Research on the current status of solar energy industrial thermal utilization

renewable energy loans and will increase access to solar energy. Keywords: Solar energy, photovoltaic (PV), solar energy technologies, renewable energy, Solar Energy Investments . I. INTRODUCTION he sun is a natural nuclear reactor that releases energy called photons, they travel 93 million miles from the sun to Earth in about 8.5 minutes[1].

Thermal energy in the industrial sector for process heating applications in the range of 50 to 250°C consumes about 35% of the global fossil fuel. Cascaded solar thermal ...

Decarbonisation plans across the globe require zero-carbon energy sources to be widely deployed by 2050 or 2060. Solar energy is the most widely available energy resource on Earth, and its ...

The Future of Solar Energy considers only the two widely recognized classes of technologies for converting solar energy into electricity -- photovoltaics (PV) and concentrated solar power (CSP), sometimes called solar thermal) -- in their current and plausible future forms. Because energy supply facilities typically last several decades, technologies in these classes will ...

The study navigates the intricate landscape of solar energy, examining its historical foundations, environmental implications, economic viability, and transformative innovations.

Major developments, as well as remaining challenges and the associated research opportunities, are evaluated for three technologically distinct approaches to solar energy utilization: solar electricity, solar thermal, and solar fuels technologies. Much progress has been made, but research opportunities are still present for all approaches.

This system can be integrated into the process of renewable energy (mainly solar energy) conversion and complementary utilization at multiple scales, effectively reducing the consumption of fossil fuels, reducing the emission of pollutants such as CO 2, realizing the conversion of solar thermal energy to the chemical energy of liquid fuels ...

Based on global distribution of solar energy and its feature, this paper discusses a review about solar energy"s utilization techniques, mainly discusses the latest ...

For regions with an abundance of solar energy, solar thermal energy storage technology offers tremendous potential for ensuring energy security, minimizing carbon ...

Key updates from the Summer 2024 Quarterly Solar Industry Update presentation, released August 20, 2024:. Global Solar Deployment. About 560 gigawatts direct current (GW dc) of photovoltaic (PV) installations are projected for 2024, up about a third from 2023.; The five leading solar markets in 2023 kept pace or increased

PV installation capacity in the first half of 2024, ...

To address these gaps, we review the current state of IPH energy use in the U.S., SIPH technologies from both technological and economic perspectives, their potential ...

making industrial processes more energy efficient. This brief first provides an overview of the current status of industrial heat in a range of sectors. It then lays out the key criteria for evaluating or characterizing clean heat technologies and describes some of the challenges and opportunities presented by clean heat technology options.

Solar-driven steam generation is not only a long history application demand but also a new research topic due to the progress in nano-material science.

The growth of solar thermal system for industrial use is slow relative to the development solar thermal for residential application due to the higher level of temperature required for industrial ...

A number of energy conservation and alternative energy approaches utilize a low temperature heat source. Applications in this category include: solar ponds, ocean thermal energy conversion (OTEC ...

Fig. 5 shows solar thermal energy utilization for different application with TES. Download: Download high-res image (247KB) ... A review on current status and challenges of inorganic phase change materials for thermal energy storage systems. ... Recent advances in research on cold thermal energy storage. Int. J. Refrig, 25 (2) (2002) ...

With increasing concerns on fuel scarcity and environmental deterioration, more and more research attention has been drawn towards enhancing the waste heat recovery performance in industrial thermal processes, thereby improving fuel utilization efficiency [] is reported that around 63% of consumed global primary energy is wasted during fuel ...

The goal of this review is to offer an all-encompassing evaluation of an integrated solar energy system within the framework of solar energy utilization.

There is a lack of contribution which review the progress in the current status of LNG cold energy utilization systems as well as the potential applications in the future. ... The results shown that the solar collector area and heat transfer area of the combined cycle could be reduced by 82.2% and 32.2% respectively. ... Tier 1 (R-279-000-542 ...

This work is an extensive compilation and review of the recent literature concerning research works carried out to solar thermal collectors and its industrial ...

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The Potential for Solar Thermal Energy Use in Industrial Sector: General Elements As discussed in the previous section, solar heat for domestic applications has increased in market

Status and trend analysis of solar energy utilization technology. T Q Sun 1,2, D L Cheng 3, L Xu 3 and B L Qian 4. Published under licence by IOP Publishing Ltd IOP Conference Series: Earth and Environmental Science, Volume 354, 2019 International Conference on New Energy and Future Energy System 21-24 July 2019, Macao, China ...

Solar-driven desalination systems begin by converting solar radiation into thermal energy, which is then utilized to generate water vapor for producing clean water [].The entire interfacial evaporation process is predicated on the need for the material to absorb the incident solar flux efficiently and then convert it into thermal energy.

Table 1: Location, study approach, objectives and methods of the studies. The status of solar energy utilization, development opportunities and challenges in Ethiopia. It further articulated that Ethiopia has high solar energy potential related to its position and gifted 13 th month sunshine. The solar energy potential of the country is may result because of the existence of ...

More than 35% of the world"s total energy consumption is made up of process heat in industrial applications. Fossil fuel is used for industrial process heat applications, providing 10% of the energy for the metal industry, 23% for the refining of petroleum, 80% for the pulp and paper industry, and 60% for the food processing industry.

Because of the unstable and intermittent nature of solar energy availability, a thermal energy storage system is required to integrate with the collectors to store thermal energy and retrieve it whenever it is required. ... The studies discussed and presented in this paper may be helpful to carry out further research in this area. REFERENCES

The objective of this chapter is to give a brief history into the subject of solar thermal energy. The chapter attempts to briefly show the general features of the sun which offers the input power to all solar thermal systems followed by early applications from the prehistoric times and a general overview of the current status of installed renewable energy systems in ...

Recent rise of solar thermal energy conversion and utilization is fueled by the re-emergency and also by our recognition of the importance of many low-grade heat driven processes and is ...

Efficient solar energy harvesting offers great potential for a global energy utilization beyond conventional fossil energy. However, current solar thermal approaches depend on sole molecular solar ...

Solar energy can be harnessed for heat production through solar thermal systems. The industrial sectors

identified as potential for the use of solar thermal energy are food processing, pulp, and paper, textiles, automotive, plastics processing, pharmaceutical, and chemical processes, etc. [3], [4], [15], [16], [6].