Building a sustainable solar supply chain:

Manufacturing trends and how you can shape them.
THE SOLAR SUPPLY CHAIN
Solar manufacturing has expanded dramatically in recent decades, with most of the growth concentrated in China.
Solar manufacturing emissions total 14-18 billion tons CO₂ over this period absent changes in supply chain.

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

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

Behind the Rise of U.S. Solar Power, a Mountain of Chinese Coal

Reliance on coal-fired electricity to produce solar panels raises concerns in the West

Reuters, December 2020
The current path – unreliable supply

U.S. sets new tariffs on Chinese solar imports

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

Global supply chain squeeze, soaring costs threaten solar energy boom

Supply chain chaos threatens the growth of solar energy

Solar industry: We’re in ‘most serious crisis’ in history
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

Heliene 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

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

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

• 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

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

<table>
<thead>
<tr>
<th>Description</th>
<th>General Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Informational Request</strong></td>
<td>Please provide the following information…</td>
</tr>
<tr>
<td>Indication of interest in low-carbon solar and ask for product-specific</td>
<td></td>
</tr>
<tr>
<td>carbon analysis documentation</td>
<td></td>
</tr>
<tr>
<td><strong>Preferential Language</strong></td>
<td>[above plus]…noting that bids with lower embodied carbon will be given preference…</td>
</tr>
<tr>
<td>Inclusion of value-added criteria that gives price or non-price considerations to embodied carbon</td>
<td></td>
</tr>
<tr>
<td><strong>Outright Specification</strong></td>
<td>[above plus]…and all bids are required to meet the following criteria…</td>
</tr>
<tr>
<td>Requirement of product-specific carbon analysis documentation and a specific kgCO₂e/kWh threshold</td>
<td></td>
</tr>
</tbody>
</table>
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.”
Contact us

Michael Parr
Executive Director
mparr@ultralowcarbonsolar.org

https://ultralowcarbonsolar.org/
https://twitter.com/ultralowcarbon