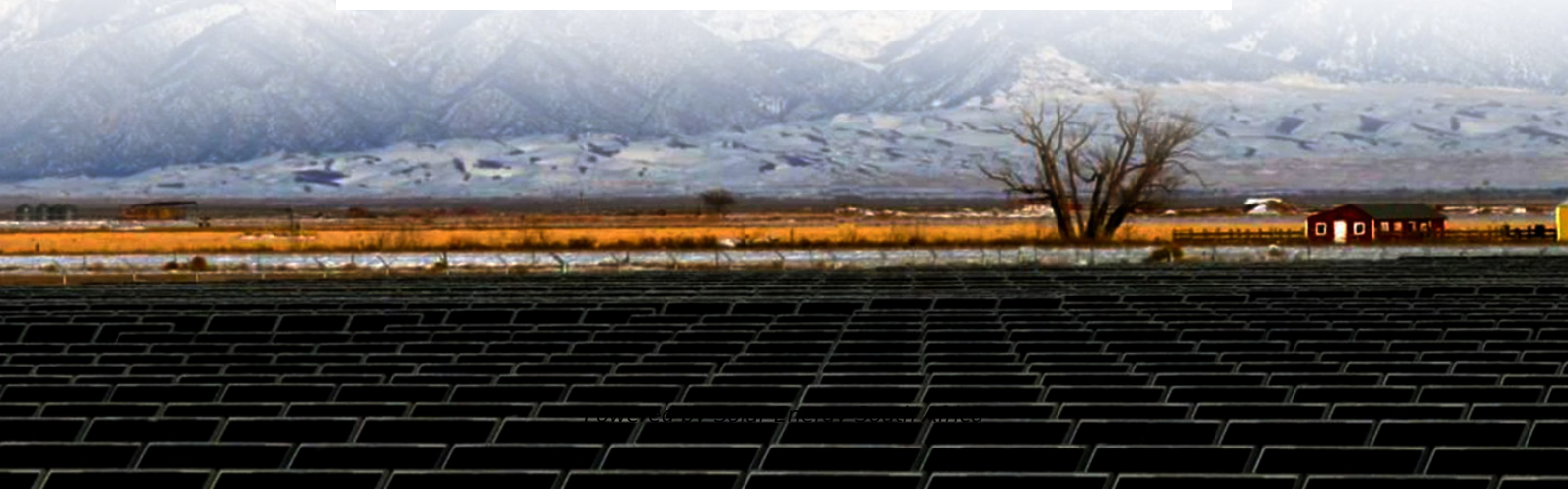


## Solar Energy South Africa

# Waste photovoltaic panel silicon wafer extraction equipment



## Overview

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How are silicon PV modules recycled?

Recycling of silicon PV modules essentially involves three main stages : (i) manual/mechanical disassembly of decommissioned PV panels which yields the aluminum frame, junction boxes and copper cables; (ii) delamination via mechanical, chemical or thermal [3, 13] treatment for glass recovery and (iii) leaching/etching for metal extraction.

How can 99% silicon be obtained from waste PV modules?

Silicon is one of the valuable materials in waste PV modules, and numerous researchers have conducted a series of studies to obtain silicon. Yi et al. proposed a method that involves leaching Ag, Al, and other metal ions using HNO<sub>3</sub> /NaOH solution, obtaining 99% silicon.

Will PV waste panels reduce the need for raw silicon extraction?

On the other hand, silicon is included in the 2020 EU list of critical raw materials (Raw Materials Information System (europa.eu)); thus, the recovered silicon from PV waste panels would decrease the need for raw silicon extraction and improve the circularity of the European economy.

Are silicon wafers suitable for photovoltaic module production?

The favorable thickness (165 μm), resistivity (1.02–2.28 Ω•cm) and carrier lifetime (1.12–2.47 μs) of the recovered silicon wafers, along with their ultralow reflectivity (5–15%) compared with commercial silicon wafers, make them excellent viable options for high-efficient photovoltaic module production.

What is the recycling process for silicon-based PV panels?

In this review article, the complete recycling process is systematically summarized into two main sections: disassembly and delamination treatment for silicon-based PV panels, involving physical, thermal, and chemical

treatment, and the retrieval of valuable metals (silicon, silver, copper, tin, etc.).

Why is silicon wafer recovery important for solar panels?

Ultimately, silicon wafer recovery is indispensable for the solar panel industry, facilitating efficient resource usage, extending product lifespan, and improving overall performance.

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### Advance of Sustainable Energy Materials: Technology ...

Modules based on c-Si cells account for more than 90% of the photovoltaic capacity installed worldwide, which is why the analysis in this paper focusses on this cell type. This study provides an overview of the current state ...

### Comprehensive Review of Crystalline Silicon Solar ...

This review addresses the growing need for the efficient recycling of crystalline silicon photovoltaic modules (PVMs), in the context of global solar energy adoption and the impending surge in end-of-life (EoL) ...



### Purification of silicon from waste photovoltaic cells and ...

The results show that alkali/acid leaching can effectively remove the main impurities and obtain high purity silicon (~99.86%). The resulting P<sub>Si</sub>/Li/N@C composite exhibits a high capacity of 685.2 mA h g<sup>-1</sup> after 100 ...

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