Finally, in recent years PV manufacturing has experienced a transition away from its traditional locations, such as Germany, Japan, and the USA, towards China: in 2015, China and Taiwan accounted for ?74 % of global PV production. 10 From the LCA perspective, this has two opposing effects. Firstly, it is likely to worsen environmental impacts ...

The IEA Photovoltaic Power Systems Programme (IEA PVPS) is one of the TCP"s within the IEA and was established in 1993. The mission of the programme is to "enhance the international ...

In particular, the LCA approach integrates knowledge of the environmental impacts of generating electricity using PV systems, and 1 kWh net electricity generation is a commonly used functional ...

Life cycle assessment (LCA) is a comprehensive method used to investigate the environmental impacts and energy use of a product throughout its entire life cycle. For solar photovoltaic (PV) technologies, LCA studies need to be conducted to address environmental and energy issues and foster the development of PV technologies in a sustainable manner.

Guidance is given on PV-specific parameters used as inputs in LCA and on choices and assumptions in life cycle inventory (LCI) data analysis and on implementation of modelling approaches. A consistent approach towards system modeling, the functional unit, the system boundaries, water use modeling, and the allocation aspect enhances the ...

PV Life Cycle Assessment (LCA) is a structured, comprehensive method of quantifying and assessing material and energy flows and their associated emissions from manufacturing, transport, installation, use and end of life. ... published in 2021 based on the Task 12 LCA Report from 2020 (and based on the 2018 update of the LCA database). A newer ...

In Table 2, representative studies on LCA of PV/wind hybrid systems are presented. It can be noted that on-grid and off-grid systems as well as battery storage and Si-based PV panels were considered. The lifespan of the hybrid systems ranged from 20 to 30 years.

Life Cycle Assessment (LCA) is a structured, comprehensive method of quantifying material- and energy-flows and their associated emissions caused in the life cycle 1 of goods and services. ...

The objective of this paper is to summarize and update the current literature of LCA applied to different types of grid-connected PV, as well as to critically analyze the results related to energy and environmental impacts ...

In this section, two prevailing impact indicators in the LCA studies on PV technologies, namely, the primary energy consumption and the carbon footprint (36-43), are estimated and compared between the two

investigated tandem architectures as well as with benchmark silicon PVs. Primary energy consumption accounts for the primary energy ...

The life cycle assessment (LCA) of EOL PV modules is becoming a hotspot. This study summarizes the research framework and common tools used in LCA and describes the C-Si PV panel structure configuration and recycling technical routes of PV modules. It also compares the impacts of landfilling, downcycling, and upcycling on six impact ...

The current report presents the latest consensus LCA results among the authors, PV LCA experts in North America, Europe and Asia. At this time consensus is limited to five technologies for which there are well-established and up-to-date LCI data: mono- and multi-crystalline Si, CdTe CIGS, and high concentration PV (HCPV) using III/V cells. The ...

Purpose Thin film copper indium gallium (di)selenide (CIGS) photovoltaic (PV) modules show promise for significant growth. The Photovoltaics Manufacturing Consortium (PVMC) is leading research and development of CIGS in New York State. This study presents the results of a life cycle assessment (LCA) study of CIGS technology, currently being advanced ...

The current report presents the latest consensus life cycle inventories among the authors, PV LCA experts in North America, Europe, Asia and Australia. At this time consensus is limited to four technologies for which there are well-established and up-to-date life cycle inventory (LCI) data (mono- and multi-crystalline Si, CdTe, CIGS, as well as ...

Guidance is given on PV-specific parameters used as inputs in LCA and on choices and assumptions in life cycle inventory (LCI) analysis and on implementation of modeling approaches. A consistent approach towards system modeling, the functional unit, the system boundaries, water use modeling and the allocation aspects enhances the credibility of ...

The present article focuses on a cradle-to-grave life cycle assessment (LCA) of the most widely adopted solar photovoltaic power generation technologies, viz., mono-crystalline silicon (mono-Si), multi-crystalline silicon (multi-Si), amorphous silicon (a-Si) and cadmium telluride (CdTe) energy technologies, based on ReCiPe life cycle impact assessment method. ...

In this study, we present a cradle-to-grave LCA of a typical silicon U.S. utility-scale PV (UPV) installation that is consistent with the utility system features documented in the National ...

LCA of electricity generation ... Photovoltaic power Geothermal power Impact assessment over 2010-2050 period Two IEA scenarios (Baseline, Blue Map) and 9 world regions n-y-ces-s-sks-and-e-s-w-on-es-y. Life cycle assessment A method and tool for attributing environmental impacts to

This study provides a model for regional planning of solar PV technology by using the methods of LCA and

MOO. The LCA results show that "toxic" environmental impact is the dominant environmental impact, mainly refers to industrial pollutants, heavy metals, carcinogens and other substances discharged into the environment during the ...

To ensure consistency between photovoltaics (PV) LCA studies, the IEA recently published guidelines (Fthenakis et al., 2011). They represent a consensus among PV-LCA experts in North America, Europe, and Asia, for assumptions about PV performance, process input, and emissions allocation, methods of analysis, and reporting of the findings.

The paper presents the results of a life cycle assessment (LCA) of the electric generation by means of photovoltaic panels. It considers mass and energy flows over the whole production process starting from silica extraction to the final panel assembling, considering the most advanced and consolidate technologies for polycrystalline silicon panel production.

Photovoltaic systems represent a leading part of the market in the renewable energies sector. Contemporary technology offers possibilities to improve systems converting sun energy, especially for the efficiency of modules. The paper focuses on current concentrated photovoltaic (CPV) technologies, presenting data for solar cells and modules working under ...

Electricity generation is a key contributor to global emissions of greenhouse gases (GHG), NO x and SO 2 and their related environmental impact. A critical review of 167 case studies involving the life cycle assessment (LCA) of electricity generation based on hard coal, lignite, natural gas, oil, nuclear, biomass, hydroelectric, solar photovoltaic (PV) and wind was ...

Life Cycle Assessment (LCA) is a structured, comprehensive method of quantifying material- and energy-flows and their associated impacts in the life cycles of products (i.e., goods and ...

a need to focus on which PV sub-assembly carries the largest environmental impact out of the panel, mounting system, inverter and electrical installation. By contrast, Bilich et al. (2017) conducted an LCA of three remote PV micro-grid power generation and distribution systems, such as PV-bat-tery,PV-dieselandPV-battery-dieselbasedonCdTesolarcell.

Life Cycle Assessment (LCA) is a structured, comprehensive method of quantifying material- and energy-flows and their associated emissions caused in the life cycle of goods and services. ...

The following are some examples: different types of LCA (economic LCA and so on); multiple kinds of PV technologies (devices for high-temperature applications; hybrid PV systems: e.g. PV installations which combine PV panels and wind turbines or PV panels and Diesel generators, etc.); a wide variety of smart systems (smart cars, smart factories ...

GHG emissions from c-Si PV technologies. Solar irradiation directly influences the power generated from a

PV system and varies by location and season, time of day, and weather. In the LCA literature on PV technologies, the assumed solar irradiation ranged from 900 to 2,200 kWh/m2/yr. When these values were adjusted to 1,700

LCA studies for PV technology began nearly forty years - the first research study on PV systems from the life-cycle perspective started in 1976 [16]. The most common indicators used to evaluate sustainability and environmental benefits include energy payback time (T EPBT), energy yield ratio (EYR), and greenhouse gas (GHG) emission [17 ...

The objective of this paper is to summarize and update the current literature of LCA applied to different types of grid-connected PV, as well as to critically analyze the results related to energy ...