



# Low indoor temperature without solar energy

In the interest of enhancing the indoor thermal conditions of rural buildings without significantly increasing heating energy costs for heating, certain researchers have proposed a composite of the traditional Kang surface with the low-temperature hot water system [20]. This system includes low-temperature pipe placed on top of the Kang surface to fulfill the ...

This difference plays a major role in answering the question of whether or not solar panels work less at certain temperatures. The Science of Solar Energy Conversion. The number one (often forgotten) rule of solar ...

TERI - Guidelines for Solar passive design for new buildings. Geetha, N., & Velraj, R. (2012). Passive cooling methods for energy efficient buildings with and without thermal energy storage - A review. Energy Education Science and Technology Part A: Energy Science and Research, Vol 29- 913 - 946. Bansal NK, Hauser G, and Minke G. 1994.

Introduction. Passive cooling is an approach that makes use of the building design and materials to keep a comfortable temperature inside buildings without mechanical or electrical devices. Instead of these it relies on natural heat transfer mechanisms, such as conduction, convection, and radiation to remove heat and maintain comfortable indoor temperatures.

Prior studies on the indoor thermal environment were mainly about the relationship between thermal comfort and thermal factors including temperature [11, 12], humidity [13, 14], and airflow [[15], [16], [17]]. Moreover, some research focused on the performance of occupants in different indoor thermal environments through field investigations and chamber ...

Cold indoor temperatures are often a consequence of outdoor temperature, structural deficiencies, including a lack of insulation and airtightness, and lack of heating. As outlined in ...

In 1970's, where the indoor photovoltaics were in budding stage, amorphous silicon was used in solar cell to harvest indoor light energy to power devices like calculators and watches Hamrick [70]. But the PCE was poor and the production cost was high. Keeping this in mind, researchers were forced to deviate their attention in developing low cost, efficient and ...

However, the data collected only demonstrates a comparison between outdoor and indoor temperatures, rather than an indoor temperature decrease between buildings with and without passive strategies. The researchers found that the indoor air temperature in summer was around 31 °C, while outdoor temperatures exhibited a diurnal variation of 15.7 ...

The combined effect of outdoor air temperature and solar energy intensity on indoor temperature field were ... i.e. with and without solar energy must first be obtained according to Eqs. (1), (2), (3). The time series of the



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general outer surface temperature of the south wall,  $T_{ge,e}$ , including  $T_{none,e}$ ,  $T_{cloudy,e}$ ,  $T_{sun,e}$ , are presented in Fig. 5 for no ...

As buildings are constructed by low-income residents without professional guidance, this study aims to investigate the indoor thermal comfort and energy resilience of ...

At night, the wall slowly releases stored solar energy into the room through heat conduction and natural convection, thereby raising the indoor temperature. Experimental studies have shown that retrofitting a residential unit in Egypt can raise the average indoor air temperature by about 3 °C on winter nights [13]. The Trombe wall is a low ...

On one side, the capacity of the world's photovoltaic (PV) systems is experiencing unprecedented growth; on the other side, the number of connected devices is rapidly increasing due to the development of advanced communication ...

The results of this study indicate that constructing a green energy roof can decrease indoor temperatures by 1.5 °C and solar module temperatures by 1.6 °C while ...

Using solar energy for space heating is an efficient and simply way to satisfy the energy demands of buildings. In this study, a typical office building is selected as a case model to obtain indoor air temperature characteristics with dual heat storage devices. By analyzing our solar heating system, a mathematical model of the system working process is ...

Currently, energy harvesting elements are a fundamental part for supplying energy to independent devices or systems, besides being an ecological option for the environment, for this reason energy harvesting systems are required in IoT [6, 12, 17, 20]. Nowadays there are several known techniques for energy harvesting [18, 19, 22], the most ...

2 Solar Energy Research Institute, Universiti Kebangsaan Malaysia 43600, Bangi, ... At cooler indoor temperatures, 26 °C, no external cooling is required, only passive, while at higher temperature, 30 and 35 °C, external cooling sources are required. Moreover, they found that a complete solidification of the PCM plates can be achieved within 12 h (nighttime ...

Photovoltaic cells have recently attracted considerable attention for indoor energy harvesting for low-power-consumption electronic products due to the rapid growth of the Internet of Things (IoT).

First-time report about the application of the low-temperature nanoparticle NiO HTL for indoor perovskite photovoltaics. o Direct comparison of two NiO HTL types for low-light perovskite solar cells fabricated with the high-temperature combustion method (300 °C), and low-temperature deposition from nanoparticle dispersion (100 °C). o Determination of ...



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For improving indoor thermal comfort of Tibetan, an active solar heating system which consists of 7 sets of tandem solar water heaters with 30 glass evacuated solar ...

Efficient indoor p-i-n hybrid perovskite solar cells using low temperature solution processed NiO as hole extraction layers Lethy Krishnan Jagadamma, Oskar Blaszczyk, Muhammad T. Sajjad, Arvydas Ruseckas, Ifor D. W. Samuel\* Organic Semiconductor Centre, SUPA, School of Physics & Astronomy, North Haugh, St Andrews, KY16 9SS, United Kingdom E-mail: idws@st ...

Thermal comfort in indoor environment: Effect of the solar radiation on the radiant temperature asymmetry. Solar Energy, 144: 295-309. Article Google Scholar Meggers F, Guo H, Teitelbaum E, et al. (2017). The Thermoheliodome--"Air conditioning" without conditioning the air using radiant cooling and indirect evaporation.

The main difference between the new solar energy system and the traditional solar energy system is that it can work at low temperature up to 70 C o, and the requirement for a heat source is greatly reduced, which is very conducive to large-scale popularization. In this research, the best parameters of each part of the system were obtained through experiments, ...

Even though, solar panel manufacturers and installers apply mechanisms to prevent solar panel overheating, in extremely hot conditions, the energy output of solar panels might decline significantly. In summer 2017, The Times published an article discussing the problem of Qatar being too hot for photovoltaic solar panels .

Therefore, the temperature difference between indoor and outdoor is very small, making it difficult to fully demonstrate the thermal performance of energy-saving materials; 4) There are few studies on reducing the indoor temperature and maintaining this low temperature in reduced-scale building models at a low cost; 5) Lack of accurate modeling and ...

Inspired by the solar-driven chimney effect of Trombe wall, we propose a novel passive ATB concept that can significantly reduce the power consumption of ventilation during thermal storage and release and, moreover, ...

On April 25, namely the day with the highest temperature, the green energy roof maintained the indoor temperature to as low as 30.99 °C, which was 1.0-1.5 °C lower than those under a solar ...

This study focused on the effect of glass structures of modern architecture on the indoor thermal environment during summer. In particular, this study examined how solar radiation significantly altered people's thermal sensations. Laboratory tests on convection-radiation air conditioning systems were conducted, encompassing 12 different ...



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According to the RENEWABLE 2020 GLOBAL STATUS REPORT [1], Off-grid solar solutions accounted for nearly 85% of distributed renewable energy in the global energy access system 2019, the off-grid solar system market grew by 13%, the highest growth in the past five years, with sales totaling approximately 35 million units (Fig. 1).Solar heating and ...

Aluminophosphates (AlPOs) and silico-aluminophosphates (SAPOs) with a moderate hydrophilicity could exhibit a distinct S-shaped water adsorption isotherm that is featured by a surge of water uptake within a small temperature or pressure swing. 52, 53 These zeolite-like molecular sieves have a low desorption temperature (60-90°C), which enables ...

An Indoor Solar Energy Harvester with Ultra-Low-Power Reconfigurable Power-On-Reset-Styled Voltage Detector Xiaodong Meng\*, Xing Li+, Yuan Yao\*, Chi-Ying Tsui\*, and Wing-Hung Ki\* \*The Hong Kong ...

The proposed modularity radiant system can satisfy the heating demand of low-energy buildings and the indoor thermal environment can meet the thermal comfort standard that the operative temperature can reach 21 °C, the vertical temperature difference below 3 K and the radiation asymmetry below 4 °C. In addition, modularity radiant heating significantly ...

With the emergence of low power-consuming wireless protocols used in IoT ecosystem including RFID tags, long-range radio (LoRa) backscatter, passive Wi-Fi, Bluetooth low energy, ANT, and Zigbee (6, 12), powering such IoT devices by harvesting indoor light via IPV cells is becoming possible.Specially, 10 cm 2 IPVs with an indoor PCE of 15% under 1000 ...

Determine your IECC climate zone. Implement passive and low-energy cooling strategies appropriate for your location, as recommended on the Climate tab of this guide for each climate region.

The current revolution in communication and information technology is facilitating the Internet of Things (IoT) infrastructure. Wireless Sensor Networks (WSN) are a broad category of IoT applications. However, power management in WSN poses a significant challenge when the WSN is required to operate for a long duration without the presence of a consistent power ...

3 The perspective of solar energy. Solar energy investments can meet energy targets and environmental protection by reducing carbon emissions while having no detrimental influence on the country's development [32, 34] countries located in the "Sunbelt", there is huge potential for solar energy, where there is a year-round abundance of solar global horizontal ...

Low-energy process for high-performance solar cells. ScienceDaily . Retrieved October 25, 2024 from / releases / 2024 / 05 / 240507150043.htm

By relying less on mechanical systems, buildings can significantly reduce energy consumption, lowering



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utility bills and decreasing demand for non-renewable energy sources. Improved indoor comfort: Passive solar design promotes a comfortable indoor environment by maintaining stable temperatures, reducing drafts, and providing ample natural ...

Solar energy has gained prominence over recent years as an alternative energy source for developing countries. It is estimated that the solar radiation flux in the sunniest region of the earth is about 1 kW/m<sup>2</sup>, the total global solar radiation per day is about 7 kWh/m<sup>2</sup>, and the total amount of solar energy received on earth is approximately 1.8 · 10<sup>11</sup> MW [4]. ...

Recent research showed that the application of passive envelope measures can effectively improve the thermal performance of building envelope and reduce the demand for ...

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