



Solar energy in residential buildings



Overview

Author links open overlay panelJinqing Peng, Jinyue Yan, Zhiqiang Zhai, Christos N. Markides, Eleanor S. Lee, Ursula Eicker, Xudong Zhao, Tilmann E. Kuhn, Manajit Sengupta. Energy consumption in buildings has been steadily increasing and contributing up to 40% of t. Solar photovoltaic and/or solar collector products can integrate with building envelopes to form building integrated photovoltaic/thermal (PV/T) systems, which can provide both. At present, in order to reduce building energy consumption and achieve the goal of building sustainability, many scholars have proposed concepts such as ultra-low energy buildings. The papers in this special issue described the state of the art of almost all fields of solar energy utilization in buildings, including solar PV generation, solar thermal for heating, hybr. The guest editors would like to express our gratitude to the publication team of the Journal of Applied Energy for their kind support and help in the organization and publication proce.



Article Content

Application of Photovoltaic and Solar Thermal Technologies in Buildings ...

The utilization of building-integrated photovoltaics (BIPVs), which are solar power-generating systems incorporated into buildings, has become increasingly popular as a ...

Solar Energy and Net Zero Buildings: Achieving Sustainable ...

The versatility of solar panels extends to their suitability for a wide range of building types, from residential homes to commercial structures and large industrial complexes. ...

Solar potential in urban residential buildings

To investigate solar contribution to energy demand of the building, electrical, thermal and total energy demands of urban residential buildings are summarized in Table 1. ...

Energy use in residential buildings for sustainable development: ...

This research focuses on achieving sustainable development in residential buildings with energy use. Under the influence of the energy crisis and related problems, ...

A review of solar chimney for natural ventilation of residential and ...

One of the promising applications for cooling residential buildings is the solar chimney (SC) that is particularly convenient for hot and humid climates. The solar chimney is a natural draught ...

Assessment of building energy performance integrated with solar ...

Additionally, the energy efficiency label for residential buildings was also launched in 2019 by the Bureau of Energy Efficiency (BEE) to create a market-driven ...

Solar Energy and Residential Building Integration Technology and ...

The application of solar energy and building integration technology in residential buildings, mainly has three aspects: solar thermal technology, solar photovoltaic tech-

Evaluating the potential energy savings of residential buildings ...

Moreover, in KSA, the solar energy on-roof PV system is investigated to fulfill partial energy needs in the residential buildings that may reduce GHG emissions. However, the ...

Solar Energy and Residential Building Integration Technology and ...

residential buildings, to maximize the use of solar energy and provide new ways and means to the residential facade design, and achieve the aim of multi-purpose as

Net-Zero Energy Assessment of Multistoried Residential Buildings ...

Table 4 outlines a net-zero energy assessment for multistoried residential buildings across scenarios A, B, and C, considering annual energy consumption and onsite ...

Evaluation of solar energy potential for residential buildings in ...

To bridge these gaps, this study proposes a parametric approach by randomly generating the parameter-controlled 3-dimensional (3-d) model database to evaluate the solar ...

Solar energy systems potential for nearly net zero energy residential ...

In the case of solar combi systems, payback period ranges between 5.5 and 6.5 years when compared with a conventional fuel oil heating boiler and 9 years when compared ...

Solar energy systems potential for nearly net zero energy residential ...

The building sector represents one of the biggest energy consumers in the European Union (EU), accounting for more than 40% of final energy consumption ...

Solar energy for low carbon buildings: choice of systems for

The performance of photovoltaic (PV) and solar collectors are compared in meeting the heating and cooling demand of a residential house using 100% solar energy ...

Residential net-zero energy buildings: Review and perspective

Qerimi et al. simulated applying solar thermal collectors citywide to buildings in Kosovo and reported a solar energy fraction of 51%–70% and a payback of 9.6 years for ...

Solar energy for low carbon buildings: choice of systems for

Solar application in buildings is limited by available installation areas. The performance of photovoltaic (PV) and solar collectors are compared in meeting the heating and ...

Integrating Solar Energy Into Building Design In 2023

Aesthetics: Solar panels can be included into a building's design as a stand-alone element or as a component of the façade. They can thus serve both practical and ...

Solar Energy and Residential Building Integration Technology and ...

of solar energy, the economic benefits that generate from its energy conservation, environmental protection, safe and efficient will become increasingly apparent. 3. Application of Solar Energy ...

Energy use in residential buildings for sustainable development: ...

From the building aspect, buildings were responsible for 34 % of energy demand globally and 37 % of energy and process related CO₂ emissions in 2021 .Even under ...

Solar Energy Systems Potential for Nearly Net Zero Energy Residential ...

Based on the Directive 2010/31/EC, which is known (Roumi et al. 2020) Solar energy systems potential for nearly net zero energy residential buildings -Investigate solar ... (PDF) Passive solar systems for buildings: performance indicators ...

Passive solar system design is an essential asset in a zero-energy building perspective to reduce heating, cooling, lighting, and ventilation loads.

Research on the integrated design of solar thermal energy ...

Fan, X. Q., Application of wall mounted solar water heater in residential buildings. Solar energy, (2009), 12, pp. 44-49. Integrated design of solar water heater and building. Jan ...

Influence of sunspace on energy consumption of rural residential buildings

The building and construction sectors account for about 40% of the world's total energy consumption and building energy consumption, almost a fifth, come from higher ...

Phase change materials for solar thermal energy storage in residential ...

There are significant environmental impacts associated with construction activities. Globally, the building stock is responsible for a high proportion of the total primary ...

Application of Photovoltaic and Solar Thermal ...

These optimized integrations led to improved energy efficiency in the solar thermal system, resulting in a cost-effective and efficient heating system for residential buildings. Through simulation, designers can evaluate ...

Solar Energy as an Approach for Sustainable ...

For the optimal use of solar energy (SE) in residential buildings and achieving sustainability for it, the paper is done about, energy consumption in the residential sector, renewable energy (RE ...

A review of solar technologies for buildings

Therefore, solar energy application in buildings has become one of the most important approaches to supply the building energy needs and reduces the environmental degradation caused by the fossil ...

Solar Energy in Construction: Definition, Benefits, and Applications

1. Solar Power for Residential Buildings. In residential construction, solar energy is often integrated into the design of homes through the installation of rooftop solar ...

Solar Energy Systems for Buildings To Improve Sustainability

Building based solar energy systems help to limit dependency on non-renewable forms of energy and therefore also result in economic benefits along with ...

A literature review on Building Integrated Solar Energy Systems ...

The present article provides a concise review of a sample of studies concerning Building Integrated Solar Energy Systems integrated into façades published in the last five years. This ...

Solar Energy and Residential Building Integration Technology and ...

Several studies has been conducted to promote the solar power to save the fossil fuel resources. According to (Ma & Xue, 2013) the application of solar energy and building ...

Solar energy systems potential for nearly net zero energy residential ...

residential buildings in order to identify their impact towards nearly Net Zero Energy Buildings (NZEB). Different options regarding the installed capacity of photovoltaics and solar combi ...

Solar Energy Utilization Potential in Urban Residential ...

In dense, energy-demanding urban areas, the effective utilization of solar energy resources, encompassing building-integrated photovoltaic (BIPV) systems and solar water heating (SWH) systems inside ...

Solar Energy and Its Purpose in Net-Zero Energy Building

The Net Zero Energy Building is generally described as an extremely energy-efficient building in which the residual electricity demand is provided by renewable energy. ...

Bridging the energy gap of India's residential buildings by using ...

The gross electricity consumption in residential buildings has been rising sharply over the years. Building energy-consumption figures rose to ~260 TWh in 2016-17, which was ...

Investigating effective parameters for enhancing energy efficiency ...

The global energy crisis necessitates enhancing energy independence for regions and countries by advancing the utilization of renewable energy sources. Solar energy ...

Evaluation of solar energy potential for residential buildings in ...

It is valuable to evaluate the solar energy potential of buildings in the design stage, because how to efficiently apply PV technology in urban buildings is being concerned ...

Evaluation of solar energy potential for residential buildings in ...

However, the diversity of residential buildings and complexity of urban environments make it difficult to efficiently utilize solar energy. The residential buildings in cities ...

A review of solar chimney for natural ventilation of residential and ...

The International Energy Agency (IEA), Intergovernmental Panel on Climate Change (IPCC), and British Petroleum (BP) categorize world power consumption into industry, ...

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