Solar energy industrial production process

What is solar for industrial processes?
Solar energy can be used to generate heatfor a wide variety of industrial applications,including water desalination,enhanced oil recovery,food processing,chemical production,and mineral processing,among many others.

Can solar energy be used in industrial processes?
The use of solar energy in industrial processes has been studied since the 1970s (SERI, 1980; Fuller, 2011), but due to high capital costs and low costs for coal and gas for industrial applications, only limited deployment has taken place over the last thirty years.

How to integrate solar thermal energy systems with industrial processes?
The integration of solar thermal energy systems with the industrial processes mainly depends on the local solar radiation, availability of land, conventional fuel prices, quality of steam required, and flexibility of system integration with the existing process.

What is a solar process heat installation?
Solar process heat installations used for industrial useare similar to those used in residential buildings,especially for those applications where only low (< 150°C) to medium (150°C - 400°C) temperatures are required. For higher temperatures (>400°C),more advanced or concentrated solar collectors are required.

What are the industrial applications of solar thermal energy?
In this article, an extensive review of various solar thermal energy technologies and their industrial applications are presented. The following industries are covered: power generation, oil and gas, pulp & paper, textile, food processing & beverage, pharmaceutical, leather, automotive, and metal industries.

How much energy does a so-lar process heating system supply?
So-lar process heating systems can supply up to 20%of heating demand of a plant (called the solar fraction). A limiting factor for solar thermal integration is often roof space (e.g. in breweries and dairies in Germany) (Mueller,et al.,2014).

Thus, solar process heat not only reduces CO2 emissions but also reduces the production costs and thereby contributes to the relative competitiveness of producers. The total industrial energy consumption in Lebanon was 6.2 TWh in 2010 (IEA 2013) and similar patterns as in Figure 1 ...

As a renewable and abundant source, solar energy systems are future sustainable solutions for industrial consumers although, some places have inadequate solar energy resource where solar industrial process heating

may not be feasible, but many other places receive abundant solar radiation and implementing such systems will drive the ...

Multi-objective design through solar thermal energy comprehensive integration. Zero emission can be accomplished in low-temperature industrial processes. An industrial ...

This study focuses on fishmeal production as a potential process for integrating industrial solar thermal heat, and aims to determine preliminary feasibility of solar thermal heat...

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In general, there are three groups of solar thermal technologies that are useful for industrial process heat: solar air collectors, solar water systems, and solar concen-trators. Solar air ...

9% of the demand for industrial process heat is supplied from renewable energy sources [2], with 741 industrial plants that use solar heat with a total area of solar collectors of 662,648 m2(567 MWth), that were reported in 2019 [3]. Applications of solar ther-mal energy (STE) in industry lead to sustainable production [4].

Renewable energy integration in the industrial sector is a key step in achieving low-carbon production systems. Solar for industrial process heat (SIPH) is gaining attention towards this goal and ...

Solar thermal technologies help in reducing the carbon footprint in industries. Quality & quantity of heat requirements are identified for various process industries. Enhanced oil recovery has huge potential for solar steam augmentation. Challenges in the integration of solar energy system with the processes are listed.

Besides, energy cost for industrial process heat depends on temperature of the process, process heat requirements, area covered and the intensity of solar radiation. For non-concentrating collectors, system costs between EUR 250-1000/kW in Europe, and around EUR 200-300/kW in South Africa and India. The energy costs for non-concentrated solar thermal ...

In this paper, the production of low to medium temperature water for industrial process heat using solar energy is considered. In particular, the paper outlines the perspective of an optimum design method that takes into account all of the typical variables of the problem (solar irradiation, system architecture, design constraints, load type and distribution, and design and ...

A design methodology to integrate solar heat into industrial process is showed in this chapter, attending restrictions like availability for area of installation, economic, environmental, and operating conditions. The evaluation of each of the restrictions allows responding to real situations that arise in the industrial sector and

thereby ...

Multi-objective design through solar thermal energy comprehensive integration. Zero emission can be accomplished in low-temperature industrial processes. An industrial process is viable when the integrated solar thermal ?T is minimum. Optimal industrial solar thermal integration can indirectly trigger power generation.

N2 - Energy used in the production and processing of materials and products represents a significant fraction of the overall energy footprint of the industrial sector. Solar technologies may provide suitable alternative to existing combustion technologies, but their relevance for industries in the United States has been largely unexplored at ...

In general, there are three groups of solar thermal technologies that are useful for industrial process heat: solar air collectors, solar water systems, and solar concen-trators. Solar air collectors are found primarily in the food processing industry to replace gas- or oil-based drying or to reduce food spoilage due to open- air dry-ing.

The project "Utilizing Solar Energy for Industrial Process Heat in Egyptian Industry" is financed by the GEF and implemented by UNIDO in partnership with the Egypt National Cleaner Production Centre ENCPC. The objective of the project is to develop the market environment for the diffusion and local manufacturing of solar energy systems for industrial process heat. The project ...

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