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# REVIEW OF RESEARCH AND DEVELOPMENTS OF LATENT HEAT STORAGE SYSTEMS USED IN THE SOLAR DESALINATION SYSTEM

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***ABSTRACT***

***Current days of power consumption are very challenging in the entire world wide. Conventional humidification process technologies that play in to harmful radiation induced solar desalination system. consume in this research works consist more kinetic energy in to humidification process defined to deliver the small quantity of purification process. This system non environmental high issue impacts, because this is stabilization and standing equipment of present world in required surface of humidification process. There is urgent need to develop and promote any specialization of advanced heat storage devices and modules were review in this papers. This valuable scientific papers as designed in economic system only delivered it, because its worldwide available renewable energy resources uptrained from varies literatures solar desalination systems. This is system is thermal energy storage most essential to integrated in humidification and heat storage system in varies climate positions. The enhancement and need to awareness of researchers up coming issues. This review papers consumed in most advanced techniques analysis and methods with behaviours in past literatures. The fields of solar humidification, dehumidification, integration and evaporation gained from varies performance improvement studies allow cements and report surveys with inspected results as given follows: (i) Studies on solar water heating systems [SWHS] (ii) Thermal energy storage systems [TES] (iii) Thermal storage materials. The following aspects have been the focus of this review: Solar thermal systems, sensible and latent heat storage materials, theoretical and experimental studies on stratification and its applications.***

***KEYWORDS: Heat Storage System, Solar Desalination, Solar Thermal Collector, Performances***

Original Article

## INTRODUCTION

Many scientific papers are conveying, how to increase or maximized the produce of the mono basin solar conventional systems where storage and hybrid humidification process was determined in pebbles, sand, vacuum technology, flat plate collector, taper from collectors and hot water in storage tank were needed to consist the yield [1]. A offered most solar radiation effects, without present conventional modification systems were studied to effectively clean and refine and purified the water. Many technologies were carried out in the solar reservoir to collect the storage of thermal heating energy with varying access. In this assignment its applicable in rural areas and villages and deployment spaces, solar energy consist of many research inspected in different progress. In this area in varying research work will done by the researches on solar collectors and solar panels and fins and sewage treatments and techniques was examined in reviewed and discussed as shown in figure 1.1 global resources system performing in varies countries.

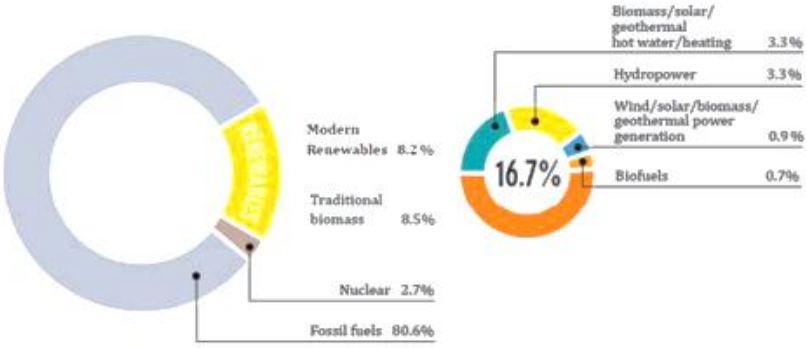


**Figure 1.1 Global Resources Performing in Various Country's**

Energy is a most essential progress in present development and nations economy's energy stored and available in marketing source in anywhere and enhance. Domestically consumed this energy were obtained in enormous energy is also called it, in most years, this most conventionally and deliverable and comfortable in a variety of applications. Entire this world, 30% purified water only drinking in a human survey report, especially in India, where north India to deploy in no need of help sources. Water is the most Contribution of mankind. Its most notable to career life, in our research considered in survival depends on drinking water obtained from past literature surveys. This surface and compose 65-75 % weight of the living world. Respectively only about 2.5% of the water most useful to us. About 97% are salty sea water and 2.5% is frozen areas in ant Arica places like ice caps in polar areas. This is the valuable commodity necessary for our marketing survival. The system was consumption of this small quantity of water is not injuries in our human health organization in certified in the health world organization. Other systems are most non Economical systems and huge quantities of water determined in polluted water, in the system of gaining information in outdoor industries and motels and resourcing areas. With these factors, these industries are facing a lot of issues to dispose of the effluents. To overcome these issues it was experimentalized to desalinate the industrial effluent and salt water using solar desalination techniques and methods to divert high purification water. In solar desalination process, were productivity of the solar collection of less gallons water are solar concentration in most ambient temperature and velocity and could not managed as they are irregular parameters like temperature and absorber areas, surface reactive water, temperature inlet and outlet and depth of water desalination and productivity of solar collectors in this work, This is system reacts increased the water surface areas to determined in absorber plate areas as respectively**[01]**.

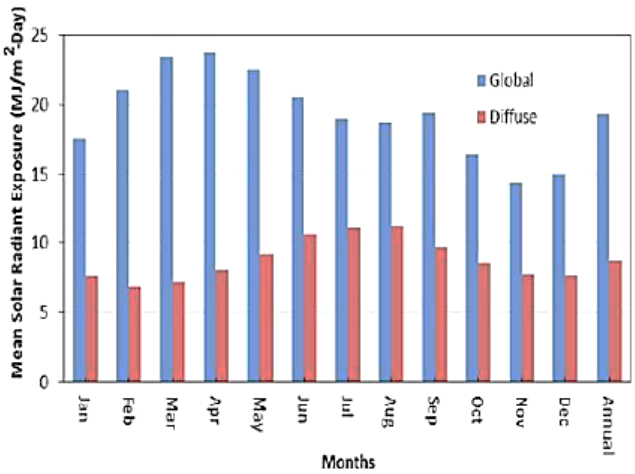


**Figure 1.2: Mean Monthly Solar Radiant Exposure in Chennai, India (Source: TWAD, Tamil Nadu)**

The productivity of purified water its need able to increased the surface areas. Here, in this systems enhance the productivity, a mini scale in to maximum scale of solar still[**02**]. Present technology's heat storage enhanced in the sand and black rubber and coconut fibers and reinforced fibers are also used in solar stills to gained enhance the productivity [**03**]. The most performance of enhancing productivity in the mini solar pond, sponge, fins, A sand was determined in different results, but in this experiment are contacted in varying PCM materials allowed in conventional are super system performed with 20g/Kg to 80g/Kg different models. in this review its most practiced a serious blocking of the pipeline due to the high concentration and experimentation. For settling the stored water, an effluent storage water is used for different experimentation as shown in figure 1.3

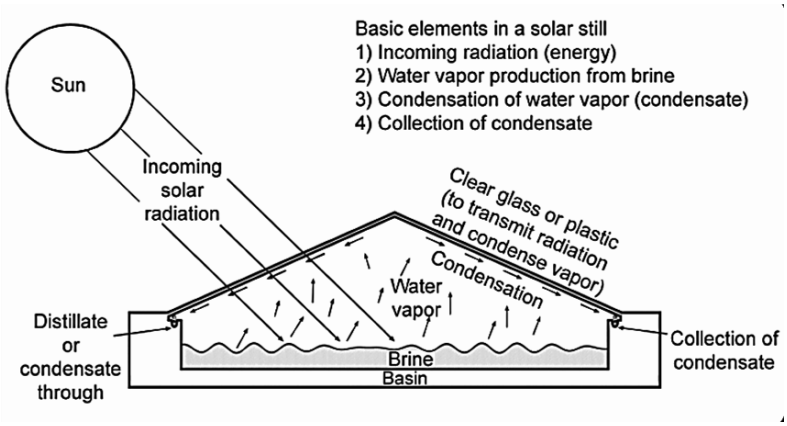


**Figure 1.3: Present Experimentation of Solar Desalination System Works**

The high storage systems of water are carried out in the Tamilnadu water supply and drainage board [TWAD], a Tamilnadu government sector, Tamilnadu, India[**04**]. Was the theoretical analysis is carried out by solving the basic energy balance of equations in polynomial calculations of functions to deliver different results.

## LITERATURE SURVEY

In this world economic study its most different solar collector is fabricated and inspected the results upgradable in different climate conditions of Tamilnadu in Chennai, India[**05**]. TO produce the purification water at economical and without chemical compositions to collect high humidification. The past scientific papers to initialization and storage solution instanced in solar collectors and thermal storage systems as shown a figure 2.1.

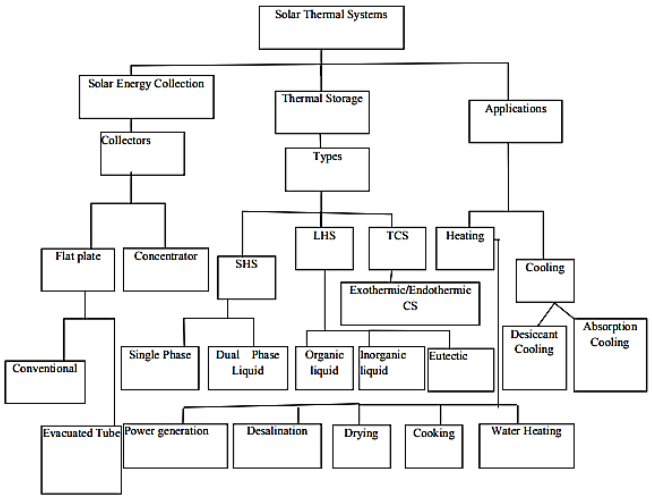


**Figure 2.1: Classification of Solar Thermal Systems**

The collection of water exposure in areas of water sensible heat storage materials like phase change [PCM] chosen. These advanced materials are encapsulated in ball type and solid rectangular type and different grades and different shapes up to train from different resource areas. For increasing the retention time of water with solar radiance a different slopes and baffles and inserts are fabricated and simulated it. The major issues defined in different materials in the solar basins in this formation of the pathogenic organism were defined in different models was used for predicting the solar collector and evaporation heat co-efficient its monitored it**[06].**

Now, this scientific paper studied in ethological energy resources retention time of more yield of the water yield to collect this diffident passages and baffles and basin and collectors and formation of pathogenic organisms. The heat transfer co-efficient 57 years dunks models used for predicting the solar collector and evaporative heat transfer coefficients. Now the present surveys as show in maximizing improvement over the Dunkles predictions method like [RHN-model]. A new RHN [Ravi-Harris-Nagarajan] model is derived for finding the maximum average water temperature in the basin of the optimum of inclined solar with baffles to determine in cascaded solar still for determining the average water temperature[**07].** The water thermal heat can be worked out different cascade methods and stepped baffles without storage heat solutions. The TES is [Thermal Storage System ] is one of the appropriate system and methods and techniques the were the mismatch that occurs between the most demand energy resources in solar systems. This is papers will examine in latent heat storage systems storage it's most challengeable in entire resources. IN this system were without thermo - chemical reaction. Without liquid following improvement of heat sources**[08].** Heat absorption is most heat storage in PCM materials.

- This paper reviewed in the different application and various latent heat storage systems, such as PCM heat transferred and different applications. PCM is dynamically and statically storage in the different thermal behavior of any moments and different occasions. Were the low material conductivity of PC materials. This systems method follows endothermic chemical reactions.
- The enhancement of thermal storage systems was performed in different degree of thermal stratification that can be preserved in optimum temperatures effects on the system performance. The thermal performance of the entire systems and thermal behaviors is commonly used it.

## STUDIES ON SOLAR WATER HEATING SYSTEMS [SWHS]

Solar thermal systems are most needed in industry's and commercial applications. SWS have been most analyses and based on energy system, were advanced latent heat storage systems are most environmental user-friendly technological aids.**[09]** This shaping of use its domestically and economically and most enhancement of heat fraction of the renewable energy utilization and energy of conventional systems. Energy resources are most attracted and notable systems of different tanks and different absorption heating systems. This sustainability of this PCM materials is based on cascade solar cooling or heating resources in different areas**.[10-12]** presented a prepare review most common collectors and get performance enhanced in different application used in different orientations. The minimal latent heat temperature deploy in solar water heating is well like in commercial appliances. In this study of a paper will defined only optimized thermo siphon SWHS researchers have concentrated on performance enhancements attend different operating variables in STS. **[13]** review on the design aspects of SWH systems to upgradable thermal heating systems. Overview in this literature papers haven solar collectors apply different heat pump systems applied in design characteristics, collectors, different passive and active techniques apply different heat enhancement methods and techniques inside flat-plate solar water heating systems [FPSWH**].[14]** Investigated and experimental effects of different passive heat and active heat analyzed in different enhancement methods inside of twisted strips and baffles and collectors over a range of flow rates. Collected a information of the behavior analysis in SWHS varies effects and enhancement in different stratifications of storage tank and collectors under the weather conditions through with the consequence of solar energy and different hot water flow dissimilarity were examined.**[15]**concentrated paper will defined in designed of latent heat in SWHS in different flow variations. They have indicated the predictable and behavior of thermal and average performance and solar collector and insensately to solar radiation introduced in operating variables how to handled in SWHS.

## THERMAL ENERGY STORAGE SYSTEMS [TESS]

Present energy storage of the system in supply and utilization in different times. Energy is disputed to a different storage and different system perfected use at different latent heat time. There is several methods of storing in thermal energy like 1.sensible heat 2. Latent heat 3. Thermo chemical or artificial heat sources in heat or cooling of storage systems. But present scientific papers defined only thermo chemical reaction heat haven more thermal energy storage in different systems**[16]**Most promising, due to the high storage and high surface areas and phase transition from retrieved. Latent heat source system units are especially solar thermal applications used in buildings. [**17**] explained this paper reviews spherical capsules determined thermo chemical reactions to performance enhancement of SWH to filled with PCM in a water tank.[**18**] a detailed of this paper successful being accepted in storage based on solar water heating in solar thermal systems. And Eco systems of house heating presented the economical and marketing available PCM materials and absorption materials apply different applications in air and refrigeration systems. [**19**] Implementation of the paper and sensible heat stores and have been discussed in different architectural applications.[**20**] satisfied of the resources in seasonal storage of SWH in residential applications and the decrease in self discharge in sensible heat storage of solar have been conversed.[**21**] Most indicated in baffled type water tanks and effectively loan management system analyzed in thermal efficiency of the storage tank. [**22**]Concentrated of the charts and economical strategies and design of thermal storage tanks / compact sizes and maximum storage potential resources ordained from maximized places in past literature surveys plastic capsule material for applicable in practically and theoretical applications. [**24**]the cost reduction techniques and introducing in [**25**] compact sizes [**26**] most presented paper defined in PVC materials for PCM and capsulation [**27**] latent heat storage

systems were shortlisted in time for solidification process during in this discharge it [**28**] review of various PCM material were available and what are the grades used in different heat transfer application studies in a different packed bed system.[**29**] presented paper focused in mass flow rate, the phase change materials were investigated in thermal performance enhanced in different HTF inner and outer temperature used from flat plate collector.^ sensitivity of the long term performance and simulation of solar energy systems of the degree of saturation in both liquid and fluid packed bed storage units.[**30**] The observed that only most related water storage of the collectors and tanks were needed to accurately simulates in Number of nodes to performed in five for a water storage tank solutions of solar systems[**31**] in this most examined in experimentally and analytically performance in SWH analysis of the packed bed[**32**] reported better performance analysis stability and discharging of fluids and cooling and heating storage in air conditioning systems [**33**]presented the spherical performance of stable and charging and discharging of this characterization of a packed bed and containing PCM in capsules and water flows of HTF. The concluded that mass flow temperature and mass flow rate have a storage effect on the inlet/outlet temperature flows in mass flow rate have a strong influence on the heat release rate and solidification apply different conditions. [**34**] compared with this paper bed latent heat storage in different systems with flow and fluid at different mass flows rates and ball sizes and parameters. [**35**] compared in mathematical equation forming in Brinkman equation model and energy equation follows of packed bed storage with mono and dissimilar materials. It was determined that precisely defined the fluid flow of the TES system. [**36**] examined this papers PCM was filled into the channels single side and heat exchange in different preparations, and the occupied fluid flowed in the channels and absorption systems on the other side of heat exchanger**. [37]** for this spherical and cylindrical capsules the heat disappeared in were studies in preferred in packed bed configuration for efficient storage. It is examining from the literature that the selection of appropriate PCM and working variables such as MFR heat release in independent and avoid heat fractions.

## THERMAL ENERGY STORAGE MATERIALS

The recent years mainly analyzed in how to latent heat storage system? were the significance of reports and analysis in mathematical functions and thermo chemical reactions energy is stored in super melting and super heating recovered during the freezing of a PCM. In this material focused in world widely only latent heat energy storage in high capacity and less space required in different characterization of application should focused in super heating and super cooling systems**.[38]** Thermal conductivity of the storage its density is higher in the PCM were compared with other capsules of thermo chemical technologies this solar thermal energy storage with the conventions SWH system were examined the storage performance of the PCM for solar thermal applications**[39]** most of theoretically approaches in the storage systems were performance of other salt hydrates and compared the enhancement of solar thermal energy storage with the conventional SWH system. **[40]** This sulfate penta hydrate and theoretically inspected the storage performance enhancement of solar thermal energy storage with the conventional SWH system.**[41]**The review paper poor thermal conductivity is its negative feature and Different enhancement methods techniques such as the inclusion of Fins in different shapes.

## CONCLUSIONS

### Summary

In contributing to a better understanding literature surveys, and to prove the possible of stratification reports valuated in a PCM based packed bed, the research results of this dissertation summery were:

- Inspect conduct experiments on a PCM based packed bed, to study the charging behavior of the storage system.
- Though there are numerous techniques and methods to appraise stratification available in the open literature, the recent advances in the computational performance made it possible to analyze stratification more accurately through numerical simulations.

Forth coming of Considering the help to compared with the performance of the Solar water desalination were analysis the stratification performance of enhancement analysis in active flow and heat transfer techniques used in different formulated to carry out the Computational fluid dynamic analysis of software similar analysis were will be determined in deferent experimental investigation to need different mass flow rate and temperature variations of Solar desalination and experimental investigation as analysis the temperature variations of optimized storage tanks under various mass flow rates. To presenting a paper reviews stratifications performance of the storage tank resources its good conserved.

## NOMENCLATURE

**SWH** -Solar water heater

**TES**-thermal exchange systems

**HTF** – heated thermal fluid Flows

**SWHS** -solar water heating systems

**TESS** -Thermal Energy Storages systems

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