

Environmental Assessment of China's Solar Photovoltaic Cell Packaging Materials



Overview

Life cycle assessment on monocrystalline silicon (mono-Si) solar photovoltaic (PV) cell production in China is performed in the present study, aiming to evaluate the environmental burden, identify key factors. Solar photovoltaic (PV) is one of the fastest growing renewable energy technology worldwide b. 2.1. LCA approach2.2. PBTE and environmental impact payback time (PBTE)PBTE is a time period defined for a PV system to generate the same amount of energy that will c. 3.1. LCIA midpoint resultsTable 3 exhibits the LCIA midpoint scores of various LCA methods. For the climate change category, the LCIA midpoint result obtained from Re. This study addresses the environmental burden and key factors contributing to the burden of mono-Si PV cell production in China. Results show that the impact from the human toxicity. We gratefully acknowledge financial support from the Institute of Plateau Meteorology, CMA, Chengdu, China (LPM2014002), China Energy Conservation and Emission Re.



Article Content

Environmental impact assessment of monocrystalline silicon solar ...

DOI: 10.1016/J.JCLEPRO.2015.08.024 Corpus ID: 152423529; Environmental impact assessment of monocrystalline silicon solar photovoltaic cell production: a case study in China @article{Chen2016EnvironmentalIA, title={Environmental impact assessment of monocrystalline silicon solar photovoltaic cell production: a case study in China}, author={Wei Chen and ...

Pollutant payback time and environmental impact of Chinese multi ...

A Life Cycle Assessment (LCA), using the end-point damage model (CEDM) of impact assessment, was conducted, to analyse the environmental impacts and pollutant ...

Environmental impact assessment of monocrystalline silicon solar ...

Life cycle assessment on monocrystalline silicon (mono-Si) solar photovoltaic (PV) cell production in China is performed in the present study, aiming to evaluate the environmental burden, ...

Solar PV cell materials and technologies: Analyzing the recent ...

The photovoltaic effect is used by the photovoltaic cells (PV) to convert energy received from the solar radiation directly in to electrical energy .The union of two semiconductor regions presents the architecture of PV cells in Fig. 1, these semiconductors can be of p-type (materials with an excess of holes, called positive charges) or n-type (materials with excess of ...

(PDF) Analyzing the lifecycle of solar panels including raw material ...

Environmental Assessment of Solar Cell ... sustainable lithium-ion batteries. Solar Energy Materials and Solar Cells, 257, 112394 ... Insights for China from EU management of recycling end ...

Environmental Impact Assessment of crystalline solar photovoltaic ...

Photovoltaic panel waste assessment and embodied material flows in China, 2000-2050 ... A review on life cycle environmental impacts of emerging solar cells. Article. ... model to predict China's ...

Life cycle assessment of multicrystalline silicon photovoltaic cell ...

Abstract Energy crisis and environmental problems have increased the attention on solar power development and utilization. This study aims to identify the environmental effects associated with photovoltaic (PV) cell made up of multicrystalline silicon (multi-Si) in China by life cycle assessment. Results showed that multi-crystal solar PV technology provided significant ...

Environmental influence assessment of China's multi-crystalline ...

Abstract The environmental burden of multi-Si PV modules in China has been discussed in existing studies, however, their data are mostly from local enterprises, and none of their environmental assessment involves the decommissioning and recycling process. This study quantitatively assesses the life-cycle environmental impacts of Chinese Multi-crystalline ...

Environmental influence assessment of China's multi-crystalline ...

This shift can be attributed to advancements and innovations in solar cell technology, which include developments of various photovoltaic materials, such as thin film and tandem solar cells, in ...

Life-Cycle Assessment of China's Multi-crystalline ...

Multi-crystalline silicon PV production and PV module packaging are important manufacturing processes within the context of environmental impacts of the manufacture of PV modules in...

Environmental effects of China's solar photovoltaic industry during ...

Along with the expansion of China's solar PV market, available data on solar PV materials and academic papers on the environmental effects of China's solar PV industry are emerging and increasing in scope in recent years (Chen et al., 2015, Fu et al., 2015, Hong et al., 2016, Hou et al., 2016, Huang et al., 2017, Yang et al., 2015, Yao et al., 2014, Yu et al., 2017, ...

Life-cycle assessment of cradle-to-grave opportunities and ...

The last 4 decades of solar photovoltaic (PV) development has seen a range of proposed and viable technologies, spanning from conventional single-crystal (s-Si) and multicrystalline silicon (m-Si) to second generation panels such as amorphous silicon (a-Si), cadmium telluride (CdTe) and cadmium indium gallium selenium (CIGS). More recently, ...

Environmental effects of China's solar photovoltaic ...

Request PDF | Environmental effects of China's solar photovoltaic industry during 2011–2016: A life cycle assessment approach | Thanks to many government incentives, China has provided, at ...

Life-cycle assessment of China's multi-crystalline silicon photovoltaic ...

China has been the largest PV-manufacturing country since 2007, when it became the largest producer of PV modules in the world, shipping 1088 MW p of multi-crystalline silicon PV modules in that year. Fig. 1 shows China's total production of 10 GW p in 2010, which accounted for 45% of the worldwide market of PV modules (Li and Wang, 2011). Approximately ...

Environmental influence assessment of China's multi-crystalline ...

China is the largest exporter of solar cells in the world, as more than 50% of the global solar cell is produced in China (Qiu et al., 2015). Among the various kinds of solar cell modules produced in China, the amount of silicon cell account for more than 90%, in which mono silicon and multi-Si PV modules are in the majority.

Environmental impact assessment of the manufacture and use of ...

The PV power generation process generates a small amount of carbon dioxide. However, evaluating the emission reduction benefits of the PV industry solely based on the power generation process is not objective (Guo et al., 2019; Liu and van den Bergh, 2020; Resalati et al., 2022; Song et al., 2015) To gain a comprehensive understanding of the environmental benefits ...

(PDF) An overview of solar photovoltaic panels" end-of ...

End-of-life (EOL) solar panels may become a source of hazardous waste although there are enormous benefits globally from the growth in solar power generation.

Environmental Assessment of Solar Cell Materials

This article presents an analysis of the impact of the materials and technologies used on the result of the environmental analysis of PV installations. In the article a detailed ...

ENVIRONMENTAL ASSESSMENT OF SOLAR CELL MATERIALS

By using the energy of solar radiation, a photovoltaic cell converts energy without emitting harmful substances to the atmosphere, noise, and waste. Photovoltaics is the cleanest technology

Economic and Social Impact Assessment of China's ...

RESEARCH AND ANALYSIS Table 1 Characteristics of mc-Si PV modules in this study
Item Description Module size (mm) 1,482 × 992 × 35 Mass (kg) 16.8 Cell area (mm²) 156 × 156 No. of cells per ...

Environmental Effects of Technological Improvements ...

We analyzed the carbon emissions of the 280 MW solar cell production project of a leading global PV module company in China. The research results indicated that polysilicon companies should proactively develop ...

Life cycle assessment of multicrystalline silicon photovoltaic cell ...

The goals of this study are as follows: (a) introduce a Chinese database for multi-Si PV cell production, (b) identify the key factors that contribute to the overall environmental burden, (c) characterize the significant potential to improve raw materials and energy consumption, (d) determine the global standing of China in terms of environmental impact via ...

Environmental impact assessment of monocrystalline silicon solar ...

Along with the expansion of China's solar PV market, available data on solar PV materials and academic papers on the environmental effects of China's solar PV industry are emerging and increasing ...

The environmental factors affecting solar photovoltaic output

The global expansion of solar photovoltaics (PV) is central to the global energy transition. As governments aim to triple renewable energy capacity by 2030, solar PV is poised for rapid growth ...

Photovoltaics International Environmental footprinting of

Environmental impact assessment of a multicrystalline silicon PV module produced in china using the reciPe H endpoint method and Europe reciPe H/A normalization with weighting in ...

Environmental effects of China's solar photovoltaic industry during ...

Among these are topics evaluating the environmental effects of mono-crystalline silicon solar PV products: Chen et al. (2015) addressed the environmental burden of mono-Si ...

Environmental impact assessment of monocrystalline silicon solar ...

Life cycle assessment on monocrystalline silicon (mono-Si) solar photovoltaic (PV) cell production in China is performed in the present study, aiming to evaluate the environmental burden, identify key factors, and explore approaches for potential environmental improvement. Results show that the impact generated from the categories of human toxicity, ...

The use of recycled semiconductor material in crystalline silicon ...

This is the reason why the aim of this study is to include the environmental impact of recovering and recycling the semiconductor material from photovoltaic solar cells. Authors compare process of new solar cells production with or without recycled silicon material to confirm this assumption.

Life cycle assessment of a virtual power plant: ...

The PV modules and batteries are assumed to be manufactured in China and shipped to Auckland port in Aotearoa New Zealand. ... Koch TW, Volk TA, et al. (2022) The environmental life cycle assessment of electricity ...

Life cycle assessment of photovoltaic panels in China

Photovoltaic cell components are composed of photovoltaic cells, tempered glass, packaging materials, etc., in which photovoltaic cells play a role in power generation and is the core of ...

A comparative study on the combination of life cycle assessment ...

For example, studies have explored the environmental repercussions of China's burgeoning solar energy sector, propelled by policy subsidies (Hong et al., 2016; Huang et al., 2017; Yu et al., 2017). The LCA method has been instrumental in evaluating the environmental trade-offs of China's solar photovoltaic industry (Xu et al., 2018).

Life cycle assessment of multicrystalline silicon photovoltaic cell ...

Along with the expansion of China's solar PV market, available data on solar PV materials and academic papers on the environmental effects of China's solar PV industry are emerging and increasing ...

Review on Life Cycle Assessment of Solar ...

Solar energy can be directly converted into electric energy by solar PV cells (or solar cells). These devices have practically zero emissions of pollutants during the operation phase, so they can be

Environmental impacts of solar photovoltaic systems: ...

It was concluded that the carbon footprint of the PV system could be decreased further by one order of magnitude using novel manufacturing materials. Recycling solar cell materials can also ...

Environmental influence assessment of China's multi-crystalline ...

Among the various kinds of solar cell modules produced in China, the amount of silicon cell account for more than 90%, in which mono silicon and multi-Si PV modules are in ...

The environmental factors affecting solar photovoltaic output

As solar PV installations move beyond the mid-to-high latitudes of the United States, Europe, and China into hotter lower-latitude regions like Africa and Southeast Asia, PV systems will encounter higher dust levels, temperatures, and solar irradiance. Different cell materials, mitigation technologies and operating strategies will be needed to ...

Environmental impacts of solar photovoltaic systems: A critical review ...

Environmental impacts of solar photovoltaic systems: A critical review of recent progress and future outlook ... Recycling solar cell materials can also contribute up to a 42% reduction in GHG emissions. The present study offers a valuable management strategy that can be used to improve the sustainability of PV manufacturing processes, improve ...

Life-cycle assessment of China's multi-crystalline silicon photovoltaic ...

The solar power resource is abundant, widely available, and one of the major renewable energy sources with great development potential. The primary solar power technology used worldwide is multi-crystalline silicon photovoltaic (PV) modules, which converts the sun's light directly into electricity (Zhang and He, 2013). As energy shortages and environmental ...

Facilitating circularity of end-of-life photovoltaic in China by mid ...

Here, we develop a multi-model coupling, multi-scale assessment framework, to forecast the spatiotemporal distribution of PV wastes during 2020-2050, and to explore the resource, environmental ...

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://pamacamper.it>

Email: info@pamacamper.it

Phone: +39 331 478 9250

Address: Via Roma 12, 20121 Milano, Italy

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