RESPONSIBLE SOURCING TOOL

Commodity Report: Polysilicon (2025)

Polysilicon is reportedly produced with forced labor (FL) and/or child labor (CL) in the following country:[1]

- China (FL)

Top ten countries that export polysilicon worldwide:[2]

1. Germany
2. United States
3. China
4. Malaysia
5. Japan
6. Republic of Korea
7. Italy
8. Singapore
9. South Africa
10. Australia

[1] This list is based solely on findings from the U.S. Department of State's *2025 Trafficking in Persons Report* and the U.S. Department of Labor's 2024 *List of Goods Produced by Child Labor and Forced Labor*.

[2] International Trade Center. Trade Map. (ITC Calculations based on UNCOMTRADE Statistics).

Where is polysilicon reportedly produced with forced labor and/or child labor?

According to the U.S. Department of State's *2025 Trafficking in Persons Report,* individuals are subjected to forced labor in factories producing polysilicon in China.[3] According to the U.S. Department of Labor's 2024 *List of Goods Produced by Child Labor and Forced Labor*, polysilicon is produced with forced labor in China.[4]

China is listed as a Tier 3 country by the U.S. Department of State's *2025 Trafficking in Persons Report*.[5]

What does human trafficking and/or child labor in polysilicon production look like?

This section includes countries with publicly available research and reporting on forced labor and child labor, in addition to the countries listed in the above-mentioned government reports.

Polysilicon is produced in the **Xinjiang Uyghur Autonomous Region** (XUAR) of **China**, a region where government-imposed forced labor has been documented among members of ethnic and religious minority groups, such as the Uyghurs.[6] In Xinjiang, polysilicon is produced by companies participating in state-sponsored labor transfer programs.[7] Extensive supply chain research conducted by Sheffield Halam University found that "all four of the major [polysilicon manufacturing] companies located in Xinjiang participate in state-sponsored labor transfer programs, and some of them are engaged in programs that promote the invasive transformation of rural Uyghur life across the XUAR."[8] While the government claims that these programs are law-abiding, voluntary and intended to alleviate poverty, there is strong evidence that they function through coercion and threat; analysis of the labor transfer programs has revealed that they are mechanisms for the compulsory labor of ethnic and religious

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[3] U.S. Department of State. *2025 Trafficking in Persons Report*. 2025.

[4] U.S. Department of Labor. *List of Goods Produced by Child Labor or Forced Labor*. 2024.

[5] For the *2025 Trafficking in Persons Report*'s tier ranking methodology, see "A Guide to the Tiers."

[6] "Shining a Light on Exploitation in the Solar Supply Chain." U.S. Department of Labor.

[7] "Shining a Light on Exploitation in the Solar Supply Chain." U.S. Department of Labor.

Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[8] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

minority workers who are held in, or recently released from, internment camps for re-education purposes.[9] Rural workers are also compelled to take manufacturing jobs, often in industrial areas, far from their homes.[10] According to the U.S. Department of Labor, the following indicators of forced labor have been identified in association with the labor transfer programs in the XUAR:[11]

- Intimidation and threats
- Abuse of vulnerability
- Restriction of movement
- Abuse of isolation
- Involuntary excessive overtime
- Lack of access to identity documents
- Abusive working conditions

Victim testimonies, news media reports, and think tank reports all indicate that factories participating in labor transfer programs "frequently engage in coercive recruitment; limit workers' freedom of movement and communication; subject workers to constant surveillance, religious retribution, physical violence, exclusion from community and social life; and threaten family members."[12]

There is also evidence to suggest that inputs for making polysilicon are produced with forced labor. The primary raw material input for polysilicon is quartz, which must first be mined and crushed. Quartz is abundant in the deserts of the XUAR region. There is documented evidence that companies that mine and process quartz in the region also participate in labor transfer programs, and internment camps have

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[9] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[10] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[11] "Shining a Light on Exploitation in the Solar Supply Chain." U.S. Department of Labor.

[12] U.S. Department of Labor. *List of Goods Produced by Child Labor or Forced Labor.* 2024.

been identified on the grounds of these companies' industrial parks.[13] The purification process that transforms crushed quartz into metallurgic-grade silicon (the precursor to polysilicon) requires extremely high temperatures and extensive electricity; the energy used to fuel this process comes from coal, which is also abundant in the XUAR. There is also evidence of coal mining and processing companies participating in labor transfer programs.[14]

Although forced labor in the production of polysilicon has only been documented in China, China's essential role in polysilicon production has implications for numerous global supply chains including solar supply chains as well as other silica-based products.[15]

Polysilicon Supply Chain and Production:

Polysilicon (full name polycrystalline silicon) is a purified form of silicon crystals extracted from quartz rock. It is a key material in the manufacturing of components for solar panels and other silicon-based goods.[16]

The polysilicon supply chain involves numerous smelting and manufacturing processes. It begins with mining and then crushing **quartz rock**. In the next step, crushed quartz is heated to remove oxygen, resulting in **metallurgical-grade silicon.** Metallurgical-grade silicon is then ground up and further purified by polysilicon manufacturers to produce mono-grade or multi-grade **polysilicon**. The purification that produces polysilicon is an industrial furnace process requiring extremely high temperatures and extensive electricity.[17] The XUAR has an abundance of coal which results in cheap power that is used to fuel this energy-intensive process; this is in part why the region is home to most of

[13] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[14] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[15] "Traced to Forced Labor: Solar Supply Chains Dependent on Polysilicon from Xinjiang." U.S. Department of Labor.

[16] "What is Polysilicon and How is it Made?" Rated Power, 12 Mar 2024.

[17] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

the world's largest polysilicon factories.[18] Metallurgical-grade silicon and polysilicon from different sources can be blended before being further processed into components of consumer or industrial goods.[19]

How consumers are linked to human trafficking and/or child labor in polysilicon production:

Top ten countries that import polysilicon:[20]

1. China
2. Vietnam
3. Japan
4. Republic of Korea
5. Singapore
6. United States
7. Germany
8. Italy
9. Türkiye
10. Australia

Polysilicon is used in a variety of products. The highest grades are used in the production of photovoltaic cells (a key component of solar panels) as well as in semiconductors and electronic devices, including

[18] Reinsch, William Alan and Sean Arrieta-Kenna. "A Dark Spot for the Solar Energy Industry: Forced Labor in Xinjiang." Center for Strategic & International Studies, 19 Apr 2021.

[19] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[20] International Trade Center (ITC Calculations based on UNCOMTRADE Statistics).

smartphones and automotive electronics.[21] Polysilicon can also be used in construction, glassmaking, metal casting and chemical production, and in steelmaking.[22]

Approximately 95 percent of solar modules rely on solar-grade polysilicon.[23] Polysilicon is melted down to make bricks and cylinders (called ingots),[24] which are sliced into wafers. These in turn are used to make photovoltaic cells, which absorb and convert sunlight into energy.[25] Polysilicon made in Xinjiang accounts for nearly 45 percent of the world's solar-grade polysilicon supply; outside of Xinjiang, China produces another 30 percent of world's polysilicon.[26] The risks documented in the production of polysilicon in XUAR impact supply chains all over the world, even if products are not directly sourced from the region. For example, according to the U.S. Department of Labor, the top four solar trading countries for the United States import large quantities of solar materials from China.[27] Supply chain transparency challenges, related in part to the movement of intermediate goods from XUAR to other regions of China, and opaque trading relationships between China and other countries, can make successfully tracing components back to XUAR challenging.

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[21] "What is Polysilicon and How is it Made?" Rated Power, 12 Mar 2024.

[22] Williams, Lee. "Know the Source: Polysilicon Supply Chain." Mine Spider, 10 Feb 2022.

[23] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[24] "Traced to Forced Labor: Solar Supply Chains Dependent on Polysilicon from Xinjiang." U.S. Department of Labor.

[25] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[26] Murphy, Laura T. and Nyrola Elima. "In Broad Daylight Uyghur Forced Labour in the Solar Supply Chain." Sheffield Hallam University, 2021. Business and Human Rights Resource Center.

[27] "Traced to Forced Labor: Solar Supply Chains Dependent on Polysilicon from Xinjiang." U.S. Department of Labor.

Examples of what governments, corporations, and others are doing:

Governments and industries alike have taken action in recent years to try to address the occurrence of forced labor associated with polysilicon production.

Tariff Act and Uyghur Forced Labor Prevention Act

Section 307 of the Tarriff Act of 1930, as amended, states that "all goods, wares, articles, and merchandise mined, produced, or manufactured wholly or in part in any foreign country by convict labor and/or forced labor or/and indentured labor under penal sanctions shall not be entitled to entry at any of the ports of the United States, and the importation thereof is hereby prohibited…." (19 U.S.C. § 1307).[28]

In 2021, the United States enacted the Uyghur Forced Labor Prevention Act (UFLPA). The UFLPA established a rebuttable presumption (presumed in violation unless evidence shows otherwise) that goods mined, produced, or manufactured wholly or in part in the Xinjiang Uygur Autonomous Region (XUAR) of China, or by an entity on the UFLPA Entity List, are prohibited from U.S. importation under Section 307 of the Tariff Act. U.S. Customs and Border Patrol enforces these acts. Under the UFLPA, an interagency Forced Labor Enforcement Task Force is directed to develop a strategy for "supporting enforcement of the prohibition on the importation of goods into the United States manufactured wholly or in part with forced labor in the People's Republic of China, especially from the XUAR."[29]

Solar Supply Chain Traceability Protocol

In response to the identification of forced labor as an area of key concern for the solar industry, the Solar Energy Industries Association developed the Solar Supply Chain Traceability Protocol 1.0 ("Protocol"). The Protocol provides recommended policies and procedures for the solar energy industry to use to help identify the sources of material inputs and to trace the movement of inputs through supply chains. It also includes an independent, third-party audit mechanism. These policies and

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[28] "Forced Labor Enforcement." U.S. Customs and Border Protection, 3 Feb 2025.

[29] "Uyghur Forced Labor Prevention Act." U.S. Customs and Border Protection, 4 Feb 2025.

procedures build on the Solar Industry Commitment to Environmental & Social Responsibility, which provides an industry code of conduct around environmental, ethical, labor, health and safety, and management systems.[30]

How can I learn more?

- Explore the U.S. Department of Labor's Shining a Light on Exploitation in the Solar Supply Chain Storyboard.
- Read "In Broad Daylight: Uyghur Forced Labour and Global Solar Supply Chains," a report by Sheffield Halam University.

[30] "Solar Supply Chain Traceability Protocol." Solar Energy Industries Association, 29 Apr 2021.