Special Issue List in Section

Modelling and Control of Heating, Ventilation, Air Conditioning and Refrigeration (HVAC&R) Systems
Guest Editors: Prof. Dr. Alessandro Beghi, Dr. Mirco Rampazzo
Deadline: **22 October 2020**

Designing, Modeling and Optimizing Energy and Environmental Systems for Buildings
Guest Editors: Prof. Dr. Heejin Cho, Prof. Dr. Kwang Ho Lee
Deadline: **31 October 2020**

Smart Forecasting of Building and District Energy Management
Guest Editors: Prof. Dr. Yacine Rezgui, Dr. Sylvain Kubicki
Deadline: **31 October 2020**

Thermal Behaviour, Energy Efficiency in Buildings and Sustainable Construction
Guest Editor: Prof. Dr. Paulo Santos
Deadline: **15 November 2020**

Thermal Energy Storage in Building Integrated Thermal Systems
Guest Editors: Prof. Nicola Bianco, Prof. Fabrizio Ascione
Deadline: **20 November 2020**

Buildings Integration of Renewable and Smart Energy Systems
Guest Editors: Dr. Marco Dell'Isola, Prof. Andrea Frattolillo
Deadline: **20 November 2020**

Buildings Energy Efficiency and Innovative Energy Systems
Guest Editor: Prof. Dr. Vítor Leal
Deadline: **30 November 2020**

Application of Advanced Lighting Systems in Buildings
Guest Editor: Prof. Dr. Geun Young Yun
Deadline: **30 November 2020**

Applied Thermodynamics and Heat Transfer for Buildings
Guest Editor: Prof. Dr. Francesco Minichiello
Deadline: **30 November 2020**

Optimal Home Energy and Active Management Strategy in Smart Grids
Guest Editor: Dr. Kodjo Agbossou
Deadline: **30 November 2020**

MDPI is a member of

Follow Us

facebook.com/MDPIOpenAccessPublishing
twitter.com/MDPIOpenAccess / @energies_Mdpi
linkedin.com/company/mdpi
plus.google.com/+MdpiOA
weibo.com/mdpicn
blog.mdpi.com

MDPI
St. Alban-Anlage 66
CH-4052 Basel
Switzerland
Tel: +41 61 683 77 34
Fax: +41 61 302 89 18

www.mdpi.com **mdpi.com/journal/energies**

See www.mdpi.com for a full list of offices and contact information. MDPI AG is a company registered in Basel, Switzerland, No. CH-270.3.014.334-3, whose registered office is at St. Alban-Anlage 66, CH-4052 Basel, Switzerland.

Basel, September 2020

IMPACT FACTOR 2.702

energies

an Open Access Journal by MDPI

Section

Energy and Buildings

energies

IMPACT FACTOR 2.702

MDPI

an Open Access Journal by MDPI

Section Editor-in-Chief

Prof. Dr. Patrick Phelan

School for Engineering of Matter, Transport and Energy, Arizona State University, Tempe, AZ 85287, USA

Section Information:

The aim of *Energies*' Energy and Buildings Section is to present new research results, and new proven practice aimed at reducing the energy needs of a building, improving building energy efficiency, and improving how energy is managed in buildings.

Example topic areas within the scope of our journal's Energy and Buildings Section are listed below. This list is neither exhaustive nor exclusive:

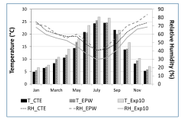
- Sustainable buildings
- Energy consumption in buildings
- Building environmental control
- Intelligent buildings

Featured Papers

DOI: 10.3390/en13010237

How Climate Trends Impact on the Thermal Performance of a Typical Residential Building in Madrid

Authors: S. Soutullo,E. Giancola, M. J. Jiménez, J. A. Ferrer andM. N. Sánchez



Abstract: Based on the European energy directives, the building sector has to provide comfortable levels for occupants with minimum energy consumption as well as to reduce greenhouse gas emissions. This paper aims to compare the impact of climate change on the energy performance of residential buildings in order to derive potential design strategies. Different climate file inputs of Madrid have been used to quantify comparatively the thermal needs of two reference residential buildings located in this city. One of them represents buildings older than 40 years built according to the applicable Spanish regulations prior to 1979. The other refers to buildings erected in the last decade under more energy-restrictive constructive regulations. Three different climate databases of Madrid have been used to assess the impact of the evolution of the climate in recent years on the thermal demands of these two reference buildings. Two of them are typical meteorological years (TMY) derived from weather data measured before 2000. On the contrary, the third one is an experimental file representing the average values of the meteorological variables registered in Madrid during the last decade. Annual and monthly comparisons are done between the three climate databases assessing the climate changes. Compared to the TMYs databases, the experimental one records an average air temperature of 1.8 °C higher and an average value of relative humidity that is 9% lower.

DOI: 10.3390/en13071541

Multi-Criteria Optimisation of an Experimental Complex of Single-Family Nearly Zero-Energy Buildings

Authors: Małgorzata Fedorczak-Cisak, Anna Kotowicz, Elżbieta Radziszewska-Zielina, Bartłomiej Sroka, Tadeusz Tatara and Krzysztof Barnaś

Abstract: The Directive 2010/31/EU on the energy performance of buildings has introduced the standard of "nearly zero-energy buildings" (NZEBs). European requirements place the obligation to reduce energy consumption on all European Union Member States, particularly in sectors with significant energy consumption indicators. Construction is one such sector, as it is responsible for around 40% of overall energy consumption. Apart from a building's mass and its material and installation solutions, its energy consumption is also affected by its placement relative to other buildings. A proper urban layout can also lead to a reduction in project development and occupancy costs. The goal of this article is to present a method of optimising single-family house complexes that takes elements such as direct construction costs, construction site organisation, urban layout and occupancy costs into consideration in the context of sustainability. Its authors have analysed different proposals of the placement of 40 NZEBs relative to each other and have carried out a multi-criteria analysis of the complex, determining optimal solutions that are compliant with the precepts of sustainability. The results indicated that the layout composed of semi-detached houses scored the highest among the proposed layouts under the parameter weights set by the developer. This layout also scored the highest when parameter weights were uniformly distributed during a test simulation.

DOI: 10.3390/en13020410

How Climate Change Affects the Building Energy Consumptions Due to Cooling, Heating, and Electricity Demands of Italian Residential Sector

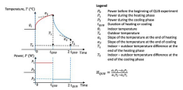
Authors: Francesco Mancini and Gianluigi Lo Basso

Abstract: Climate change affects the buildings' performance, significantly influencing energy consumption, as well as the indoor thermal comfort. As a consequence, the growing outdoor environmental temperatures entail a slight reduction in heating consumption and an increase in cooling consumption, with different overall effects depending on the latitudes. This document focuses attention on the Italian residential sector, considering the current and reduced meteorological data, in anticipation of future climate scenarios. According to a sample of 419 buildings, referring to the climatic conditions of Milan, Florence, Rome, and Naples, the heating and cooling needs are calculated by a simplified dynamic model, in current and future conditions. The effects of the simplest climate adaptation measure, represented by the introduction of new air conditioners, have been also evaluated. The simulations results show an important reduction in complex energy consumption (Milan −6%, Florence −22%, Rome −25%, Naples −30%), due to the greater incidence of heating demand in the Italian context. However, the increase in air conditioning electrical consumption over the hot season (Milan +11%, Florence +20%, Rome +19%, Naples +16%) can play a critical role for the electrical system; for that reason, the introduction of photovoltaic arrays as a compensatory measure have been analysed.

DOI: 10.3390/en13010284

Influence of Initial and Boundary Conditions on the Accuracy of the QUB Method to Determine the Overall Heat Loss Coefficient of a Building

Authors: Naveed Ahmad, Christian Ghiaus and Thimothée Thiery

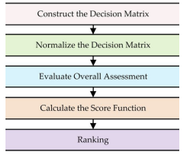


Abstract: The quick U-building (QUB) method is used to measure the overall heat loss coefficient of buildings during one to two nights by applying heating power and by measuring the indoor and the outdoor temperatures. In this paper, the numerical model of a real house, previously validated on experimental data, is used to conduct several numerical QUB experiments. The results show that, to some extent, the accuracy of QUB method depends on the boundary conditions (solar radiation), initial conditions (initial power and temperature distribution in the walls) and on the design of QUB experiment (heating power and duration). QUB method shows robustness to variation in the value of the overall heat loss coefficient for which the experiment was designed and in the variation of optimum power for the QUB experiments. The variations in the QUB method results are smaller on cloudy than on sunny days, the error being reduced from about 10% to about 7%. A correction is proposed for the solar radiation absorbed by the wall that contributes to the evolution of air temperature during the heating phase.

DOI: 10.3390/en13092155

A Robust q-Rung Orthopair Fuzzy Information Aggregation Using Einstein Operations with Application to Sustainable Energy Planning Decision Management

Authors: Muhammad Riaz, Wojciech Sałabun, Hafiz Muhammad Athar Farid, Nawazish Ali and Jarosław Wątróbski



Abstract: A q-rung orthopair fuzzy set (q-ROFS), an extension of the Pythagorean fuzzy set (PFS) and intuitionistic fuzzy set (IFS), is very helpful in representing vague information that occurs in real-world circumstances. The intention of this article is to introduce several aggregation operators in the framework of q-rung orthopair fuzzy numbers (q-ROFNs). The key feature of q-ROFNs is to deal with the situation when the sum of the qth powers of membership and non-membership grades of each alternative in the universe is less than one. The Einstein operators with their operational laws have excellent flexibility. Due to the flexible nature of these Einstein operational laws, we introduce the q-rung orthopair fuzzy Einstein weighted averaging (q-ROFEWA) operator, q-rung orthopair fuzzy Einstein ordered weighted averaging (q-ROFEOWA) operator, q-rung orthopair fuzzy Einstein weighted geometric (q-ROFEWG) operator, and q-rung orthopair fuzzy Einstein ordered weighted geometric (q-ROFEOWG) operator. We discuss certain properties of these operators, inclusive of their ability that the aggregated value of a set of q-ROFNs is a unique q-ROFN. By utilizing the proposed Einstein operators, this article describes a robust multi-criteria decision making (MCDM) technique for solving real-world problems. Finally, a numerical example related to integrated energy modeling and sustainable energy planning is presented to justify the validity and feasibility of the proposed technique.