

Endurans[®] HP backsheets

A PFAS-free alternative for the solar industry

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Introducing Endurans[®] Solar

Experts in polymer films for the solar industry



2011-2021

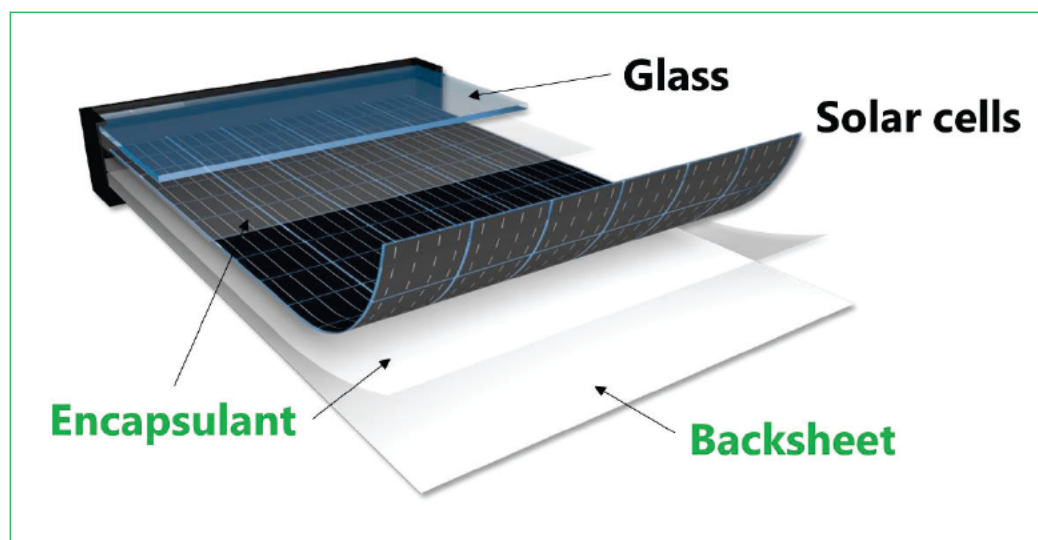


since 2021

+



since 2023



We believe that the solar industry has a huge role to play in creating a better, more sustainable future for our planet.

And we are making this a reality by boosting the performance of PV modules and developing solutions that are circular by design.

Backsheet's: market, materials & requirements

Fluoropolymers are current choice of material in a China dominated market

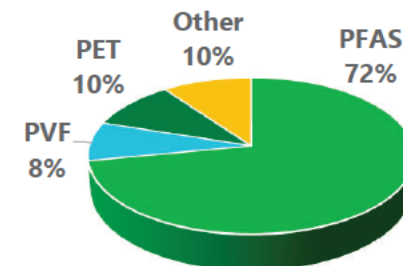


Traditional PET backsheet

Classification by outer layer:

Market shares 2022

Main PFAS resins:
FEVE resin (fluoroethylene vinyl ether)
PVDF resin (polyvinylidene difluoride)

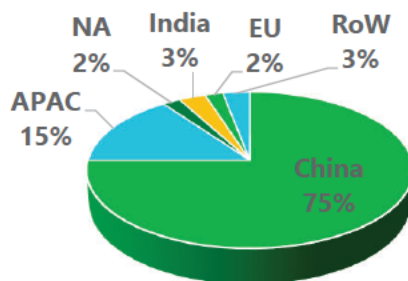


Source: TaiyangNews 2023

Global backsheet market:

2021 polymeric backsheet consumption reached about 750mln.m²

Market by region 2021



Source: IEA 2022

Main product requirements:

- 30-year outdoor protection & stability
- Bankable
- Lowest cost

Endurans® HPO backsheet technology

Well-known material & manufacturing technology tailored for Solar PV

air side



Endurans® HP backsheet

HIGH PERFORMANCE CO-EXTRUDED POLYOLEFIN TECHNOLOGY

Always a **strong polyolefin core**
moisture & UV resistant

Made via **co-extrusion** for
ultimate performance

Intrinsic film properties

- Excellent UV & hydrolysis resistance
- Abrasion & acid resistance
- High water barrier & acetic acid permeability
- High electrical insulation
- Strong interlayer adhesion
- Low-cost raw material
- Recyclable & low carbon footprint



Challenges

- Replacing a material with one of the *strongest* molecular bonds (F-H) in an application that sets *long lifetime* requirements (30+ yr) under *extreme outdoor* conditions is a huge **technical challenge**.
- In a market that is ruled by **bankability**, the introduction of a new material concept is challenging.
- The lower environmental impact of being **PFAS-free** was and is of no value at all, in the PV market.
- Changing the **mindset and regulations** towards the acceptance and/or promotion of environmental friendly solutions is a long and ongoing process.
- The **business environment** of the PV industry is extremely dynamic and challenging, especially for innovators, with high price pressure, unpredictable regulatory changes, short technology cycles, dominant Chinese competition, etc.

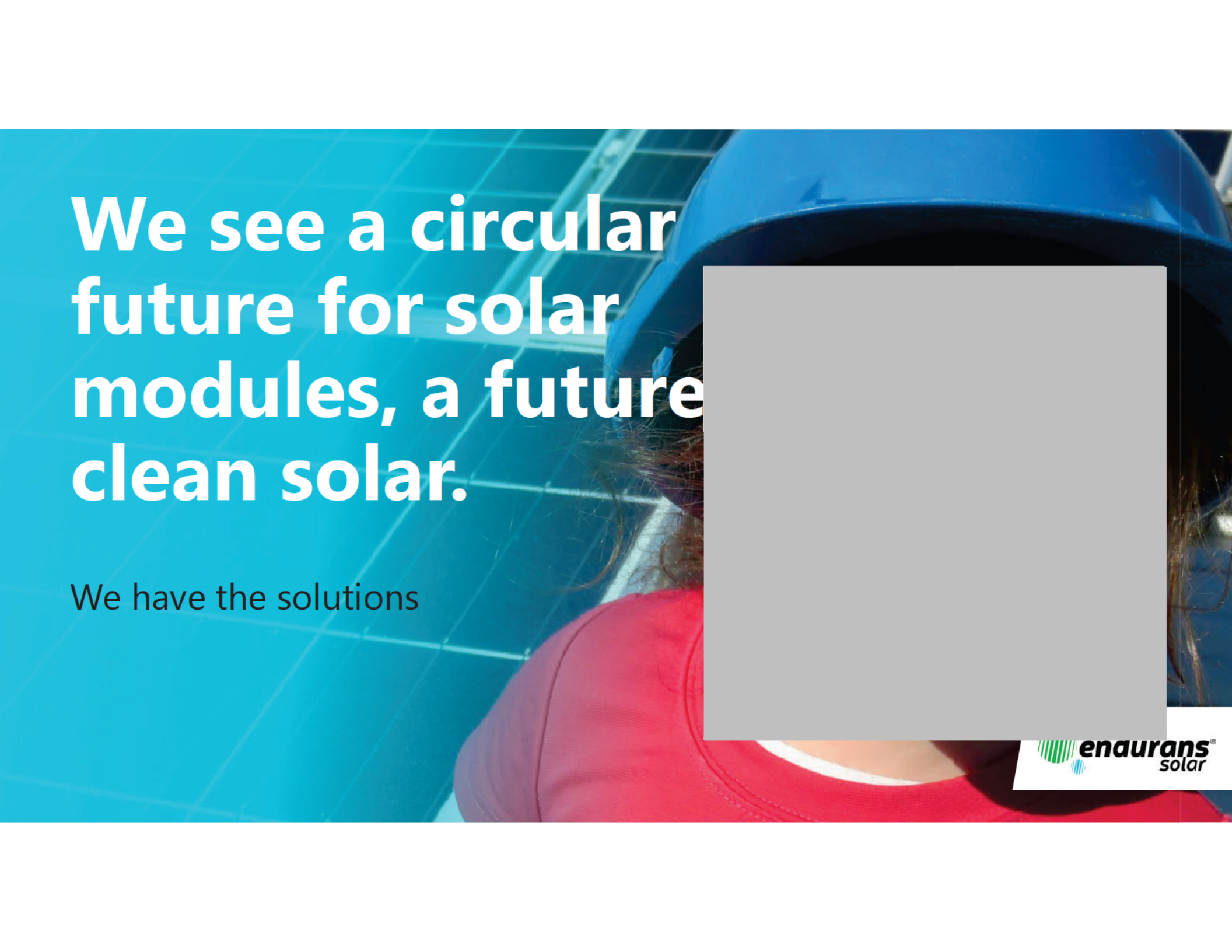


Our path forward

- We have built a 9 year performance track record.
- We lost and withdrew from our 'main' market (China) due to unsustainable market conditions.
- The market most advanced in accepting environmental friendly products, the EU, has evaporated due to failing industry policy.
- We have shifted our focus towards the semi-protected market of the USA, with a production site in Nashua, NH and a planned expansion.

Conditions: level playing field + environmental policies



A person wearing a blue hard hat and a red shirt is working on solar panels. The background is a close-up of the solar panels, which are blue with white grid lines. The person's face is obscured by a large grey rectangle.

We see a circular future for solar modules, a future clean solar.

We have the solutions

Same sun. More power.™

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