



**ULTRA LOW-CARBON**  
**SOLAR ALLIANCE**

# Building a sustainable solar supply chain:

Manufacturing trends and how  
you can shape them.

A stylized sun graphic is positioned on the left side of the slide. It features a large, solid orange circle at its center, surrounded by a ring of orange rectangular rays of varying lengths. The entire graphic is set against a background with a vertical orange-to-red gradient.

1

# THE SOLAR SUPPLY CHAIN

# Rapid growth and concentration



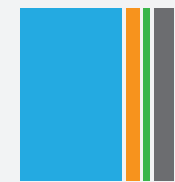
Polysilicon | Wafer | Cell | Module

2010

CHINA



NA/EUR



OTHER



Total global manufacturing  
 $\approx 24$  GW

2020

CHINA



NA/EUR



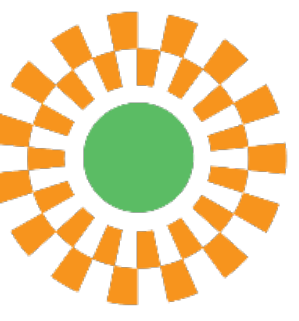
OTHER



Total global manufacturing  
 $\approx 400$  GW

Production (GW)

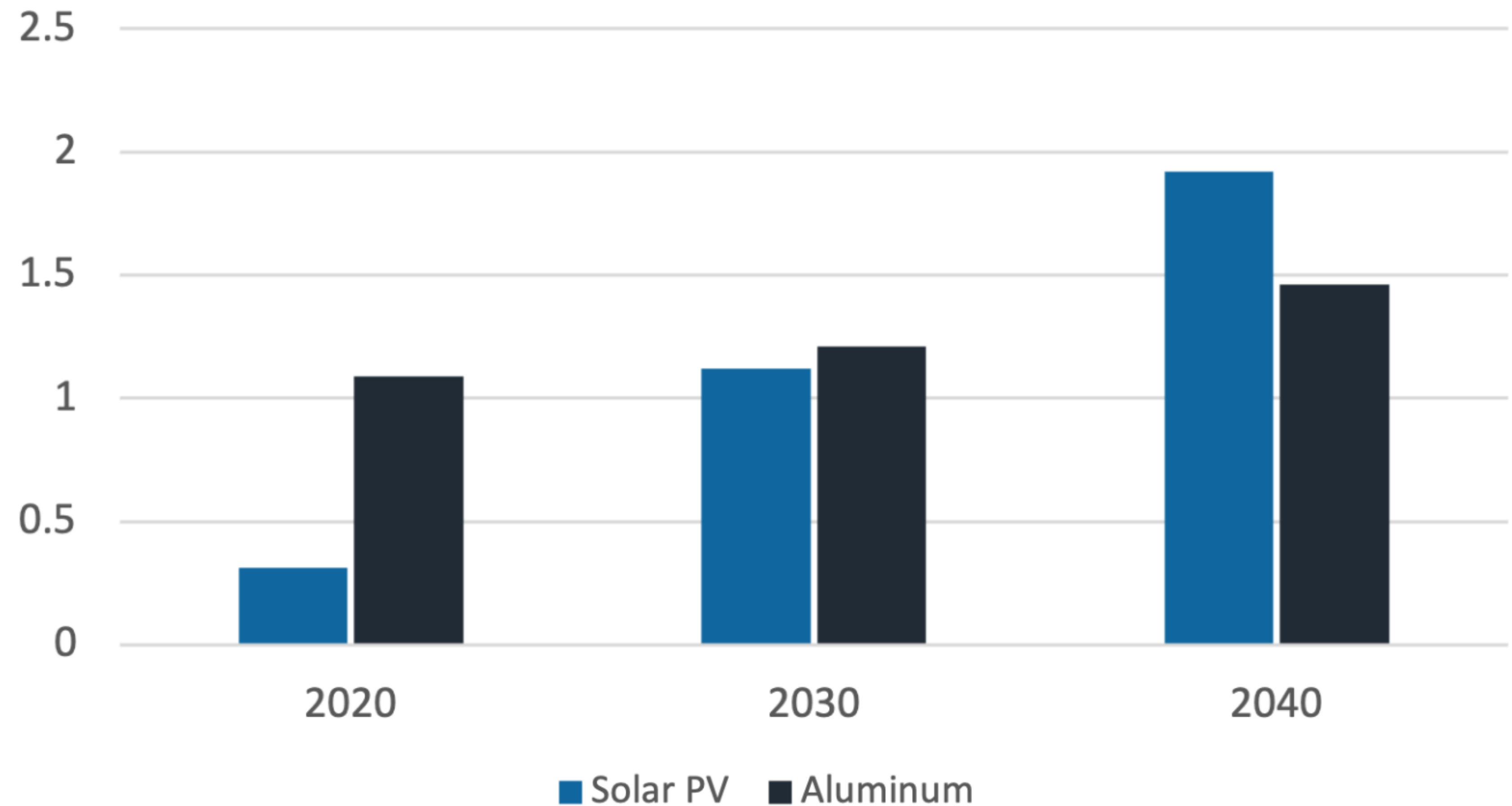
Solar manufacturing has expanded dramatically in recent decades, with most of the growth concentrated in China.



## Solar manufacturing emissions under a business as usual scenario

Solar manufacturing emissions total 14-18 billion tons CO<sub>2</sub> over this period absent changes in supply chain.

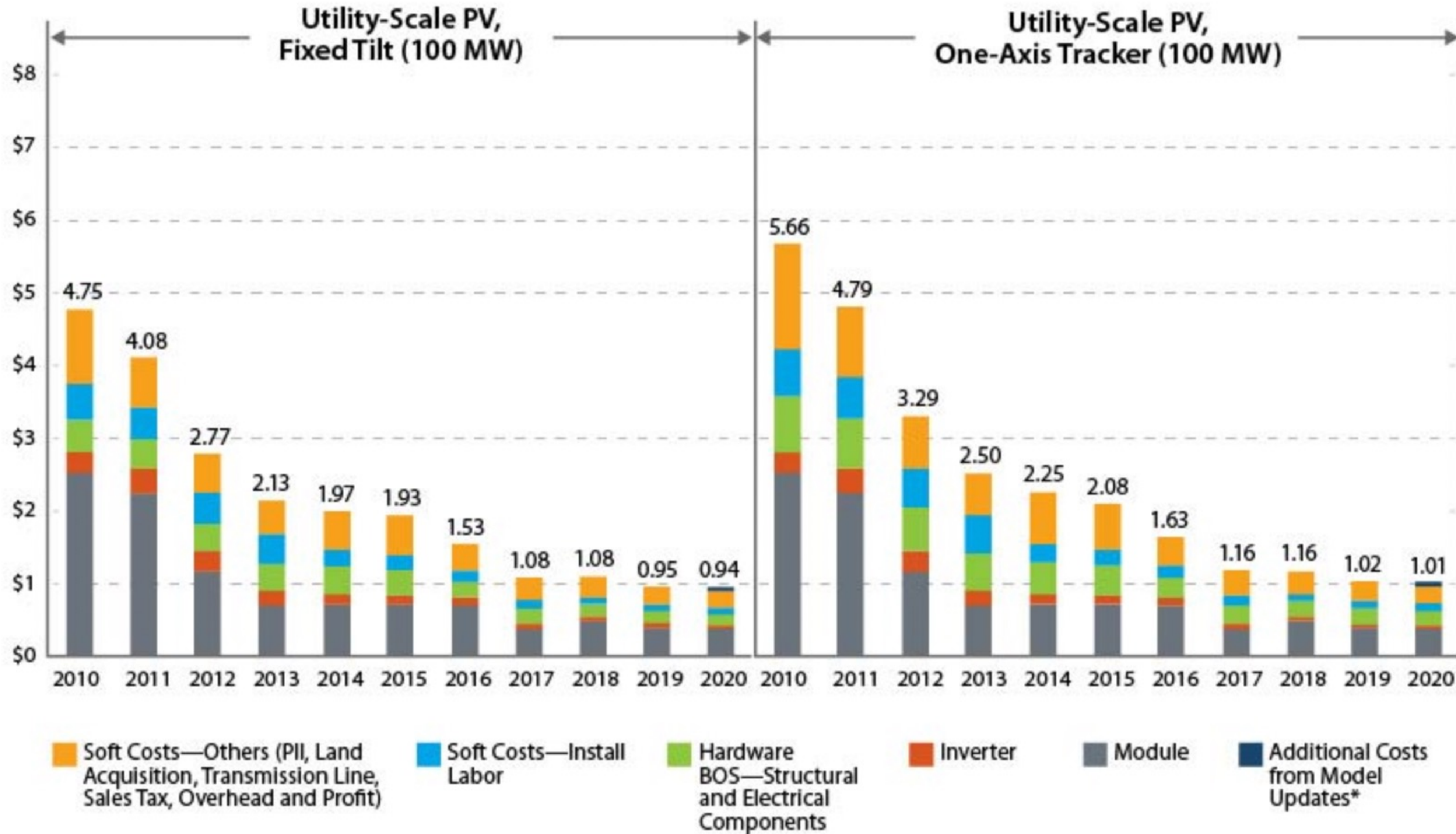
Projected global emissions from solar manufacturing could exceed that of aluminum production, a major emitter.



Clean Energy Buyers Institute “Low-Carbon Solar: Enabling Sustainable Growth and Raising the Industry Standard.” September 2021. pg. 7.



# Rapid scaling, declining prices





# Non-Chinese supply chain 50% less carbon intensive

Reflects lower carbon grid energy inputs, greater energy efficiency and technology innovation.

ultra low-carbon solar

Chinese supply chain solar panels

Conclusion of studies by Argonne National Labs & Northwestern University and Michigan State University.



# The current path – high carbon emissions



[80%

**OF SOLAR PANELS**

COME FROM THE HIGH-CARBON  
CHINESE SUPPLY CHAIN

*Reuters, December 2020*





# The current path – unreliable supply



EMERGING MARKETS MAY 17, 2012 / 3:56 PM / UPDATED 10 YEARS AGO



## U.S. sets new tariffs on Chinese solar imports

Thu 17 May 2012 17:54 EDT

US commerce department brings heavy tariffs against Chinese solar panels

Investigation finds China kept prices low with subsidies, but some in US warn tariff will slow adoption of solar energy

2021-2022

Global supply chain squeeze, soaring costs threaten solar energy boom

June 9, 2021  
1:58 AM EDT



SHINE BLOCKERS

Published November 1, 2021

Supply chain chaos threatens the growth of solar energy

QUARTZ

2012

Solar industry: We're in 'most serious crisis' in history

By David Iaconangelo | 04/06/2022 07:21 AM EDT



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## RECENT SUPPLY CHAIN TRENDS



# Growing attention to sustainability



Amazon extends position as world's largest corporate buyer of renewable energy

## A greener PV

By Jules Scully

April 22, 2022



### CEBI Low-Carbon Solar Resources

#### Low-carbon Solar Primer



An introduction to solar PV supply chain challenges and the opportunity for energy customers to take action now toward decarbonization

#### Letter of Intent



A letter for suppliers to signal energy customers' collective intent to prioritize embodied carbon in solar PV procurement

#### RFP Guidance



An overview of how to integrate low-carbon solar preferences into procurement documents

#### Embodied Carbon Analysis



An overview of key embodied carbon analysis terminology and documentation, along with existing national frameworks



# Buyers seeking more secure supply



## Lightsource bp and bp Sign Multi-Year Agreement for up to 5.4GW of First Solar Modules

NOVEMBER 22, 2021

- Order includes up to 4.3GW for Lightsource bp projects and up to 1.1GW for bp projects
- Companies to benefit from First Solar's technology roadmap with scheduled deliveries from 2023 to 2025

## First Solar bags two module orders totaling 4.75 GW

The US manufacturer secured this week two solar module supply deals from Origis Energy and Silicon Ranch, respectively.

## First Solar nabs 1.2-GW module order from Swift Current

## Maxeon secures solar panel supply order from Cypress Creek Renewables

Helene to supply up to 250MW of US-made modules to C&I solar developer Altus Power

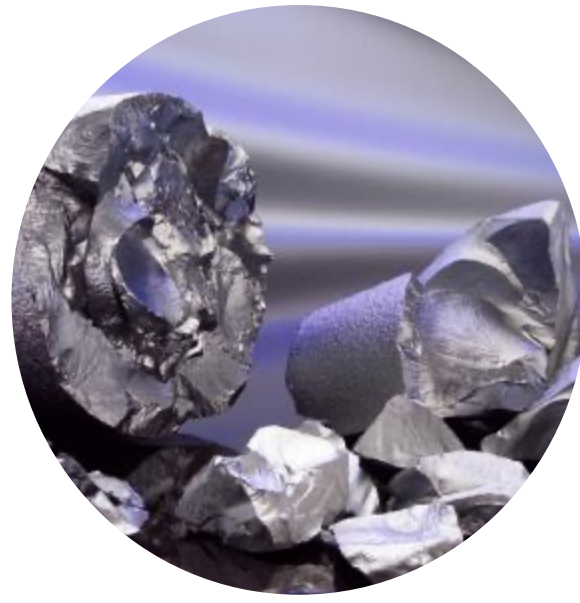
## OCI secures \$1.2 billion polysilicon order from Hanwha Solutions



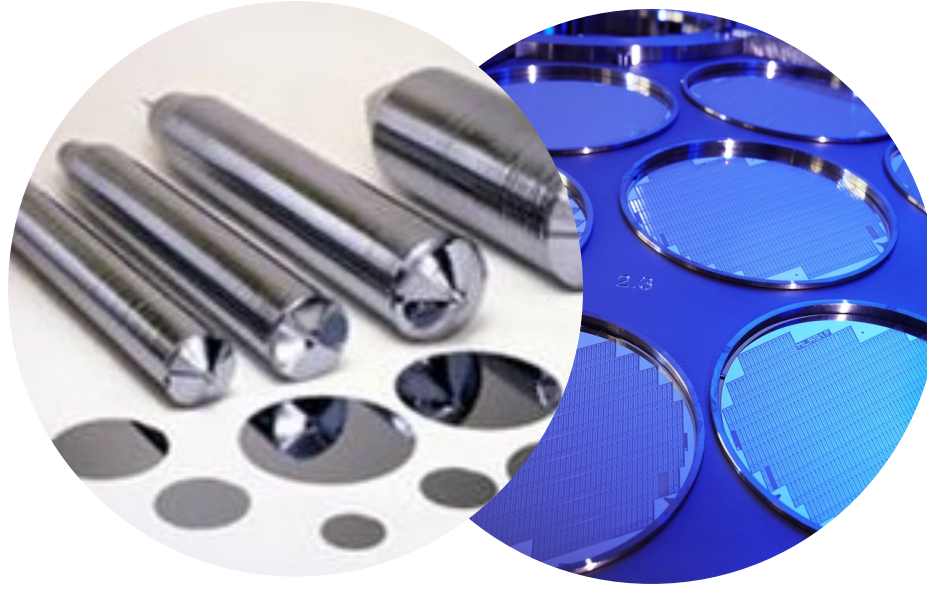
# Examples of capacity expansion beyond China



**Metalurgical  
Grade Silicon**  
U.S.



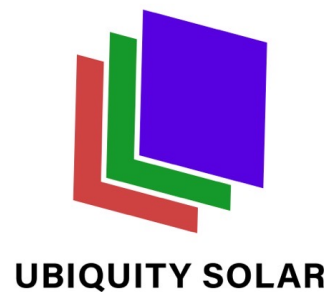
**Polysilicon**  
U.S., Malaysia



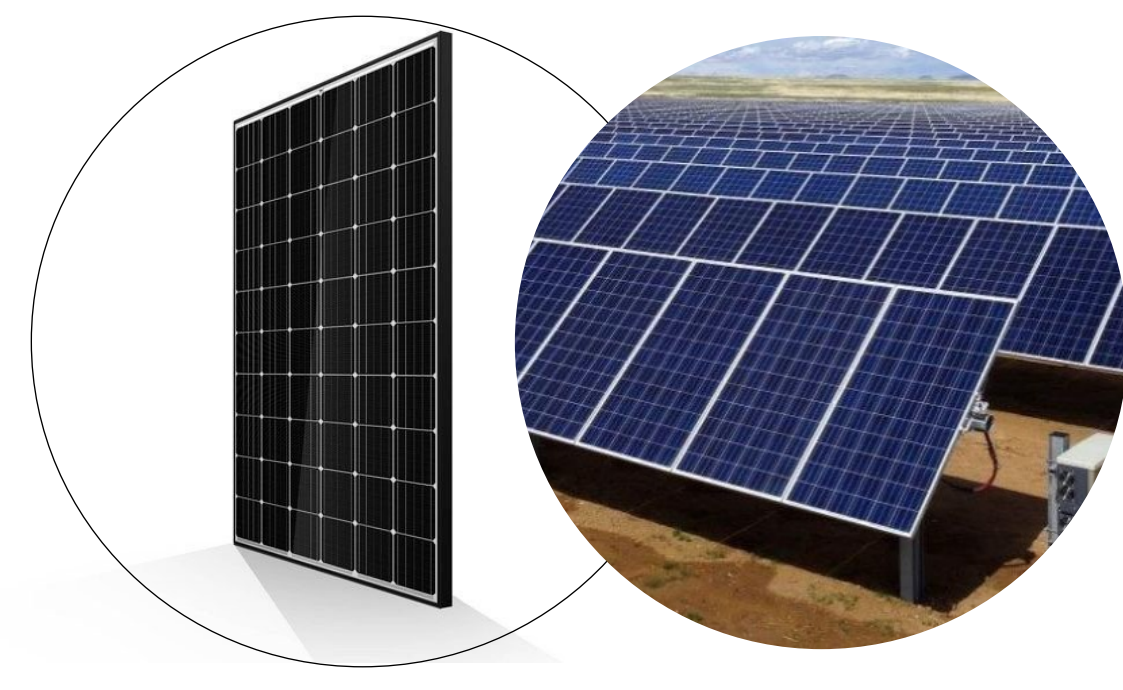
**Ingots/Wafers**  
Vietnam, U.S., India



**Cells**  
U.S., Sweden, Germany,  
Australia, Italy



EXEGER



**Modules/Panels**  
France, Taiwan, India, Lithuania,  
Australia, Cambodia, Germany, U.S.



swiss solar



maxeon



75 GW of low-carbon poly anchors ex-China supply chain



A stylized sunburst graphic is positioned on the left side of the slide. It features a large, solid orange circle at its center. Surrounding this circle are several concentric rings of orange segments. The segments in the outer rings are wedge-shaped and radiate outwards, creating a sunburst effect. The segments are in various shades of orange, with some being lighter and some being darker, adding depth to the graphic.

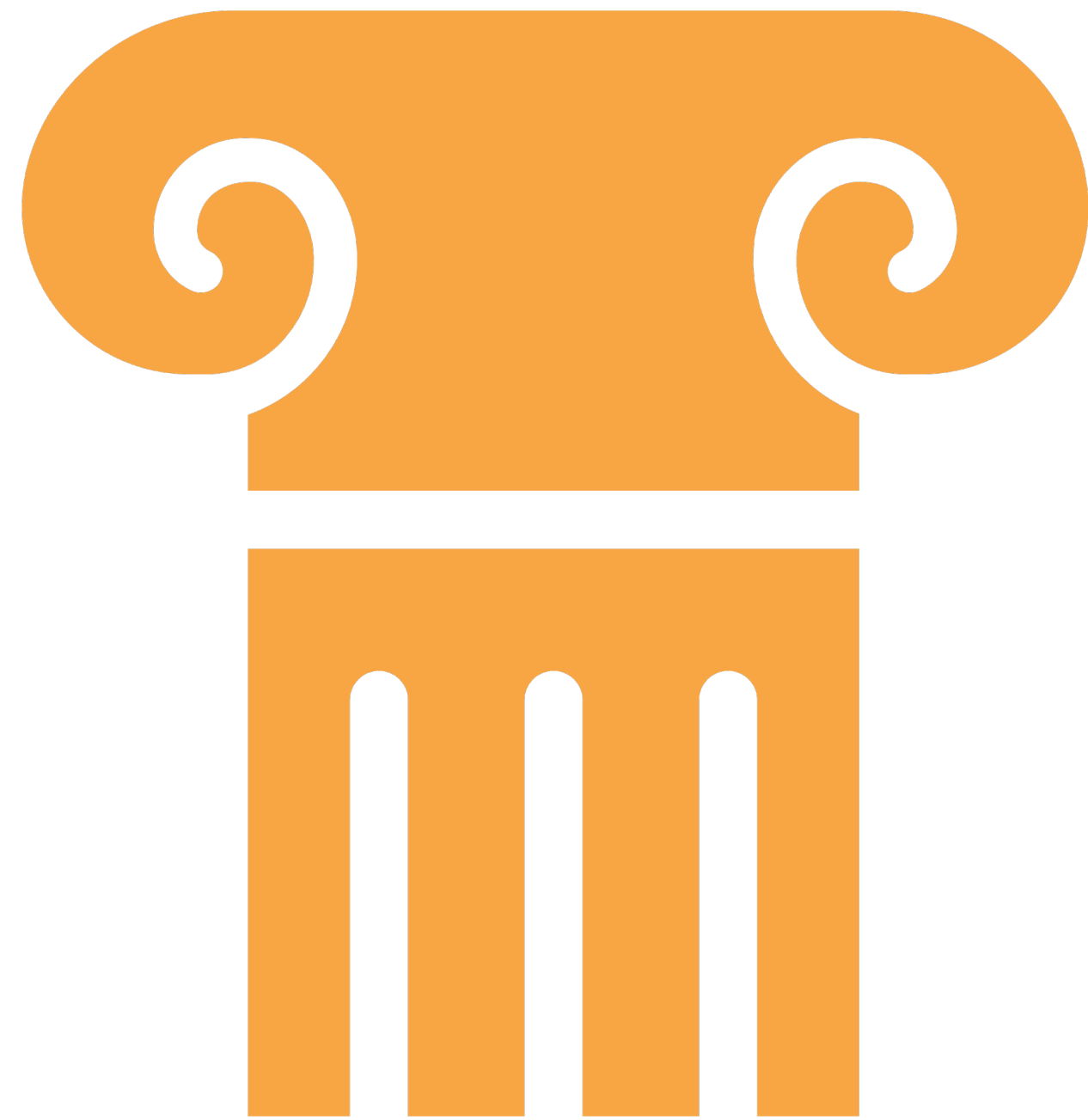
3

# ACCELERATING A BETTER SUPPLY CHAIN

# Pathway to a better solar supply

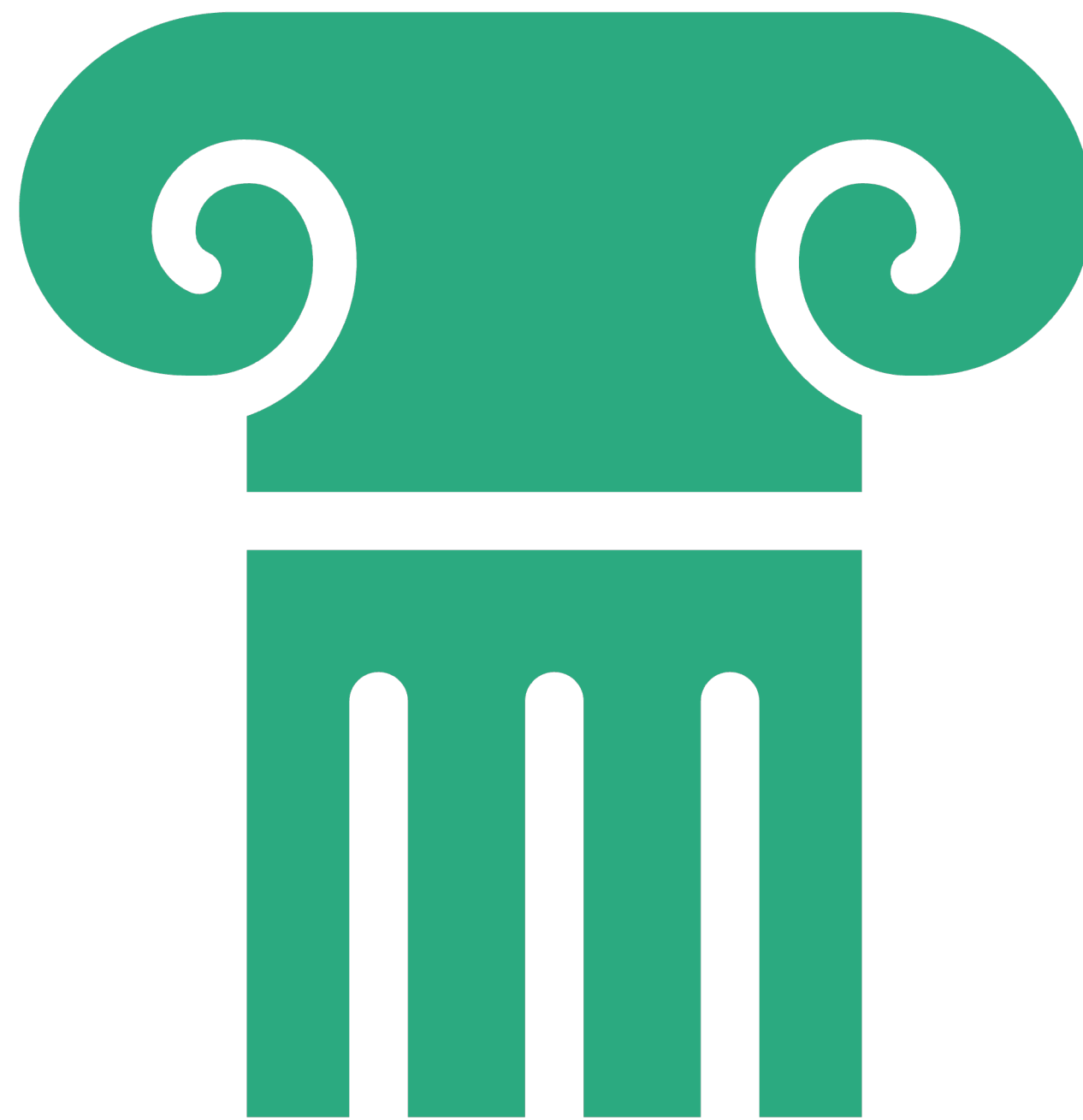


Buyers



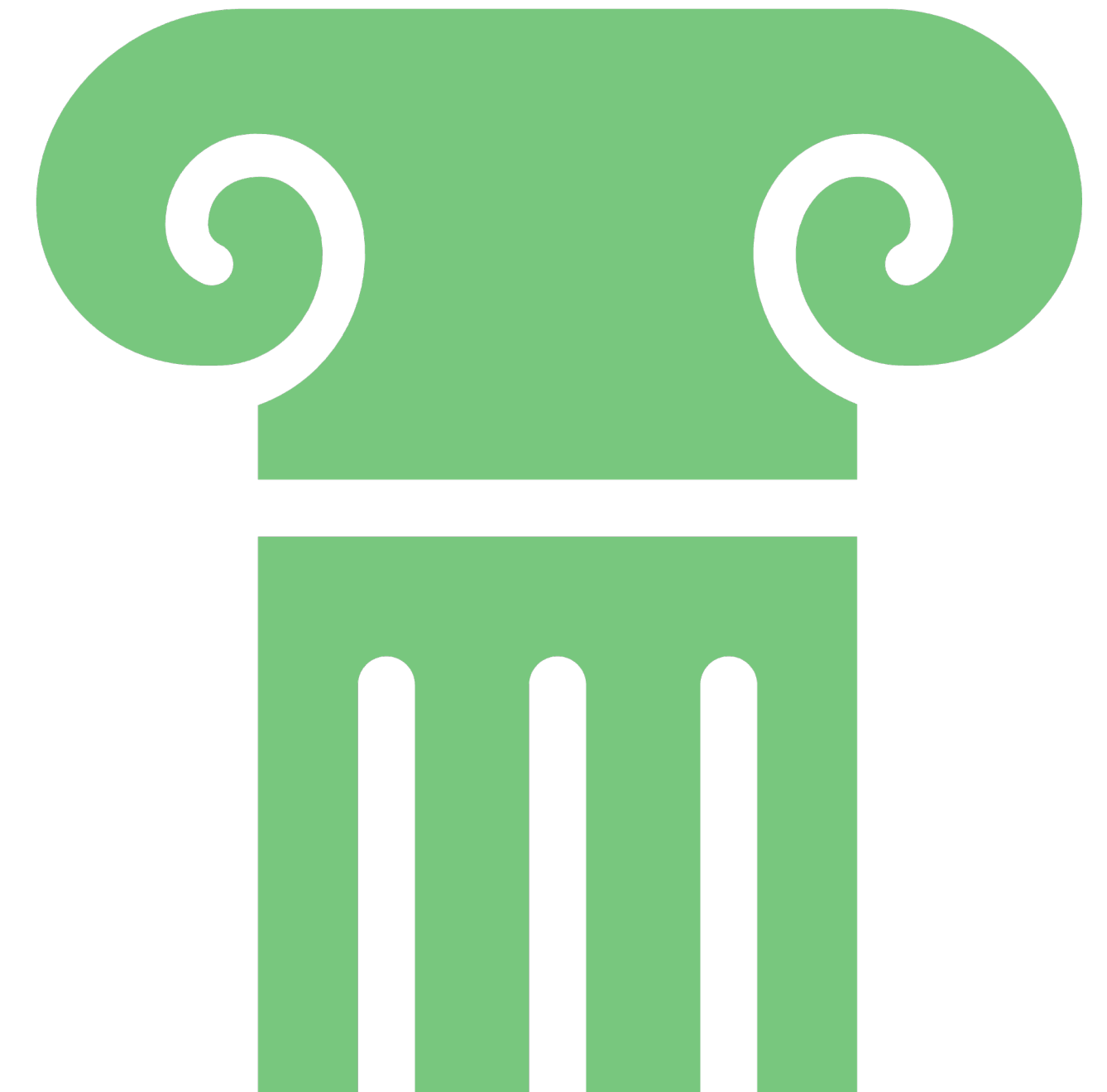
Create demand

Government



Policy, purchasing

Manufacturers



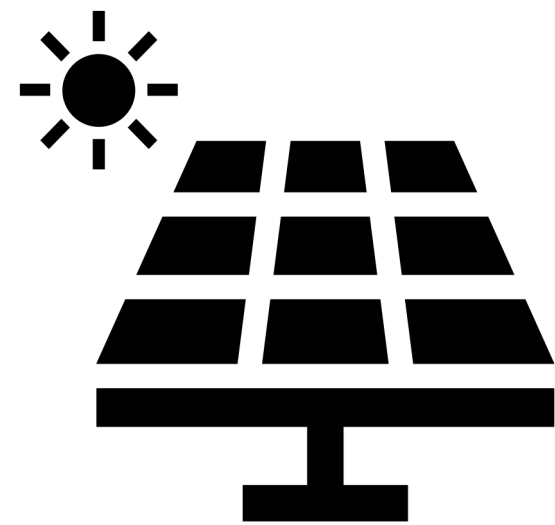
New capacity

Building a sustainable, resilient low carbon solar supply chain.

# EPEAT: a Type 1 ecolabel for Electronics Goods



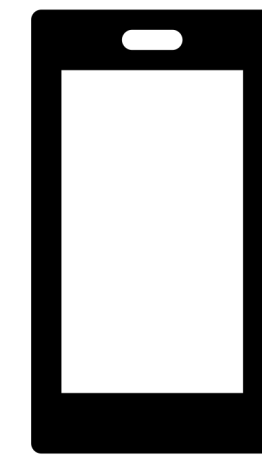
## Current EPEAT Product Categories



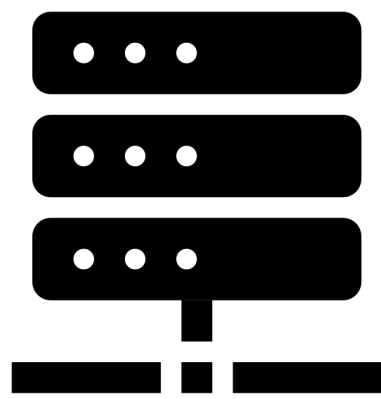
Photovoltaic  
Modules & Inverters



Imaging Equipment



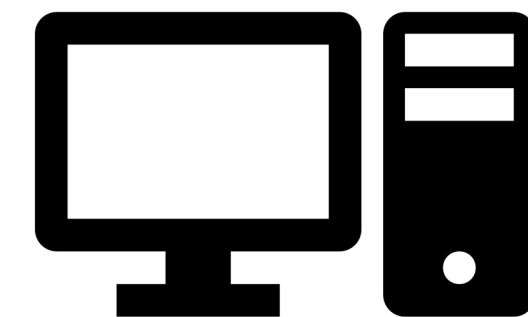
Mobile Phones



Servers



Televisions



Computers & Displays



# Why Type 1 ecolabels are the gold standard:



Based on voluntary consensus standards



Multi-attribute



Transparent criteria



Third-party certified



# EPEAT: The World's Leading Electronics Ecolabel

- GEC manages EPEAT, the leading global ecolabel for sustainable IT products and services.
- Ecolabels are labeling systems for products that make it easier to purchase products and services that comply with standards that favorably impact the environment and sustainable development.
- Launched in 2006, EPEAT is a Type 1 ecolabel recognized by ANAB (ANSI National Accreditation Board) defined by ISO 14024: Environmental Labels and Declarations.

40+

Countries where  
EPEAT products are  
currently registered



*\*Numbers represent what was reported to GEC but does not necessarily represent the full impact of EPEAT*

•**2.2 Billion USD**

•Spent on EPEAT-registered products in 2020\*

•**6.35 Billion USD**

•Spent on EPEAT-registered products since 2006

•**13.1 Billion USD**

•Cost savings since 2006

•**1.5 Billion**

•EPEAT-registered products purchased since 2006

•**398 Million**

•Megawatt hours of energy saved since 2006

•**200 Million**

•Metric tonnes of GHG gases reduced since 2006

# GEC's criteria development process



Aligns with ISO 14024 for Type 1 Ecolabels

# EPEAT criteria for PV modules and inverters



## Climate Change Mitigation

- Manufacturing energy efficiency
- F-GHG emissions in manufacturing
- Life cycle assessment and disclosure of cumulative energy demand and global warming potential
- COMING SOON – carbon footprint

## Sustainable Use of Resources

- Recycled content
- Design for recycling
- Product take back & responsible recycling
- Disclosure of recovery & recycling achievement
- Material recovery targets
- Efficient water use in manufacturing

## Reduction of Chemicals of Concern

- Restricted substances in product - RoHS, REACH, halogenated substances
- Substance inventory and disclosure
- Alternatives assessment

## Corporate ESG Performance

- Social performance & audits
- Worker health & safety
- EMS
- Responsible mineral sourcing
- Corporate reporting
- Hot spot identification & leadership compared to industry

# Recommended RFP text for ultra low-carbon solar



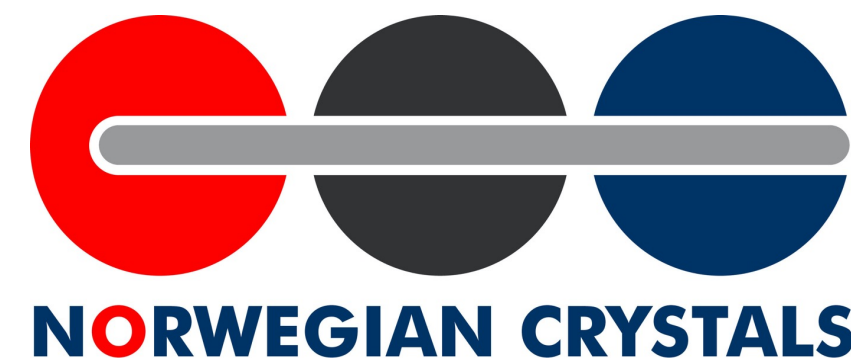
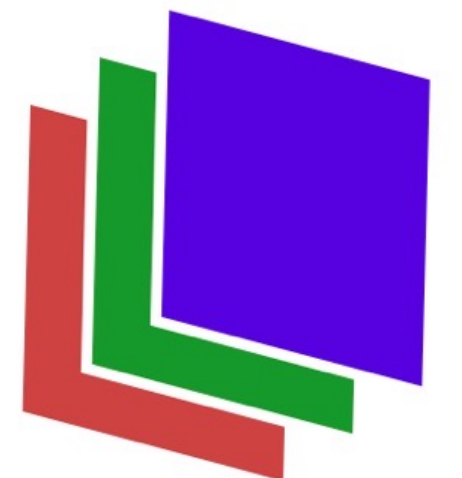
	Description	General Sample
Informational Request	Indication of interest in low-carbon solar and ask for product-specific carbon analysis documentation	Please provide the following information...
Preferential Language	Inclusion of value-added criteria that gives price or non-price considerations to embodied carbon	[above plus]...noting that bids with lower embodied carbon will be given preference...
Outright Specification	Requirement of product-specific carbon analysis documentation and a specific kgCO <sub>2</sub> e/kWh threshold	[above plus]...and all bids are required to meet the following criteria...



# About us



[Alliance Member companies](#) include major solar manufacturers across the solar value chain committed to the deployment of ultra-low carbon solar.



Decarbonizing the solar PV supply chain and addressing emissions deep in a product supply chain requires a strong and uniform market signal from consumers. Project specifications in RFPs are an impactful tool for energy customers to demonstrate supply chain priorities. CEBI has created introductory language for inclusion at the beginning of RFPs.

*“In collaboration with the Clean Energy Buyers Institute and other concerned energy customers, project developers, and solar panel manufacturers, we recognize that the solar industry has an opportunity to strengthen its supply chain and optimize its environmental impact by reducing the emissions associated with the manufacturing of solar components. Given this, we seek information Regarding embodied carbon of solar modules in our supply chain so as to make more informed decisions based on the upstream carbon-related impacts associated with our energy procurement and/or associated equipment.”*





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# Contact us



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