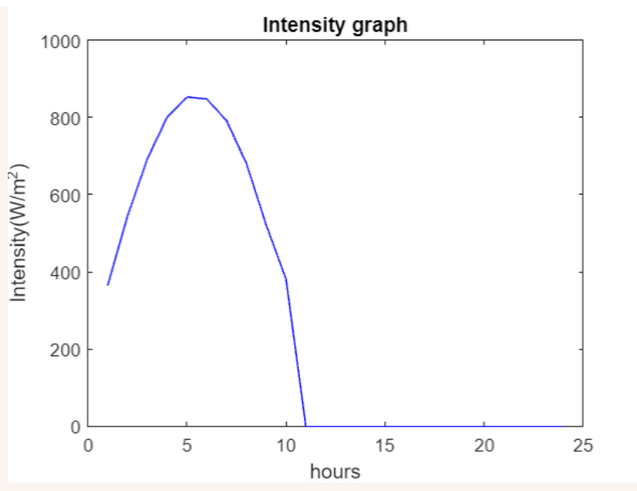
1. A single slope solar distillation system
2. A cylinderical coil which is connected to ETC and ETC is connected to PV(for energy)
3. Blackened surface of kitchen wall where this system is going to fit.
4. PV on the surface of a solar model(replace the glass with PV).

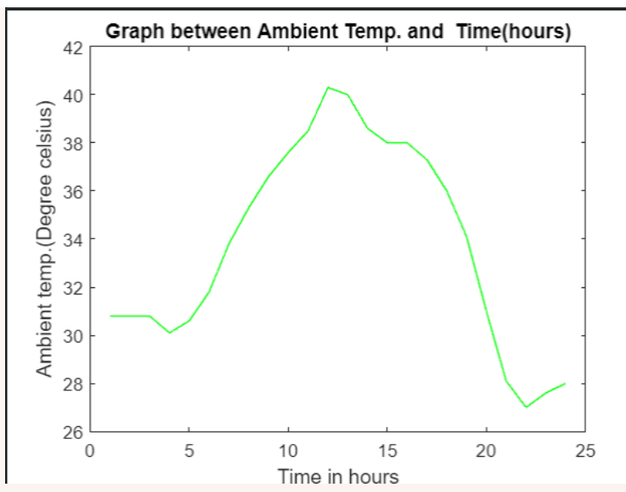
$$T_w = \frac{f(t)}{a}[1 - e^{-a\Delta t}] + T_{bw0}\, e^{-a}$$

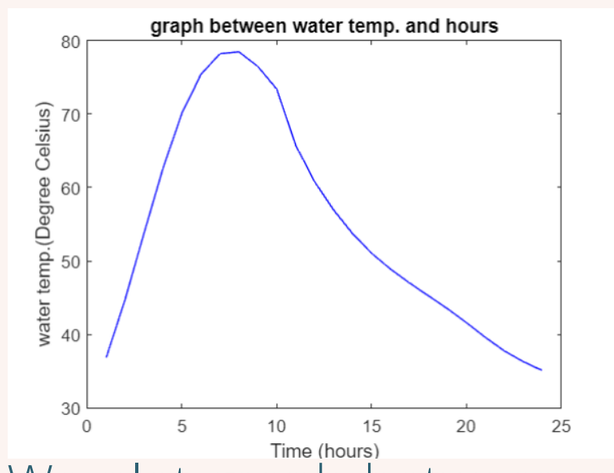
$$a = \left(\frac{1}{M_w C_w}\right)\left[-\left(\frac{h_{bw}^2}{(AH)_1}\right)A_b^2 + h_{bw}A_b + h_1 A_m + (UA)_{SL} + \dot{m}_f c_f - \frac{(\dot{m}_f c_f)^2}{(AH)_3} - \left(\frac{h_1 U_{bc,w} A_m}{(AH)_2}\right)\right]$$

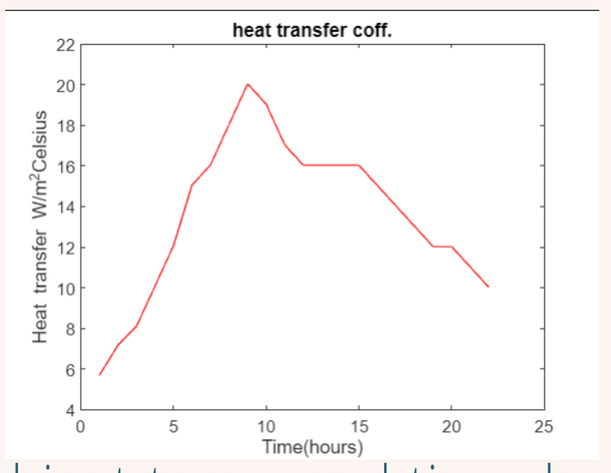
$$f(t) = \left(\frac{1}{M_w C_w}\right)\left[\left(\frac{h_{bw}}{(AH)_1}\right)(J_1 + J_2) + \frac{(\dot{m}_{cond})L_v}{(AH)_3} + T_a\left[\left(\frac{U_{ba}U_{bw}A_b}{(AH)_1}\right) + (UA)_{SL} - A_{cond}U_{tcond,a} + (A_m U_{tc,a})\left(\frac{h_1}{(AH)_2}\right)\right]\right.$$

Result & Discussion









We plot graph between ambient temp. and time. by observing them we can predicit that the final energy will touch peak in noon. We plotted the graph for basin water with time and made the following observations. The result was that the final basin water temprature peaks at around 1 o clock and then decreases.

Future Work

The main aim in our future will be to improve the efficiency of our model. And we also want to reduce the overall cost by doing cost analysis and introducing different nano-fluids(CQD and CNF) in the basin water.

References

https://www.researchgate.net/publication/326523554_Effect_of_optimized_metallic_nanoparticles_on_the_thermophysical_characteristics_of_hybrid_double_slope_solar_still_A_critical_analysis

https://www.researchgate.net/publication/334725794_Performance_and_cost_analysis_of_a_modified_builtinpassive_condenser_and_semitransparent_photovoltaic_module_integrated_passive_solar_distillation_system