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AKADEMİK TEŞVİK KOMİSYONU

AKADEMİK TEŞVİK BAŞVURU SİSTEMİ KILAVUZU

Ocak/2024

ÖNEMLİ NOTLAR

- Bu kılavuz, siz değerli akademisyenlerin akademik teşvik dosyalarının, daha özenli ve hatasız incelenmesi için hazırlanmıştır.
- Öğretim elemanlarımızın teşvik hak ediş ödemelerinde problem yaşanmaması için, kılavuzda belirtilen formatlara uyulması önem arz etmektedir.
- **Belgelerin sadece ilgili bölümlerinin sisteme yüklenmesi gerekmektedir. Örneğin 1500 sayfa bildiri kitabının tamamı sisteme yüklenmeyip sadece ilgili sayfaların uygun bir program yardımı ile (pdf kesme/birleştirme programı) yüklenmesi gerekmektedir.**
- Belgeler yüklenirken format dışı yüklenen dosyaların, birimlerimizde oluşturulan komisyonlar tarafından ilgililerine tekrar düzenlemeleri için kesinlikle iade edilecek olup, bunun zaman kaybına neden olacağı göz önüne alınmalıdır.

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MAKALE EKLEME

SCI,SCIEXP, SSCI Dizinlerinde taranan makale için örnek

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Science of the Total Environment 778 (2022) 146362

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Review

Effects of ambient conditions on solar assisted heat pump systems: a review

ilgili yazarın işaretlenmesi

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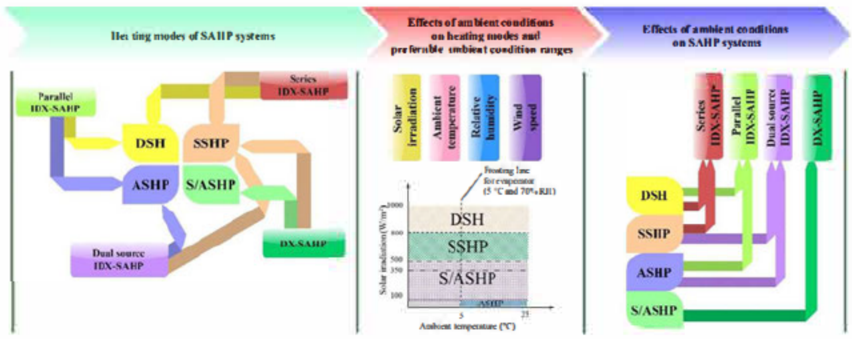
[c] Department of Energy Systems Engineering, Burdur Mehmet Akif Ersoy University, Burdur, Turkey
[d]

HIGHLIGHTS

- Heating mode options of solar assisted heat pumps vary with systems type.
- Effects of ambient conditions on heating modes determine the preferable ranges.
- Insulated collector drops evaporator temperature below air in low solar irradiation.
- Heat loss from bare collector evaporator starts with high solar irradiation.
- Frosting isn't disruptive factor in flat air type evaporators unlike in finned type.

GRAPHICAL ABSTRACT



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ABSTRACT

Solar assisted heat pump (SAHP) systems aim to increase the performance of heat pumps by supporting with solar energy using various heating modes, whose performances depend on ambient conditions. In the literature, SAHP systems are classified by structure types, and the heating mode options are not considered as the main priority of the design but a result of the structure of the system. This paper aimed to investigate the effect of ambient conditions on heating modes, and identify the preferable ambient condition ranges for each SAHP system depends on their heating modes, by using a narrative review of 47 recent studies, that shed light on the problem. For this purpose, direct solar heating (DSH), air source heat pump (ASHP), solar source heat pump (SSHP) and solar air source heat pump (S/ASHP) modes were stated as the basic heating modes of SAHP systems. In accordance with the literature, SAHP systems were classified as direct expansion solar assisted heat pump (DX SAHP) and series, parallel and dual source indirect expansion solar assisted heat pumps (IDX SAHP). Solar irradiation, ambient temperature, relative humidity and wind speed has been taken as major ambient conditions to investigate. Reviewed studies indicated that, parallel and series IDX SAHP are preferable in high solar irradiations about 800 W/m^2 with their DSH mode options. Frosting on evaporator is prevented in DX SAHP with its S/ASHP mode, and even in the presence of frosting, unlike IDX SAHPs ASHP mode, freezing is a factor that improves performance on flat evaporator in cold and humid conditions. This study indicates that there are obscure areas for future studies to focus on for a better comparison between SAHP types. Moreover, proposed novel designs of this paper, such as solar preheating of air in IDX SAHP systems to add S/ASHP mode as an option, might enhance the performance and applicability of SAHP systems.

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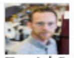

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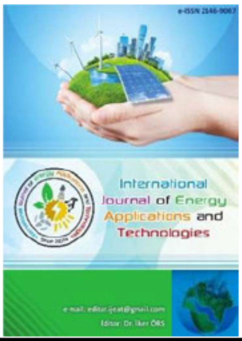

Original Research Article

Hydrogen production from groundnut shell via circulating fluidized bed technology

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ABSTRACT

In this study, hydrogen production performances of groundnut shells in a circulating fluidized bed gasifier is evaluated by employing a previously developed and validated model. Basically, we simulate a circulating fluidized bed gasification system that is connected to a water-gas shift reactor, for hydrogen purification with the gasifier temperature of 1150 K. We find that the amount of hydrogen gas produced from circulating fluidized bed gasification of groundnut shells increases from 49.25 kmol to 68.83 kmol (per 1000 kg of raw groundnut shells) when the gasifier is integrated with water-gas shift reactor. We observe that it is possible to obtain a high yield of hydrogen gas from the gasification of groundnut shells. Therefore, we conclude that the groundnut shell is a remarkable feedstock for bioenergy.

Keywords Circulating fluidized bed gasification; Groundnut shell; Sustainable energy technology; Hydrogen purification

1. Introduction

The depletion of fossil fuel resources and climate changes as a consequence of increasing environmental pollution have increased the attention on environmentally friendly energy resources and sustainable conversion technologies. The International Energy Agency's World Energy Outlook in 2016 reported that the share of biomass accounts for 9.7% of the global energy mix in the world. This ratio is far behind the three main energy sources, namely, 31.7% oil, 28.1% coal and 21.6% natural gas in the global energy supply [1]. Renewable energy sources are evaluated in terms of zero-emission, infiniteness, and easy applicability aspects. Biomass is of great potential worldwide with respect to sustainable energy supply, given its high availability, renewable status and the possibility of productively utilizing waste materials [2-4]. The term "biomass" refers to carbonaceous materials derived from agricultural crops, forestry, agro-industrial, and domestic wastes. Fuels derived from biomass resources reduce net CO_2 emissions during their processing owing to their inherent carbon-neutral nature. Hence, plentiful biomass resources are good candidates for the siting of facilities to produce green energy. Nowadays, intensive research has been conducting on the energy production of biomass as an alternative to fossil fuels. A variety of methods such as biomass gasification, biomass pyrolysis, biomass liquefaction etc. are used in hydrogen production [5-7]. Note that hydrogen is a significant

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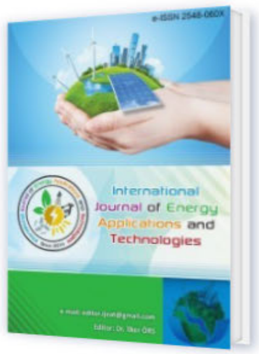

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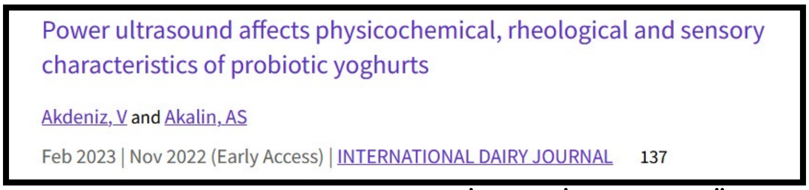

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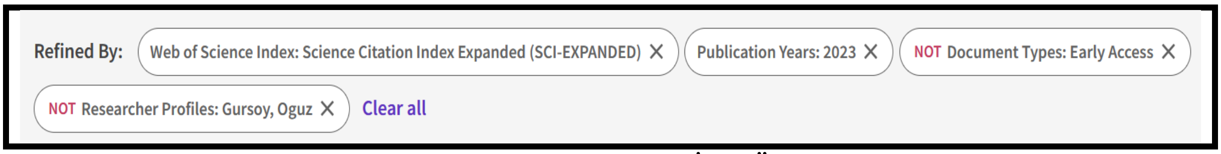

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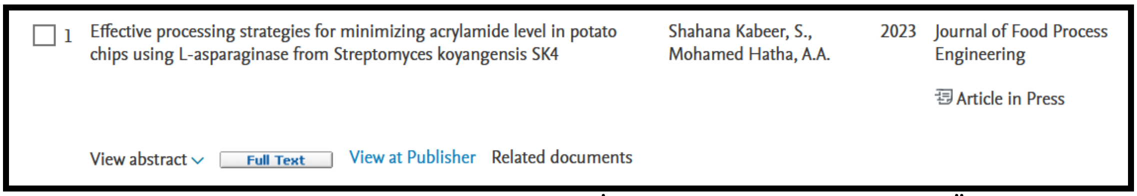

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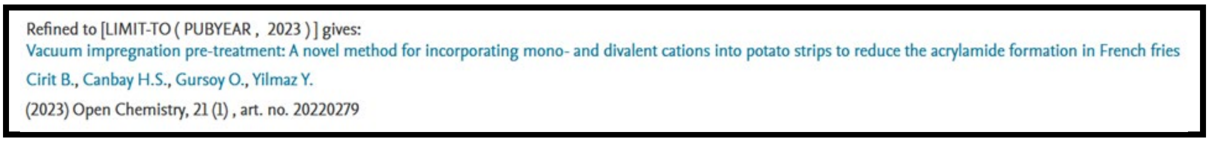

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Review

Review of the advances in solar-assisted air source heat pumps for the domestic sector

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ABSTRACT

Solar assisted air source heat pump shows great potential as a promising energy-saving heating technology, which integrates solar collector and air source heat pump. It is widely considered for supplying hot water, space heating and/or space cooling in the domestic sector. The performance of solar assisted air source heat pumps can be evaluated in system level by parameters such as coefficient of performance, seasonal performance factor, energy consumption, solar fraction as well as initial and operating costs, and in component level by parameters such as efficiencies of solar collection and thermal energy storage. Their performances are affected by many factors such as system configuration, components size, working fluid, working conditions and weather conditions. This paper presents a comprehensive review on the recent advances in solar assisted air source heat pump for the domestic sector in terms of system configuration, solar collectors, thermal energy storage, defrosting method and the perspective areas of further investigations. The results of this review confirm that research is still required to improve the performance of such a combined system and reduce initial cost compared with existing heating systems based on hydrocarbon combustion. The information presented in this paper is beneficial to the researchers, small and medium-sized enterprises suppling renewable energy system technologies, heating engineers and service workers, energy policy and decision makers, environmental activists and communities.

1. Introduction

Heat pumps (HPs) can be considered as both energy efficient and renewable energy technology [1]. The use of this technology to increase buildings energy efficiency by utilizing low-grade thermal energy from existing heating supply systems is of significant interest today. However, to significantly reduce energy consumption and to improve the performance of HPs, many studies are devoted to increasing the share of renewable energy. According to the International Energy Agency (IEA), worldwide, thermal energy accounts for more than 50% of energy consumption, with about 45% consumed in residential and commercial buildings [1]. In the UK, heating took up 48% of the total energy consumption in 2013, and the domestic sector accounted for 57% of the entire heating demand [2]. Emissions of greenhouse gases (GHGs) and air pollutants during heat provision from hydrocarbon combustion are 39%, with fossil fuel being the main heat source today [1]. To achieve the UK's target of the net zero emissions of GHGs by 2050, the domestic heating sector has to be decarbonised [3]. Many countries have a strategy by 2050 to increase the share of renewable energies. In combination with renewable energy, an increase in HPs in heating provision is expected. By 2030, HP should provide 22.1% of the domestic heating compared with 5% in 2019 [1]. The coefficient of performance (*COP*) and seasonal performance factor (*SPF*) are parameters to evaluate the performance of HPs [4]. HPs are divided into air source heat pump (ASHP), ground source heat pump (GSHP), water source heat pump (WSHP) and soar assisted heat pumps (SAHP). Depending on the purpose of application, climate conditions, technical and economic parameters, each of them has its own advantages and disadvantages.

Table 1 lists of review papers on solar assisted ASHPs (SAASHPs,

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Bir Rüzgâr Enerji Santralinin Güç Kapasitesine Bağlı Olarak Üretebileceği Elektrik Enerjisi Potansiyelinin Belirlenmesi – Artvin İli Örneği

Durukan ERDOĞAN[1], Kenan YİGİT[2], Bora ACARKAN[1*]

ÖZET: Bu çalışmada, Weibull olasılık yoğunluk fonksiyonu ve simülasyon yaklaşımı kullanılarak Artvin ili Merkez ilçesinin rüzgâr enerjisi potansiyeli hesaplanmıştır. Weibull olasılık yoğunluk fonksiyonun şekil ve ölçek parametrelerinin hesaplanmasında ortalama ve standart sapma, moment, enerji örneği, grafik, maksimum olabilirlik ve modifiye edilmiş maksimum olabilirlik yöntemleri kullanılarak 24 metre, 59 metre ve 120 metre kule yüksekliğindeki rüzgâr hızlarının modellenmesi gerçekleştirilmiştir. Bu modellemelerin R^2, RMSE, MSE ve X^2 yöntemleri ile hata analizleri yapılarak en tutarlı matematiksel yöntemin belirlenmesi amaçlanmıştır. Ayrıca 100 kW, 1 MW ve 5 MW kurulu güce sahip rüzgâr enerji santrali için kapasite faktörleri hesaplanmış ve üretilebilecek elektrik enerjisi potansiyeli analiz edilmiştir. Çalışma neticesinde maksimum olabilirlik ve modifiye edilmiş maksimum olabilirlik yöntemlerinin hata oranı en az olan yöntemler olduğu saptanmıştır. Daha yüksek rakımlarda daha yüksek enerji üretim potansiyelinin sağlanacağı ve daha yüksek kurulu güce sahip rüzgâr enerji santralinin en iyi kapasite faktörünü ihtiva edeceği sonucuna ulaşılmıştır. Weibull olasılık yoğunluk fonksiyonu ve simülasyon yaklaşımı sonucunda Artvin ilinin yıllık elektrik enerjisi ihtiyacının 100 kW kurulu güce sahip bir sistem ile %0.036 ila %0.075 oranında, 1 MW güce sahip bir sistem ile %0.384 ila %0.773 oranında, 5 MW güce sahip bir sistem ile %1.983 ila %4.051 arasında karşılanabileceği tahmin edilmiştir.

Anahtar Kelimeler: Rüzgâr Enerji Santrali, Weibull, Kapasite Faktörü, Elektrik Enerjisi, Enerji Verimliliği

Determination of the Electrical Energy Production Potential of a Wind Power Plant Depending on the Power Capacity: a Case Study for Province of Artvin

ABSTRACT: : In this study, wind energy potential of the central district of Artvin province was calculated by using Weibull probability density function and simulation approaches. In the calculation of the shape and scale parameters of the Weibull probability density function, the modeling of the wind speeds of the central district of Artvin at 24 meters, 59 meters and 120 meters altitudes was performed using the average and standard deviation, moment, energy pattern, graphical, maximum likelihood and modified maximum likelihood methods. It is aimed to calculate the most consistent mathematical method by evaluating these models with R^2, RMSE, MSE, and X^2 error analysis. Also, the capacity factors were calculated for the 100 kW, 1 MW and 5 MW wind power plants and the potential of electrical energy that can be produced has been analyzed. As a result of the study, it has been determined that the maximum likelihood and modified maximum likelihood methods have the lowest error rate. It has been concluded that higher energy production potential will be achieved at higher altitudes and that the wind power plant with higher installed power will contain the best capacity factor. As a result of the Weibull probability density function and simulation approaches, the annual electrical energy need of Artvin province can be met between at 0.036% and 0.075% with a system of 100 kW, between at 0.384% and 0.773% with a system of 1 MW, and between at 1.983% and 4.051% with a system of 5 MW installed power capacity.

Keywords: Wind Power Plant, Weibull, Capacity Factor, Electrical Energy, Energy Efficiency

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Bu çalışma Durukan ERDOĞAN'ın Yüksek Lisans tezinden üretilmiştir.

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- 2014 *(2)*
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Conventional Free Radical Polymerization of N-Vinyl Pyrrolidone Homopolymers

Michael A. Tallon and Osama M. Musa

Ashland LLC, Bridgewater, NJ, USA

1 Introduction

The year 2019 marks the 80th anniversary of polyvinyl pyrrolidone's (PVP) introduction into the marketplace. Since then, countless patents have been filed detailing applications on the use of PVP. The breadth of uses is amazingly broad. For example, PVP is used in the Pharmaceutical industry; and in Personal Care businesses such as Hair Care, Oral Care, Skin Care, to Industrial markets such as Electronics, Adhesives, Composites, and Energy to just name a few. While new uses are constantly being born each day, and book chapters devoted to PVP exist in the literature, there is still a lack of an up to date repository of information on PVP localized in just one place.

Only a few books have been solely dedicated to PVP, like Polyvinylpyrrolidone Excipients for Pharmaceuticals; Povidone, Crospovidone, and Copovidone, by Volker Buhler in 2005 [1]. However, this only covers PVP and the physical properties exhibited in the field of drug solubilization and disintegrant attributes. Other texts like Polyvinylpyrrolidone PVP and other Related Materials authored by E.G. Malawer in 2012 but mostly in the spotlight of Biotechnology and not its physical properties [2]. Moreover, the lack of centralized data on PVP copolymers is woefully inadequate in the literature as well. Other texts on this subject deal with only specific applications, rather than a generalized overview of the PVP subject matter as a whole.

This chapter focuses on the synthesis of polyvinyl pyrrolidone in a variety of forms. In particular, methodologies to produce soluble, branched, and crosslinked versions are described, and these are related back to their physical properties. Critical factors involved in the conventional free-radical polymerization processes employing thermal initiators to manufacture PVP are described in-depth, including initiator choice; polymerization solvent and temperature, polymerization catalysts, bulk/solution/precipitation polymerization methods, adiabatic versus isothermal routes, stereochemistry/tacticty/architecture have all been highlighted. This essential information provides a thorough and fundamental

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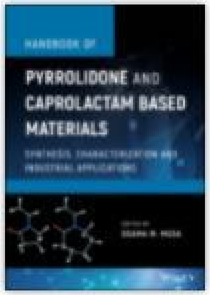

HANDBOOK OF PYRROLIDONE AND CAPROLACTAM BASED MATERIALS

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About this reference work

Brings together, for the first time, a comprehensive review of all aspects of pyrrolidone- and caprolactam-based materials.

Describes the broad technical universe of γ- and ε- lactams, reviews in-depth the chemistry of the small lactam-based molecules, uncovers their unique properties and shows how they have enabled a myriad of commercially important applications. From synthesis, through production and into applications, this reference targets significant and recent trends in γ- and ε-lactam science and technology and addresses all key aspects of pyrrolidone- and caprolactam-based materials to produce a definitive overview of the field.

Diğer uluslararası hakemli dergilerde yayınlanmış makalelerden atıf örneği

CONFLICT OF INTEREST

All authors declared no conflict of interest in the paper.

AUTHOR CONTRIBUTIONS

Dr. Stephen Tangwe was responsible of conceptualization, drafting and development of the manuscript. Prof. K Kusakana provide technical input and conduct technical restructuring and proofreading of the manuscript.

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The Impact of an Air to Water Heat Pump in the Residence of a University Campus

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***Abstract*—The implementation of an energy efficiency intervention in the students' residence of the university campus may lead to a reduction in the energy consumed and electricity cost. The study focused on retrofitting a 1000 L, 12 kW boiler, with a 4.0 kW Air Source Heat Pump (ASHP) unit. A data acquisition system was built and deployed, to monitor the baseline performance of the electric boiler and the actual performance of the installed ASHP water heater (which was used to retrofit the electric boiler during the assessment period). The results show an annual electrical energy saving of 34805.94 kWh and load factor reduction of 0.124 due to the replacement of the electric boiler with the ASHP unit. The payback period of the ASHP system was 1.7 years, using the method of net present value of money. Wilcoxon rank sum test was employed to compare both the daily volume of water and energy consumed by the electric boiler and the ASHP water heater to test if their difference was of any significance. We concluded that, there exists a significant difference in the average daily energy consumed by the boiler and the ASHP water heater in both summer and winter season with the utilization of the Wilcoxon rank sum test. We could conclude that, a rollout of the ASHP units to retrofit the existing electric boiler in the students' residence in the University campus is economically viable and calls for such an intervention is imperative.**

***Index Terms*—Load factor, Energy saving, Tariff hike, Air source heat pump, Electric boiler, Net present value payback period, Wilcoxon rank sum test**

I. Introduction

Heat pump technology (e.g., air source heat pump, ground source heat pump, and solar-assisted heat pump) is both a renewable and an energy efficient technology for both sanitary hot water and space heating [1], [2]. Extensive studies by a group of researchers in the United Kingdom have resulted in the finding that, air-source and geothermal heat pump water heaters can be employed in wider applications [3]. Hot water production is the fourth largest energy consumer in the commercial building sector following space heating, air conditioning and lighting [4]. The South Africa available commercial supply networks of natural gas are very limited as opposed to the European countries and United States [5]. The use of the inefficient resistance element, such as an electric boiler for water heating is predominant in the commercial sector of South Africa. An electric boiler is an inefficient sanitary hot water device, having the capacity of a storage tank above 500 L and the hot water heating is primarily achieved by a heating element [5]. Energy factor of an electric geyser is less than 1 and is due to the input electrical energy supplied which is often greater than the output thermal energy gained by the stored water [5]. Hence, by replacing the electric boiler with Air Source Heat Pump (ASHP) water heater can lead to significant power and energy reduction in the commercial sector. Research conducted on the techno-economic analysis of the ASHP water heater in the commercial sector based on limited experimental data, proved that the technology is viable with a simple payback period of 12.5 months and an internal rate of return of 98%. Zhang *et al.* [6] conducted a techno-economic analysis of ASHP with reference to space heating in Northern China and compared its viability to traditional heating methods that included coal-fired cogeneration, large coal-fired boiler heating, regional coal-fired boiler heating, wall hanging gas boiler heating and direct electric heating. They concluded that other than the coal-fired cogeneration mode, the ASHP demonstrated better energy consumption and economic efficiency than the rest of the technologies. In addition, Alshehri *et al.* [7] performed a techno-economic analysis between ground and air source heat pumps in the hot, dry climate and depicted that the total annual cost of the energy consumed by the ASHP system was more than that of ground heat pump water heater (a 34.6% increase). The authors demonstrated that the ASHP water heater possessed a greater efficiency of the operation cost in the long term to the ground source heat pump water heater. The authors further noted that due to the large installation cost of ground source heat pump water heater, the market penetration of this technology is unfavorable in the hot, dry climate. First degree audits were conducted in the major cities (Johannesburg and Cape Town) in South Africa to assess the economic viability of commercial ASHP water heaters over electric resistance heaters in large residential units and hospitals for sanitary hot water heating [8]. The findings showed that ASHP water heater is an economic viable technology, with an efficiency that could be enhanced via correct sizing and optimization of the operation. They further showed that the performance of an ASHP water heater was better in the coastal region as opposed to the inland region.

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- Aims and Scope
- Editorial Board
- Indexing Service
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The Impact of an Air to Water Heat Pump in the Residence of a University Campus

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- Aims and Scope
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