

## European Solar and Energy Storage Solutions

# Upstream and downstream of photovoltaic panels



## Overview

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Upstream: silicon material; Midstream: solar cell (wafer-based; thin-film) and solar cell module; Downstream: solar photovoltaic system. Source: adapted from PIDA (2012) [ 1 ].

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For those unwilling to wait for the solar industry to go through further maturation via vertical integration, downstream power players like SolarCity or Vivint Solar are likely superior.

Based on a sample of globally leading solar PV manufacturers originated in Canada, China, Germany, South Korea, and the United States of America we conduct a detailed analysis and provide insights into solar PV industry upstream and downstream network dynamics examined for the period 2007–2023.

According to Haley and Schuler, 2011, Hu and Yeh, 2013, Liu and Lin, 2019, Su, 2013, Zhang and Gallagher, 2016, the activities of the main value chain of distributed generation of photovoltaic energy are divided into upstream, midstream, and downstream.

Solar photovoltaic (PV) energy, or the capture of solar radiation through photovoltaic panels to produce electricity, is considered one of the most promising markets in the portfolio of renewable energies, due to its potential to mitigate global warming and meet the CO<sub>2</sub> reduction targets imposed by national governments and international . What is the difference between upstream and downstream solar companies?

In the solar industry, upstream companies are those involved in the production of solar panels and other components, while downstream companies deal with the installation, sale, and maintenance of solar systems. There is a large disparity in gross margins between these two types of companies. Downstream companies often face higher barriers of entry due to

brand and sector complexity. The solar industry has undergone significant maturation in the past decade.

What is the upstream sector of a photovoltaic cell?

As can be seen in Table 2, the upstream sector includes the initial stages for the formation of the photovoltaic cell, such as silica extraction, production of solar grade silicon, silicon ingot, and silicon wafer.

Why is the upstream chain important in photovoltaic industry?

It was found that the upstream chain involves specific knowledge and high technological capacity, creating greater added value and obtaining the highest profits within the global photovoltaic industry.

What's the difference between a midstream and a downstream PV industry?

The industry's midstream produces batteries, cell components, and related products. The downstream is an integration of the PV installation system. China's PV industry that produces silicon of high purity relies on foreign countries for raw materials, key technology and equipment, and market demand.

What are the effects of upstream PV industrial policies on downstream products?

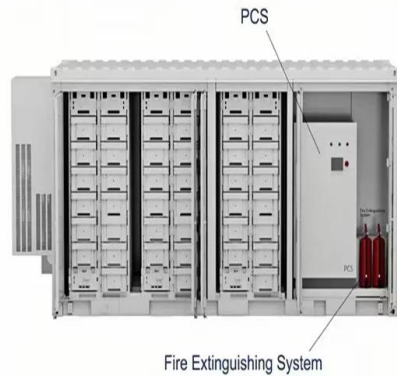
In general, (1) For the impacts of upstream PV industrial policies on the downstream products, the policy-conducting effects are not obvious, that is, one unit of price drop due to the subsidy for the upstream PV enterprises leads to 0.016-unit price drop of downstream products, which is mainly due to the nature of the PV industry in China.

What is the difference between brand name and downstream solar business?

Brand name plays a huge role in the downstream markets of financing, leases/ppa, etc. in the solar industry, whereas the downstream solar business is more of a service than a product. Individuals may view different companies' panels as substitute products (panels are mainly used for functionality).

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### Renewable Energy & New Downstream

Distributed Energy Resources (DER) valuation tool. Using our DER tool, we evaluate granular project economics for DER installations across technologies (storage, solar, energy efficiency, and demand response), geographies, and ...

### View of the upstream or supply side of the PV value chain.

Conversely, PV panels also contain valuable metals and materials that, if recovered and reused, can significantly contribute to promoting a circular economy in the solar energy sector [12, ...



### Competing in the Global Solar Photovoltaic Industry: The Case of ...

Companies that comprise the value chain of the solar photovoltaic industry are categorized as (1) upstream: silicon materials and silicon wafer, (2) midstream: solar cells and ...

### Development and Upstream Integration of the ...

In this sense, the development of a photovoltaic

industry in Mexico and its respective value chain, has been evaluated in various studies; considering the upstream and downstream value chain together [95, 96, 97]; ...



## Development and Upstream Integration of the ...

However, as seen in the previous section, the use of solar energy requires the use of PV technology which totally depends on access to Poly-Si, which, being present in each of the steps of the chain of rising value ...

## The Impact of Policy Intensity on Overcapacity in Low ...

Photovoltaic power generation is a low-carbon energy and has significant environmental protection and economic benefits (Lei et al., Financial support has positive effect on spare capacity of PV enterprises in upstream ...



## Analysis of the Photovoltaic Market in China: Optimization of

industrial chain structures, and the market fluctuation between upstream and downstream industrial chains changes periodically. However, in the long run, the photovoltaic industry is on ...

## Exploring the Solar PV Value Chain: Opportunities and ...

The solar PV value chain can be broadly segmented into upstream, midstream, and downstream sectors. The upstream sector involves the production of raw materials and manufacturing of solar cells and modules. The ...



## Current Situation and Trend of Taiwan's Solar Energy ...

There are significant features that vary within the upstream and downstream levels of the solar energy industry: Upstream: Production of Silicon wafers and polysilicon materials (refining and processing raw materials into ...

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