

# Responsible Procurement of Solar Panels

A Guide Focusing on Risks Related to  
Forced Labour in Global Supply Chains

This guide is a joint publication by Ethical Trade Sweden, Ethical Trade Norway and Ethical Trade Denmark.

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### **About the Organisations Behind the Guide**

Ethical Trade Sweden, Ethical Trade Norway and Ethical Trade Denmark are multi-stakeholder initiatives bringing together companies, trade unions, civil society and the public sector to strengthen workers' rights and respect for human rights in global supply chains. The organisations offer training, advisory services, tools and platforms for collaboration, and also cooperate within Joint Ethical Trading Initiatives (JETI).

Read more at [www.etiskhandel.se](http://www.etiskhandel.se), [www.etiskhandel.dk](http://www.etiskhandel.dk), [www.etiskhandel.no](http://www.etiskhandel.no).

### **Disclaimer**

This guide does not constitute legal advice and cannot guarantee that products or supply chains are free from links to forced labour. Users are themselves responsible for how the guidance, criteria and contract terms are applied, and for ensuring compliance with applicable legislation and their own internal requirements.

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# Abbreviations

|              |                                                                |
|--------------|----------------------------------------------------------------|
| <b>CSDDD</b> | Corporate Sustainability Due Diligence Directive               |
| <b>CSRD</b>  | Corporate Sustainability Reporting Directive                   |
| <b>EPC</b>   | Engineering, Procurement and Construction                      |
| <b>ESG</b>   | Environmental, Social and Governance                           |
| <b>EUFLR</b> | EU Forced Labour Regulation                                    |
| <b>HRDD</b>  | Human Rights Due Diligence                                     |
| <b>ILO</b>   | International Labour Organisation                              |
| <b>MGS</b>   | Metallurgiskt kisel (Metallurgical Grade Silicon)              |
| <b>OECD</b>  | Organisation for Economic Co-operation and Development         |
| <b>RBC</b>   | Responsible Business Conduct                                   |
| <b>SAQ</b>   | Self-Assessment Questionnaire                                  |
| <b>SSI</b>   | Solar Stewardship Initiative                                   |
| <b>UFLPA</b> | Uyghur Forced Labor Prevention Act                             |
| <b>UNGPD</b> | United Nations Guiding Principles on Business and Human Rights |

## Actors described in the guide

|                            |                                                                                                                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Buyer</b>               | A public or private organisation that procures or buys solar panels.                                                                                                                                                                 |
| <b>Supplier</b>            | The actor that sells solar panels to the buyer and that is covered by the procurement or contract. Depending on the business arrangement, the supplier may be an importer/wholesaler, an EPC/installation company or a manufacturer. |
| <b>Importer/wholesaler</b> | Imports or distributes solar panels and sells them on to, for example, EPC-contractors or directly to buyers.                                                                                                                        |
| <b>EPC-contractor</b>      | Designs and engineers, delivers and installs solar installations. May also sell solar panels directly to the buyer.                                                                                                                  |
| <b>Manufacturer</b>        | Manufactures solar panels or their components. In some cases sell directly to the buyer.                                                                                                                                             |

# Introduction

## Background

Solar energy is the fastest-growing energy source in the EU and an important part of the transition to a fossil-free energy system.<sup>1</sup> Solar panels can be installed both in large-scale facilities and on individual buildings and properties, making the technology flexible and scalable. The EU aims to further drive this development through requirements for the installation of solar panels on new commercial and public buildings from 2026 and on newly constructed residential buildings from 2029.<sup>2</sup>

At the same time, the solar panel supply chain is associated with serious and well-documented risks of forced labour and other human rights violations. In recent years, particular attention has been paid to the links between the solar energy sector and state-imposed forced labour in Xinjiang. These risks are especially difficult to identify and address due to complex supply chains, a high geographic concentration of production, limited traceability and restricted opportunities to conduct human rights due diligence. This means that traditional procurement requirements and supplier assurances are rarely sufficient.

The issue has become even more relevant in light of the EU Forced Labour Regulation (EUFLR), which from December 2027 prohibits products made with forced labour from being placed on the EU market. The risks therefore relate not only to sustainability and reputation, but also to supply disruptions and products that cannot be sold within the EU.

This guide has been developed by Ethical Trade Sweden's working group on renewable energy to support public and private buyers in the work on responsible procurement of solar panels. The guide aims to strengthen dialogue and cooperation between buyers and suppliers, and to contribute to greater traceability, transparency and a systematic approach to identifying and managing risks of forced labour in the supply chain.

## Target Audience

The guide is primarily aimed at procurers and buyers who purchase solar panels through EPC contractors, wholesalers or importers, but can also be used by actors who purchase directly from manufacturers. It is aimed at both public and private actors, such as municipalities, regions, property companies and retailers.

Since the target group is broad, criteria and working methods may need to be adapted to the individual organisation's circumstances. Public actors must also ensure that their requirements are compatible with applicable procurement legislation.

## Scope and Structure

The guide covers the entire supply chain for silicon-based solar panels, from quartz mining to finished panel. It is primarily intended for larger or recurring procurement processes but can also be used for one-off purchases. Several of the recommendations have the greatest impact when combined with dialogue and follow-up throughout the contract period.

<sup>1</sup> European Commission, [Solar energy](#)

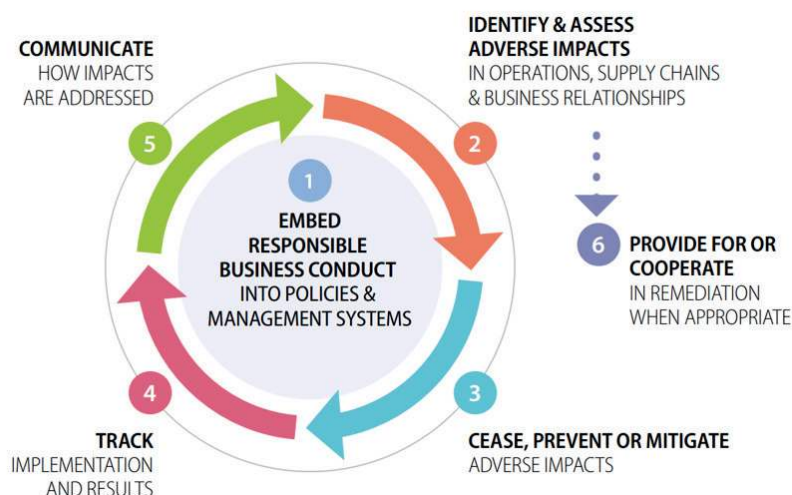
<sup>2</sup> European Commission, [Solar energy in buildings](#)

The guide consists of the following parts:

1. A description of the solar panel supply chain, risks of forced labour and challenges related to traceability and human rights due diligence.
2. Compilation of relevant laws, certifications, and initiatives.
3. Guidance on how procurers and buyers can work with setting requirements, dialogue and follow-up to address risks of forced labour.
4. Appendixes with practical tools in the form of selection and award criteria as well as contract clauses.

## Guiding Principles

The guide is based on the UN Guiding Principles on Business and Human Rights (UNGPs) and the OECD Guidelines on Due Diligence for Responsible Business Conduct. Together, these constitute the central international frameworks for corporate responsibility to respect human rights. The OECD Guidelines translate these principles into a practical due diligence process with six steps for identifying, preventing, mitigating, monitoring and addressing negative impacts on people and the environment.



The guide takes into account the specific challenges in solar panel supply chains, where it is currently not possible to fully verify the absence of forced labour. The focus is therefore not on guarantees, but on requirements, dialogue and follow-up that promote greater traceability, transparency and a systematic approach to identifying and addressing forced labour risks.

## How to use the guide

The guide can be used in different parts of the procurement process:

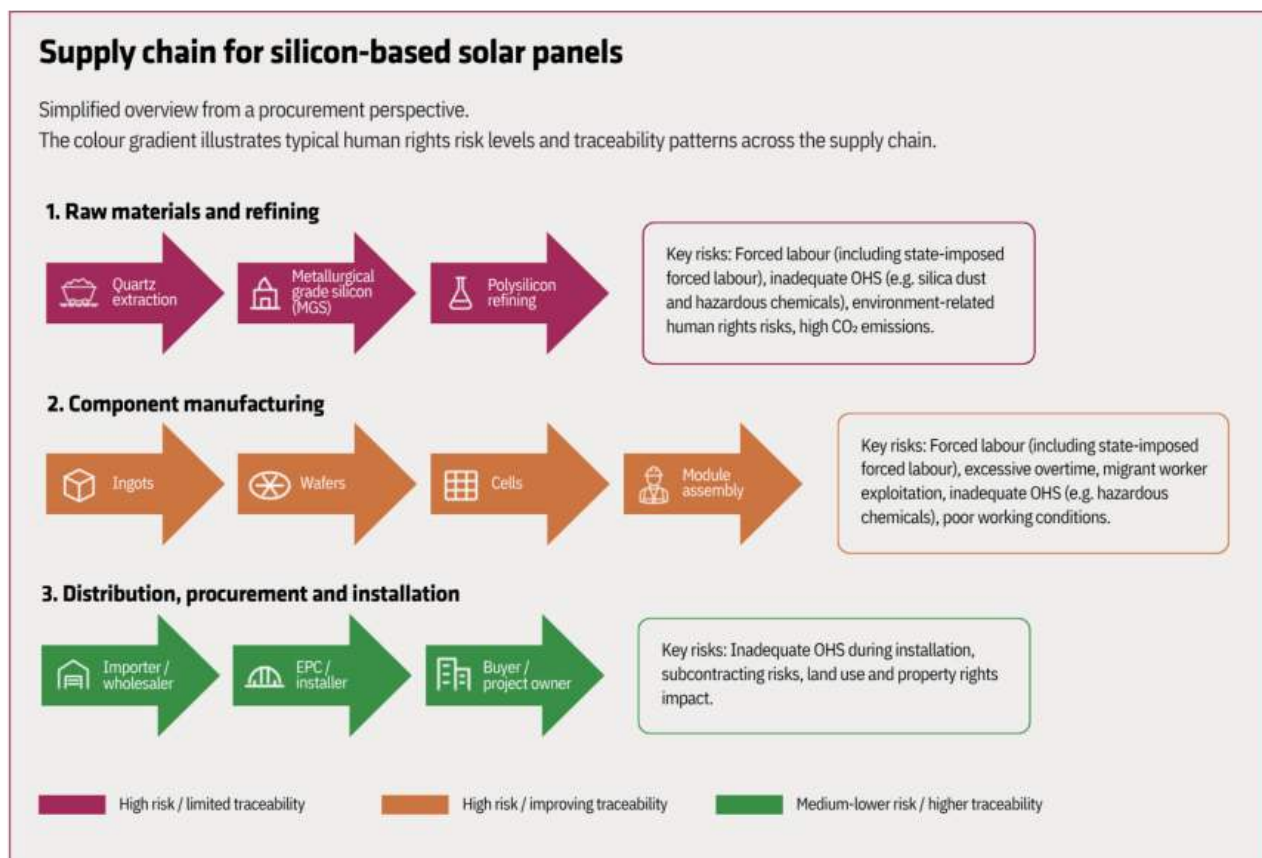
- Before procurement: to understand the risks in the supply chain and plan setting of requirements.
- During procurement: as support when using qualification criteria, award criteria and contract terms.
- During the contract period: as support for dialogue, follow-up and management of identified risks or changes in the supply chain.



# Supply Chains, Risks and Challenges

The solar panel supply chain is complex and spans multiple tiers, from the extraction and processing of raw materials to the manufacturing of components and finished panels, as well as distribution, procurement and installation.

There are two main types of solar panels: thin-film panels and silicon-based panels. Silicon-based panels account for approximately 95 per cent of the global market<sup>3</sup> and it is also in this supply chain that the most extensive risks of forced labour have been documented. The guide therefore focuses on silicon-based solar panels (hereinafter referred to as solar panels). The figure below shows a simplified overview of the supply chain for silicon-based solar panels and how human rights risks and traceability typically vary across different tiers.



## Geographic Concentration in the Supply Chain

The global production of solar panels is heavily concentrated in China, particularly in the early stages of the supply chain where raw materials are extracted and refined. China dominates the solar panel supply chain today - from raw materials to finished modules - which affects both market dynamics and companies' ability to conduct effective due diligence and traceability work. The dominance is particularly significant in the production of polysilicon (89 per cent), ingots (96 per cent) and wafers (96 per cent).

The Xinjiang region plays a significant role in the early stages of the supply chain, with extensive quartz mining and a large share of global capacity to produce metallurgical grade silicon and polysilicon. For example, approximately 32 per cent of global production of metallurgical grade silicon and 35 per cent of polysilicon for solar panels is estimated to originate in the region.<sup>4</sup>

<sup>3</sup> United States Department of Energy, [Solar Photovoltaic Cell Basics](#)

<sup>4</sup> Danish Institute for Human Rights (2025), [Human rights and solar energy: A primer for the Danish solar energy sector](#)

## Geographic concentration of key inputs for silicon-based solar panels

Share of global production by production stage.

| Quartz                                                                            | MGS                                                                                 | Polysilicon                                                                       | Ingot                                                                             | Wafer                                                                             | PV Cell                                                                             | PV Module                                                                           |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |    |  |  |  |  |  |
| China, particularly mines in Xinjiang.                                            | China: 69%, of which 32% in Xinjiang.<br>USA: 11.9%<br>Norway: 5.7%<br>Brazil: 5.7% | China: 89%, of which 35% in Xinjiang.                                             | China: 96%                                                                        | China: 96%                                                                        | China: 75%                                                                          | China: 66%                                                                          |

Figure based on Danish Institute for Human Rights (2025), [Human rights and solar energy: A primer for Danish solar energy sector](#).

At the same time, manufacturing capacity is being developed in other countries, including Vietnam, India, Thailand, Malaysia and the US.<sup>5</sup> Europe's manufacturing capacity remains limited and the EU is heavily dependent on imported solar panels and components.<sup>6</sup> Production outside China occurs primarily in the later stages of the supply chain, such as cell and panel manufacturing, while China continues to dominate the earlier stages. This means that even if the final manufacturing of panels takes place in other countries, it is very likely that they contain raw materials and components originating from China.

## Forced Labour Risks

Forced labour is a serious human rights violation and is prohibited under international law. According to the International Labour Organisation (ILO), forced labour refers to work or services performed under the threat of some form of penalty and for which the person has not offered themselves voluntarily.<sup>7</sup> Forced labour can occur in different forms, including through debt bondage, threats, restricted freedom of movement, confiscation of identity documents or state programmes in which people are not able to refuse work.

Within the solar panel supply chain, particular attention has been directed at risks related to state-imposed forced labour in China. At the same time, other forms of forced labour and human rights violations may also occur in different parts of the supply chain.

## State-Imposed Forced Labour in China

The Chinese state carries out extensive repression of Uyghurs and other predominantly Muslim minorities in Xinjiang. The UN has documented widespread arbitrary and discriminatory detention and other serious violations of fundamental human rights and assessed that these abuses may constitute international crimes, including crimes against humanity.<sup>8</sup> Researchers and human rights organisations have also documented forced labour linked to state-run labour transfer and poverty alleviation programmes.

Links to state-imposed forced labour have been identified in several industries and supply chains in China, but the solar energy sector is one of the sectors where the risks are the most systematic and well-documented.

<sup>5</sup> Solar Advice (2025), [Where Are Solar Panels Made? \(Top Countries Explored\)](#)

<sup>6</sup> PV Magazine (2025), [European solar manufacturing 'considerably behind' NZIA targets, says EU observatory](#).

<sup>7</sup> ILO, [What is forced labour?](#)

<sup>8</sup> OHCHR (2022), [Assessment of human rights concerns in the Xinjiang Uyghur Autonomous Region](#)

The 2021 report *In Broad Daylight* mapped how state-run labour transfer programmes are linked to the production of key inputs for solar panels and to several major Chinese manufacturers.<sup>9</sup> Subsequent studies have further documented these links throughout the supply chain.<sup>10</sup> The risks are particularly significant in the upstream stages, especially in the extraction and processing of quartz, metallurgical-grade silicon (MGS) and polysilicon, where Xinjiang plays a significant role in production.

However, the risks are not limited to Xinjiang. People from the region have also been transferred to factories in other parts of China through state labour programmes. This means that risks linked to state-imposed forced labour may also occur outside Xinjiang and in later stages of the supply chain.

## Forced Labour in Other Geographies

Although the most extensive documentation of forced labour in the solar supply chain concerns state-imposed forced labour in China, there are also risks of forced labour and labour exploitation in other geographies. In several Asian manufacturing countries where cell and panel manufacturing takes place, there are documented risks linked to migrant workers, such as use of recruitment fees, debt bondage, confiscation of passports and restricted freedom of movement.

Malaysia is a country where migrant workers constitute a significant portion of the workforce in the manufacturing industry. Workers from countries including Bangladesh, Nepal, Indonesia and Vietnam are recruited through recruitment chains where high fees, lack of information and dependency can lead to various forms of modern slavery.<sup>11</sup> One example is First Solar, where independent third-party audits in 2023 identified risks related to migrant workers and debt bondage at service providers at production facilities in Malaysia. The risks included recruitment fees, confiscation of passports and withheld wages. First Solar disclosed the findings publicly and took measures to provide remedy for affected workers and to strengthen supplier oversight.<sup>12</sup>

## Other Human Rights and Environmental Risks

In addition to risks related to forced labour, other documented human rights and environmental risks also exist in the solar panel supply chain. Although these issues are not the focus of this guide, they are important to take into account when conducting risk assessments and procurement.

Examples of documented risks include:

- Poor occupational health and safety conditions and health risks: Shortcomings in occupational health and safety conditions and exposure to hazardous chemicals during the manufacturing of solar panels have been documented in China, India, Vietnam, Malaysia and Thailand. In the earlier stages of the supply chain, workers are also exposed to quartz dust during the mining and production of metallurgical grade silicon (MGS), which can cause serious occupational diseases such as silicosis.<sup>13</sup>
- Poor labour conditions: Reports have documented a range of concerns in the manufacturing of solar panels and components in China, including excessive overtime, low wages, discrimination against migrant workers and shortcomings in occupational health and safety conditions.<sup>14</sup>

<sup>9</sup> Laura T. Murphy, Nyrola Elimä (2021), *In Broad Daylight: Uyghur forced labour and global solar supply chains*

<sup>10</sup> For example, Alan Crawford, Laura T. Murphy et al. (2023), *Over-exposed: Uyghur Region Exposure Assessment for Solar Industry Sourcing*, Stefan Brehm and Helena Magnusson (2026), *State-Imposed Forced Labour in the Solar Panel Sector in China: A Human Rights Due Diligence Analysis*

<sup>11</sup> United States Department of State, *Malaysia*

<sup>12</sup> Business and Human Rights Resource Centre (2023), *Malaysia: First Solar takes steps to remediate abuse as audit reveals conditions of forced labour for subcontracted migrant workers*

<sup>13</sup> Danish Institute for Human Rights (2025), *Human rights and solar energy: A primer for the Danish solar energy sector*, Federal Ministry of Labour and Social Affairs (2023), *Selected sections of the German energy industry Potential human rights risks along the supply and value chains*

<sup>14</sup> Stefan Brehm and Helena Magnusson (2026), *Labour Rights Violations in the Solar Panel Sector in China: A Human Rights Due Diligence Analysis*

- Environmental impact and pollution: The mining of quartz and the production of MGS and polysilicon can cause significant air and water pollution. The production of polysilicon also involves the use and generation of hazardous chemicals and by-products, such as silicon tetrachloride, which can cause serious environmental and health damage if not handled correctly.<sup>15</sup>
- Climate impact: The production of MGS and polysilicon is highly energy-intensive. In Xinjiang, production relies primarily on coal-based energy, resulting in significantly higher carbon dioxide emissions than equivalent production in regions with a less carbon-intensive energy mix.<sup>16</sup>

## Limited Traceability in Supply Chains

Solar panel supply chains are characterised by low transparency and limited traceability, particularly in the earlier stages (quartz, MGS and polysilicon) where the risks of forced labour are greatest. The lack of verifiable information means that it is not possible to guarantee that serious violations do not occur at any stage. As awareness of the risks of forced labour in Xinjiang has grown globally, it has in several cases become more difficult to obtain sufficient information to assess whether production is taking place in the region. Furthermore, some manufacturers have developed separate production and supply chains for different markets. This means that materials from Xinjiang may be excluded from products sold to, for example, Europe or the US, while the same manufacturer continues to use materials from the region in products for other markets (commonly referred to as bifurcation).<sup>17</sup> This can further complicate assessment of where production takes place.

Despite these challenges, traceability methods in the supply chain are developing. In response to increased demands from customers and legislators, many suppliers are now able to demonstrate traceability to polysilicon level. However, this traceability still relies largely on information from manufacturers themselves, while third-party verification remains limited and the available information is often complex and difficult to verify. Traceability to quartz level remains uncommon, but some suppliers are beginning to see increased transparency at this level as a competitive advantage.<sup>18</sup>

## Limitations in Conducting Human Rights Due Diligence

Conducting human rights due diligence in the solar panel supply chain presents particular challenges. Risks of forced labour are often very difficult to identify and address, especially where state-imposed forced labour is concerned. This is further complicated by complex supply chains, limited traceability and limited transparency, particularly in the earlier stages where the risks are greatest.

The challenges are particularly significant in China, especially in supply chains linked to Xinjiang. State surveillance, as well as Chinese security, data and other legislation, may restrict the ability to obtain, verify and share information about supply chains. At the same time, workers, manufacturers and auditors may have limited opportunities to openly report concerns or abuses. Legal and political developments may therefore further constrain the ability to identify, assess and address serious human rights abuses, including risks of state-imposed forced labour.

As a result, traditional methods such as self-assessments, audits and site visits may provide limited assurance when it comes to identifying or ruling out risks of forced labour. Even where suppliers can provide audit reports or other documentation, these need to be critically assessed. To strengthen the reliability of the assessment, such methods should therefore be complemented by greater traceability, risk-based analysis and information from multiple sources.

<sup>15</sup> Danish Institute for Human Rights (2025), [Human rights and solar energy: A primer for the Danish solar energy sector](#), Federal Ministry of Labour and Social Affairs (2023), [Selected sections of the German energy industry Potential human rights risks along the supply and value chains](#)

<sup>16</sup> Seaver Wang and Juzel Lloyd (2022), [Sins of a solar empire](#)

<sup>17</sup> Alan Crawford, Laura T. Murphy et al. (2023), [Over-exposed: Uyghur Region Exposure Assessment for Solar Industry Sourcing](#)

<sup>18</sup> Danish Institute for Human Rights (2025), [Human rights and solar energy: A primer for the Danish solar energy sector](#)

## What Does This Mean for Procurers and Buyers?

The production of solar panels presents particular challenges that need to be taken into account in procurement. Risks of forced labour are well-documented, yet at the same time very difficult to identify and address. The production of key input materials is heavily geographically concentrated, and the supply chain is characterised by limited traceability and challenges in conducting human rights due diligence. This means that in many cases it is not possible to fully verify where key input materials have been produced or that they are free from links to forced labour.

For procurers and buyers, this means that procurement can rarely be based on guarantees that risks do not exist in the supply chain or that production does not take place in a specific geographic area. The focus instead needs to be on requesting verifiable traceability information and assessing suppliers' processes for identifying, managing and following up on risks of forced labour.

Furthermore, risks can rarely be addressed through setting requirements alone. Procurement therefore also needs to create the conditions for dialogue, follow-up and continuous improvement over the duration of the contract. In many cases, improvement efforts will need to take place in collaboration with suppliers, manufacturers and other actors in the supply chain, as the ability of individual buyers to drive change is often limited.

## Further Reading

For those who wish to explore these topics further, the annex to this guide contains links to reports, databases and other resources on the solar panel supply chain and the management of risks related to forced labour and human rights.



# Legislation, Certifications and Initiatives

## Relevant Sustainability Legislation

Several new EU regulatory frameworks affect companies that procure solar panels. While these frameworks serve different purposes, taken together they impose increased requirements to understand the supply chain, identify and manage risks of forced labour, and demonstrate how this work is being carried out.

### EU Forced Labour Regulation (EUFLR)

The EU Forced Labour Regulation prohibits products that have been wholly or partially manufactured with forced labour from being placed on or made available on the EU market or exported from the EU. The Regulation will begin to apply on 14 December 2027 and covers the entire supply chain.

If there are well-founded indications that a product may have been manufactured with forced labour, competent authorities may initiate an investigation. Companies may then be required to provide information about their supply chains, their human rights due diligence work and the measures taken to identify and manage risks. If a product is determined to have been manufactured with forced labour, it may be prohibited or required to be withdrawn from the EU market.<sup>20</sup>

For procurers and buyers who purchase solar panels through EPC contractors, installers or wholesalers, the Regulation does not normally entail any direct obligations. However, products subject to a decision under the Regulation may affect both ongoing procurements and existing contracts. Procurers should therefore require suppliers to work systematically on human rights due diligence, traceability and risk management. This also improves the conditions for suppliers to be able to provide information to competent authorities if an investigation is initiated.

The European Commission has compiled guidance, questions and answers, a database of risk areas and other information on the Regulation at [Forced Labour Single Portal](#).

### Corporate Sustainability Due Diligence Directive (CSDDD)

The CSDDD requires larger companies to conduct human rights and environmental due diligence in their own operations, subsidiaries and value chains. This work must be risk-based and cover the identification, prevention, mitigation and monitoring of adverse impacts on human rights and the environment.<sup>21</sup>

For companies subject to the Directive, this means that risks of forced labour in the solar panel supply chain should be included in the company's risk assessment and, where risks are identified, addressed through appropriate preventive and mitigating measures. This work needs to be followed up on an ongoing basis and adapted in response to new information and changing risk conditions. Public contracting authorities are not subject to the obligations of the Directive. However, the Directive means that suppliers' compliance with the CSDDD, or the voluntary implementation of equivalent due diligence processes, may be taken into account as an environmental or social criterion in public procurement, in accordance with applicable procurement legislation.<sup>22</sup>

<sup>20</sup> European Commission, [The Forced Labour Regulation](#)

<sup>21</sup> European Commission, [Corporate sustainability due diligence](#)

<sup>22</sup> [See Article 31](#)

## EU Corporate Sustainability Reporting Directive (CSRD)

The CSRD requires large companies to report on their material sustainability matters, including how they manage risks and impacts in the value chain.<sup>23</sup>

For procurers of solar panels, this creates an increased need for reliable information about the supply chain, traceability and the company's work on managing risks of forced labour. At the same time, the information gathered can serve as important input for sustainability reporting.

## US Uyghur Forced Labor Prevention Act (UFLPA)

The UFLPA is a US law that prohibits the import of goods wholly or partially manufactured in Xinjiang, unless the importer can demonstrate that no forced labour was used.<sup>24</sup> Although the law applies only to imports into the US, it has had significant global implications. Many solar panel manufacturers have developed dedicated traceability systems and supply chains to meet the requirements of the US market. These developments also affect European buyers and have contributed to an increased focus on traceability and due diligence in the supply chain.



<sup>23</sup> European Commission, [Corporate sustainability reporting](#)

<sup>24</sup> United States Customs and Border Protection, [Uyghur Forced Labor Prevention Act](#)

# Certifications

Certifications and audits can provide valuable support in assessing suppliers' sustainability work, but they cannot on their own ensure that forced labour does not occur in the supply chain. They often cover individual production facilities or parts of the supply chain and are often based on social audits, which have limited ability to identify risks of forced labour. In addition, there are specific challenges associated with audits in China, as described in previous chapters. Certifications and audits should therefore be used as a complement to human rights due diligence, traceability and risk management.

## SSI Certification

The Solar Stewardship Initiative (SSI) has developed the first and so far only industry-specific certification system for the responsible production of solar panels. The certification system is aimed at manufacturing members, who can certify individual production facilities through independent third-party audits.

SSI's certification consists of two standards:

- The **ESG Standard** covers requirements for environment, human rights, labour conditions, business ethics and governance at individual production facilities. However, the the ESG certification applies only to the certified facilities and does not cover the deeper tiers of the supply chain, where the risks of forced labour are often greatest.
- The **Supply Chain Traceability Standard** requires manufacturers to establish traceability systems throughout the supply chain for silicon-based solar panels. The aim is to progressively enable an unbroken chain of custody - that is, a documented and verifiable traceability of materials throughout the entire value chain.<sup>25</sup>

The SSI certification is still relatively new and the number of manufacturers and certified facilities remains limited. What makes SSI unique is the combination of human rights and traceability requirements, which provides better conditions for identifying risks of forced labour in the supply chain. At the same time, the certification does not cover the entire supply chain and should be seen as a support tool in procurement, not as a guarantee that forced labour does not occur.

Both the ESG Standard and the Supply Chain Traceability Standard use the certification levels gold, silver and bronze, and minor deviations are addressed through Corrective Action Plans that are followed up within the certification process. An up-to-date list of certified facilities is available on [SSI's website](https://www.solarstewardshipinitiative.org/ssi-standards/).

## Other Certifications and Audit Programmes

Some solar panel manufacturers and their subcontractors also use other certifications and audit programmes, such as SA8000, SMETA and RBA's Validated Assessment Program (VAP).

These can provide valuable information about labour conditions and management systems at individual production facilities, but do not normally cover the manufacturer's wider operations or the earlier stages of the supply chain. They have also not been developed specifically for the solar panel sector and do not normally include requirements for traceability throughout the entire supply chain. They should therefore be seen as a complement to due diligence and traceability work.

<sup>25</sup> See <https://www.solarstewardshipinitiative.org/ssi-standards/>

## **Sustainability Initiatives in the Solar Energy Sector**

In recent years, several industry-specific initiatives have been established to promote more sustainable and responsible production of solar panels. By participating in such initiatives, buyers, suppliers, and manufacturers can collaborate on common challenges and help strengthen efforts to combat forced labor in the supply chain.

### **Solar Stewardship Initiative (SSI)**

SSI is an initiative for sustainably produced solar panels driven by the industry associations Solar Power Europe and Solar Energy UK. Participants include manufacturers, buyers, civil society organisations, financial institutions, academics and independent experts. SSI has two standards: an ESG standard and a traceability standard, both leading to certification (see above). More information is available [here](#).

### **Ethical Trade Sweden's Working Group on Renewable Energy**

Ethical Trade Sweden's working group on renewable energy brings together companies, procurers, civil society and other actors to strengthen human rights and working conditions in global supply chains for solar energy, wind power and energy storage. Through collaboration, knowledge sharing and practical tools, the group works towards a more sustainable and just green transition. More information is available [here](#).

### **Ethical Trade Denmark's Alliance for Responsible Green Energy**

The Danish alliance is a multi-stakeholder initiative bringing together companies, civil society, trade unions and other actors to strengthen responsible business conduct in supply chains related to the green transition. The initiative focuses in particular on human rights, due diligence and risks related to transition minerals, solar energy and other green energy technology. More information is available [here](#).

### **International RBC Agreement for the Renewable Energy Sector**

A Dutch-led multi-stakeholder initiative bringing together companies in the solar and wind energy sectors, industry associations, the government, trade unions and civil society. Participants commit to applying the principles of the OECD Guidelines and the UN Guiding Principles on Business and Human Rights (UNGPR) and to jointly address risks related to human rights and environmental impacts in renewable energy value chains. More information is available [here](#).

### **The German Energy Sector Dialogue**

A German multi-stakeholder forum where energy companies, civil society organisations, trade unions, authorities and experts collaborate. The purpose is to identify and address environmental and human rights risks in the energy sector's global supply chains, including solar cell production. The dialogue provides a guiding framework for risk analysis and sustainability work within the sector. More information is available [here](#).

### **Community of Public Buyers for Sustainable Solar PV**

A network platform for public procurers in the EU helping them develop sustainable solar cell projects. The platform shares guidance, procurement templates and results from market analysis regarding quality, climate impact, lifespan and ethical production conditions. The aim is to collectively drive demand for more sustainable solar panels. More information is available [here](#).



# Responsible Procurement of Solar Panels

This section of the guide provides practical guidance on how procurers and buyers can work with risks related to forced labour in the solar panel supply chain. The guidance has a particular focus on the challenges specific to the solar supply chain, such as limited traceability, complex supply chains and risks linked to state-imposed forced labour.

The guide is also accompanied by:

- Selection and Award Criteria, Appendix 1
- Contract Clauses, Appendix 2

## Principles for Responsible Procurement

Below are principles that can serve as guidance in the procurement of solar panels.

### Focus on processes rather than guarantees

Since production is geographically concentrated and opportunities to verify information in the supply chain are limited, it is rarely possible to ensure that forced labour does not occur or that a product does not contain materials from, for example, Xinjiang. Procurement should therefore focus on suppliers' work with due diligence, traceability and risk management, rather than on guarantees of risk-free supply chains. At the same time, procurement should provide incentives for suppliers to progressively improve their performance over the term of the contract.

### Reward traceability and transparency

Procurement should be designed to encourage suppliers to openly disclose risks, challenges and limitations in the supply chain, rather than merely presenting a risk-free picture. Suppliers who can identify manufacturing facilities, disclose the supply chain to polysilicon level, share relevant documentation and demonstrate how risks are managed in practice should be assessed more favourably than suppliers who cannot provide equivalent information. Limited traceability or access to information should at the same time be factored into the risk assessment, particularly if the supplier cannot explain the reasons for the limitations or how they are being addressed.

### Consider the entire supply chain

Requirements and follow-up should cover the entire supply chain, not only the direct supplier or module manufacturer. Particular attention should be directed at the earlier stages (quartz, MGS and polysilicon) as this is where the risks of state-imposed forced labour are greatest.

### Apply responsible purchasing practices

The decisions made by procurers and buyers themselves affect conditions in the supply chain. Unrealistic delivery timelines, severe price pressure and unclear or contradictory requirements can make it more difficult for suppliers to identify, manage and follow up on risks of forced labour.

Responsible purchasing practices mean that procurement is designed in a way that supports suppliers' due diligence work and continuous improvements. This may include, for example, realistic timelines, clear and proportionate requirements, and rewarding suppliers who work systematically on traceability, transparency and risk management.

## **Use procurement as a tool for long-term improvement**

Procurement should not only be used to set requirements, but also to enable long-term improvements. Through clear expectations, continuous dialogue and follow-up over the duration of the contract, buyers and suppliers can progressively strengthen traceability, transparency and human rights due diligence work.

Since the ability of individual actors to drive change is often limited, collaboration with suppliers, industry initiatives and other relevant actors can also be an important tool for driving improvements and addressing shared challenges in the supply chain.

## **Differentiate between different types of forced labour**

The risks in the solar panel supply chain encompass both state-imposed forced labour and more traditional forms of exploitation. These situations require different types of action.

In some situations, for example in the case of debt bondage linked to migrant workers, remedy and corrective action may be possible. In other situations, particularly in cases of state-imposed forced labour, the possibilities for remedy may be very limited or non-existent. Risk management therefore needs to be adapted to the type of forced labour identified.

## **Consider carbon footprints in procurement**

Production of solar panels and input materials in China still relies heavily on fossil-based energy. Production in Xinjiang has received particular attention due to its high carbon intensity.

Setting requirements for the reporting or reduction of carbon footprint can therefore also help to reduce exposure to certain high-risk areas and supply chains.

Carbon footprint can also serve as an entry point for dialogue with suppliers. For some manufacturers, environmental and climate issues are less sensitive than human rights issues, which can create conditions for greater transparency and broader sustainability dialogues.

# **Procurement Criteria**

The procurement criteria in Appendix 1 are based on the principles described in this guidance. The selection criteria help to assess suppliers' basic capacity to work with human rights due diligence, while the award criteria reward suppliers that have progressed further in this work.

## **Selection Criteria**

When qualifying suppliers, procurers and buyers are recommended to use the selection criteria that accompany this guide, see Appendix 1. These aim to assess whether the supplier has basic policies and processes in place to identify and manage risks to human rights and the environment in the supply chain. Three of the criteria are suggested to be so-called knock-out criteria i.e. minimum requirements.

Since time and resources are often limited during the qualification phase, the objective is primarily to verify that such policies and processes are in place, rather than to assess how effective they are in practice.

## Award Criteria

When evaluating bids, procurers and buyers are recommended to use the award criteria in Appendix 1. These aim to reward suppliers that can demonstrate a higher degree of traceability, transparency and risk management in practice, including through verifiable information about the supply chain and participation in relevant initiatives and certifications.

The criteria are divided according to different purchasing models in the solar supply chain and distinguish between:

- procurement through EPC contractors or wholesalers, and
- procurement directly from manufacturers.

This is to better reflect what is proportionate and practically feasible to request from different actors in the supply chain. The criteria can also be adapted for the public sector. Suggested assessment criteria are included for each criterion. The scoring system and weighting may need to be adapted to the organisation's procurement model.

### ➡ Important considerations when assessing responses

Suppliers should, as far as possible, be able to substantiate their responses with relevant documentation or concrete examples of measures implemented. If responses are unclear, incomplete or if transparency is limited, it may be justified to request clarification. Limited transparency may in itself be an indicator of risk and should be considered in the overall assessment.

Responses and assessments should also be used as the basis for continued dialogue with the supplier as well as for follow-up and measures during the contract period.

### ➡ Important considerations in public procurement

In public procurement, criteria and assessments must be designed in accordance with applicable procurement legislation. Requirements should be proportionate, non-discriminatory, relevant to the subject matter of the contract and capable of being followed up on in practice.

Requirements that directly or indirectly exclude products or components based on geographic origin may entail legal risks in certain jurisdictions. Public procurers should therefore ensure that requirements and criteria are legally robust and adapted to the specific procurement.

The criteria in Appendix 1 are designed to be adapted to different legal and practical conditions. Public procurers should themselves assess which criteria are relevant and proportionate in the specific procurement.

## Contract Terms and Follow-up

Responsible procurement is not only about setting the right requirements at the time of procurement, but also about following these up over the duration of the contract. Through contract terms and risk-based follow-up, procurers and buyers can ensure that the requirements set are followed up and create conditions for continuous improvements.

## Contract Terms

The contract terms in Appendix 2 aim to ensure that the supplier's work on due diligence, traceability and risk management is followed up and developed over the duration of the contract. They focus in particular on the challenges associated with the solar panel supply chain and support continuous improvement through dialogue and follow-up.

The contract terms cover, among other things:

- due diligence and responsible business conduct
- traceability and transparency in the supply chain
- requirements and expectations vis-à-vis subcontractors and manufacturers
- management of risks of forced labour
- responsible recruitment and protection of migrant workers
- reporting on changes affecting the risk picture
- cooperation, dialogue and continuous improvement
- corrective actions and management of deviations

The terms are designed to be used by different types of procurers and buyers. They can, where needed, be adapted or supplemented according to the organisation's circumstances, risk profile and level of ambition.

## Follow-up on Contract Terms

To ensure that the contract terms have a practical effect, follow-up must take place regularly over the duration of the contract. Follow-up should be risk-based and adapted to the scope of the procurement, the supplier's role in the supply chain and the identified risks.

### Continuous Dialogue

Dialogue should focus on the areas regulated in the contract terms and that are particularly relevant to the solar panel supply chain. This may include, for example, the supplier's due diligence processes, traceability to polysilicon level, work on ethical recruitment and identified risks of forced labour.

Dialogue should not focus only on identified risks and deviations, but should also be used to strengthen traceability, transparency and risk management over time. Follow-up should therefore be seen as a tool for continuous improvement, not merely as compliance monitoring.

### Examples of questions in follow-up:

- Has the supplier conducted new risk assessments or updated its due diligence work?
- Has traceability improved for the products covered by the contract?
- Have new manufacturers, production facilities or suppliers been added?
- Has the supplier communicated requirements related to human rights, responsible recruitment and traceability to its subcontractors?
- Have new risks of forced labour or other human rights violations been identified?
- Has the supplier implemented or planned corrective actions?
- Have certifications or participation in relevant initiatives changed?

## **Reporting and Transparency**

Upon request, the supplier should, be able to provide relevant information on how the contract terms are implemented in practice. This may include, for example, risk assessments, traceability information, requirements communicated to subcontractors and follow-up on identified risks and actions.

Reporting should also cover significant changes in the supply chain, for example new manufacturing facilities, changed sourcing patterns, new suppliers or other changes that may affect the risk profile for the products covered by the contract.

## **Documentation as a Basis for Follow-up**

Information provided as part of reporting may, where necessary, need to be substantiated through additional documentation. At the same time, access to certain information may be limited in parts of the supply chain.

Depending on the supplier's role in the supply chain and the risks identified, the following information and documentation may be relevant to request:

- policies, governance documents and risk assessments related to due diligence and forced labour
- information about suppliers, subcontractors, manufacturing facilities, and production sites in the supply chain
- traceability documentation, such as supplier declarations, purchase and transaction documents, and chain-of-custody documentation that verifies the origin of the materials and their path through the supply chain
- documentation on ethical recruitment and protection of migrant workers
- action plans, progress reports and other documentation linked to identified risks or deviations.

## **Management of Risks and Deviations**

If procurers or buyers identify deviations from contract terms, the focus should in the first instance be on dialogue and corrective actions. This may include, for example, insufficient traceability, inadequate transparency, absence of risk assessments, identified risks of forced labour or shortcomings in the supplier's follow-up of subcontractors.

For risks that can be addressed through corrective actions, procurers and suppliers should, where possible, cooperate to reduce the risks and contribute to improvements. Procurers can contribute, for example, through dialogue with suppliers and manufacturers, participation in follow-up meetings and support for remediation measures.

In cases of serious deviations or where agreed actions are not implemented, further measures may need to be considered, for example requiring replacement products, suspended deliveries or other forms of escalation in accordance with the contract terms.

## **Responsible Disengagement as a Last Resort**

In certain situations, continued cooperation may entail unacceptable legal, commercial or human rights-related risks. This may be the case, for example, if the supplier does not cooperate on follow-up, does not provide reasonable information about the supply chain, does not implement agreed actions or if there are credible links to state-imposed forced labour that cannot be managed or verified.

In such situations, termination of the business relationship may become necessary. In line with international guidelines on responsible business conduct, however, disengagement should only occur as a last resort, after the possibilities for leverage, corrective action and risk mitigation have been assessed.

Before terminating a business relationship, procurers and buyers should, where possible, assess the negative consequences that disengagement may have for workers and other rights-holders, and whether further opportunities for improvement or leverage remain.

### **Learning and Improvement**

Follow-up should be documented and used to track the development of the supplier's work on due diligence, traceability and risk management over time. Tracking developments in the earlier stages of the supply chain, where the risks are often greatest and transparency most limited is of particular importance.

By following up on previous actions, identifying recurring challenges and monitoring changes in the supply chain, procurers and buyers can progressively develop their work and strengthen future procurement processes.



# Annex: Resources and Tools

Below are examples of reports, databases, guides and other resources that can be used as support in the work on due diligence, traceability and responsible procurement of solar panels.

## Reports

- [In broad daylight: Uyghur Forced Labour and Global Solar Supply, Sheffield Hallam University \(2021\)](#) - report on solar panel supply chains and the link to state-imposed forced labour in China.
- [Over-exposed: Uyghur Region Exposure Assessment for Solar Industry Sourcing, Sheffield Hallam University \(2023\)](#) - builds on "In Broad Daylight" and assesses 20 solar panel suppliers and their links to forced labour.
- [State-Imposed Forced Labour in the Solar Panel Sector in China: A Human Rights Due Diligence Analysis, Global Works \(2026\)](#) - a report analysing risks related to state-imposed forced labour in the Chinese solar panel sector and how these can be linked to the largest Chinese solar panel manufacturers.

## Databases

- [UFLPA Entity List, US Department of Homeland Security](#) - a list of entities in Xinjiang linked to forced labour through the extraction, production or manufacturing of goods. Used by companies to screen suppliers against US legislation.
- [Forced Labour Detection Tool, Exiger](#) - an open database that collects and analyses publicly available information on risks of forced labour in global supply chains. The tool allows users to enter a company name to check whether it has links to forced labour, particularly state-imposed forced labour.
- [Certified Sites, Solar Stewardship Initiative](#) - list of facilities certified according to SSI's environmental and social standards.
- [Open Supply Hub](#) - an open platform for supply chain mapping used and continuously updated by actors across different sectors and supply chains.

## Tools

- [SAQ: Forced Labour in Solar Panel Supply Chains, Ethical Trade Sweden](#) - self-assessment questionnaire for identifying the risk of forced labour in solar panel supply chains.
- [Responsible Contracting Project](#) - freely available tools for responsible contracts, particularly suitable for the private sector.
- [Due diligence guidance](#) - husr.se - guide on contractual clauses and support for suppliers to comply with them.

## Guider

- [Human rights and solar energy: A primer for the Danish solar energy sector, Danish Institute for Human Rights \(2025\)](#) - guide on human rights due diligence in solar energy value chains with recommendations for companies and public actors.
- [Addressing Modern Slavery and Labour Exploitation in Solar PV Supply Chains - Procurement Guidance, Action Sustainability \(2023\)](#) - guide with a particular focus on sustainable procurement of solar panels.
- [Evidence Briefs, Sheffield Hallam University](#) - short guides on how companies can identify and manage the risk of state-imposed forced labour in China.
- [Respecting Rights in Renewable Energy: Investor guidance to mitigate Uyghur forced Labour risks in the renewable energy sector \(2024\)](#) - guide for investors to identify and manage exposure to Uyghur forced labour.
- [Clean Dirty Energy, Unison \(2022\)](#) - guide for local authorities on sustainable procurement of solar panels.
- [How to address state-imposed forced labour in accordance with international responsible business standards, Anti-Slavery International](#) - short guide on state-imposed forced labour and how companies can address it.

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