Standard and Poor

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First Solar's growth plans hinge on opaque market for tellurium

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Uyghur Forced Labor Prevention Act

https://www.cbp.gov › trade › forced-labor › UFLPA

The Uyghur **Forced Labor Prevention Act** (UFLPA) was signed into law by President Biden on December 23, 2021. It establishes a rebuttable presumption that the ...

First Solar powers new tellurium demand - North of 60 Mining News

Critical Minerals Alliance- September, 2022 A look at the “possibilities” and new processes necessary to bring rare earth mining from China to the US.

“ Like many of the critical metals (and metalloids), China dominates tellurium production, accounting for nearly 60% of the roughly 580 metric tons of tellurium recovered globally during 2021.”

First Solar Issues with Tellurium Sourcing, China Processsing and Extraction, Opaqueness and How Will There Be Enough as Sales Skyrocket if Mining Extraction isn’t Worth the Effort?

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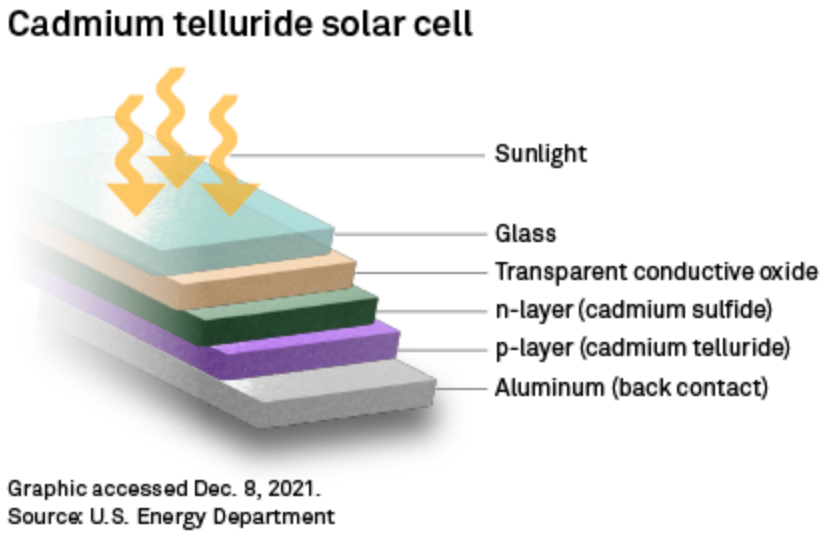
Dec 16, 2021 — First Solar's plan to spend $**1.36 billion** to help increase module capacity to 16 GW by 2024 seems certain to strain the tellurium market.Tellurium also used in many other products-Tellurium is often used **to improve the machinability of copper and stainless steel**. It's used to make blasting caps, added to cast iron and ...After it implemented a restructuring plan to cut costs, the company in 2013 sold property in Colorado where tellurium had been discovered to a group of investors led by John Keller, First Solar's former exploration manager for North America.As First Solar retrenched, it focused on cutting the amount of tellurium it needs to make modules. Simon Jowitt and Brian McNulty, economic geologists at the University of Nevada, Las Vegas, estimate the tellurium intensity of cadmium telluride solar modules has fallen by more than half in the past decade.



Graphic accessed Dec. 8, 2021.
Source: U.S. Energy Department

"[First Solar] can puppeteer every single part of the process to make the modules more efficient," said Kelsey Goss, a solar analyst at the consulting firm Wood Mackenzie who previously worked at First Solar. "And that is something that I think they probably are doing" to manage their tellurium needs.How far companies can cut their demand for the material is unclear, however."The industry will encounter fundamental mass limitations for how many solar cells it can manufacture due to basic constraints in sourcing raw material," Samuel Goodman, an analyst at the U.S. International Trade Commission, or USITC, said in a 2019 article published in the Journal of International Commerce and Economics."These are intensive processes,"

Goodman added, "whose expansion would not necessarily be economically viable unless downstream prices increased, especially for tellurium."Koralewski said initiatives are underway to further decrease the tellurium intensity of First Solar's modules, and Widmar has told investors that the company's module recycling program someday will offer at least a partial solution to its raw-material needs. In the meantime, First Solar is in the market for new sources of supply.

Record demand for First Solar modules In November, First Solar reported that module bookings were up more than 150% from the same period of 2020, and the company said it received its largest module order ever, from BP PLC and Lightsource BP Renewable Energy Investments Ltd. Increased tellurium demand should encourage more production, Goodman, the USITC analyst, said in an interview."If [copper producers] see the financial case for it with the higher demand and the higher tellurium price because of that, then you'll start seeing more of these capital investments," Goodman said.Tellurium prices need to increase "very, very, very significantly," however, to attract more investment, said Michael Husakiewicz, a metal trader at Lipmann

Walton & Co. Ltd. "Tellurium is not really a metal where [copper producers] make serious money," Husakiewicz said. "If there's any possibility that it might cause any problems to the equipment, to the planning of processing, literally anything, then they're not going to bother, because what they make in copper probably in a day is way more than they would make on tellurium in a year."

Global risk: 'Uncertainty and lack of transparency'With First Solar aggressively expanding its business, sources of new tellurium supplies will be essential "unless significant amounts are stockpiled in warehouses, which does not appear to be the case," Keller, First Solar's former exploration manager, said in a statement. First Tellurium recruited Keller in November.New tellurium production in North America could help to provide a secure source of supply for First Solar's growing U.S. business."The US solar industry is at an important inflection point where it must continue the charge towards delivering 45% of our country's electricity by 2050 while addressing the risks and uncertainty posed by increasingly volatile solar panel production, pricing, and supply," Georges Antoun, First Solar's chief commercial officer, said in a statement announcing the BP

contract. "This is where we come in." But First Solar's operations stretch beyond the U.S. The company has factories in Vietnam, Malaysia and soon, it expects, in India. And a key ingredient in its technology comes from mines and refineries scattered around the globe. "In terms of transparency, it's an entirely global supply chain," Goodman said. "And China is the largest producer of tellurium. So, I would say that there is uncertainty and lack of transparency and potential risks due to all of those factors, as you would find with any other kind of globally traded commodity."

Mining tellurium in the US hasn't paid. It's been cheap from China where forced labor with displaced Tibetans and state ability to control pricing to undercut competition. Now, the cost of Tellurium is rising as well as the roductg being withheld to leverage against US tariffs on Chinese photovoltaics to undeerrcut their sales in America. -Two fold objective to increase Amerrican solar so as not to be dependent on china and boost its economy as it becomes more aggressive and counter to US security policiy. First Solar's opacity appears to be referencing its past use of available and affordable and unethical Chinese mining and processing of Telurium in the rare earth rich

district of Xianxang where forced labor camps are constructed for polysilicon as well.

Where does First Solar get all the tellurium it needs? 2 US Mines- One started up last summer and at the end of the year will have produced (mined)20 tons. Where does it get processed? 5NP is its go to. The number don't add up.

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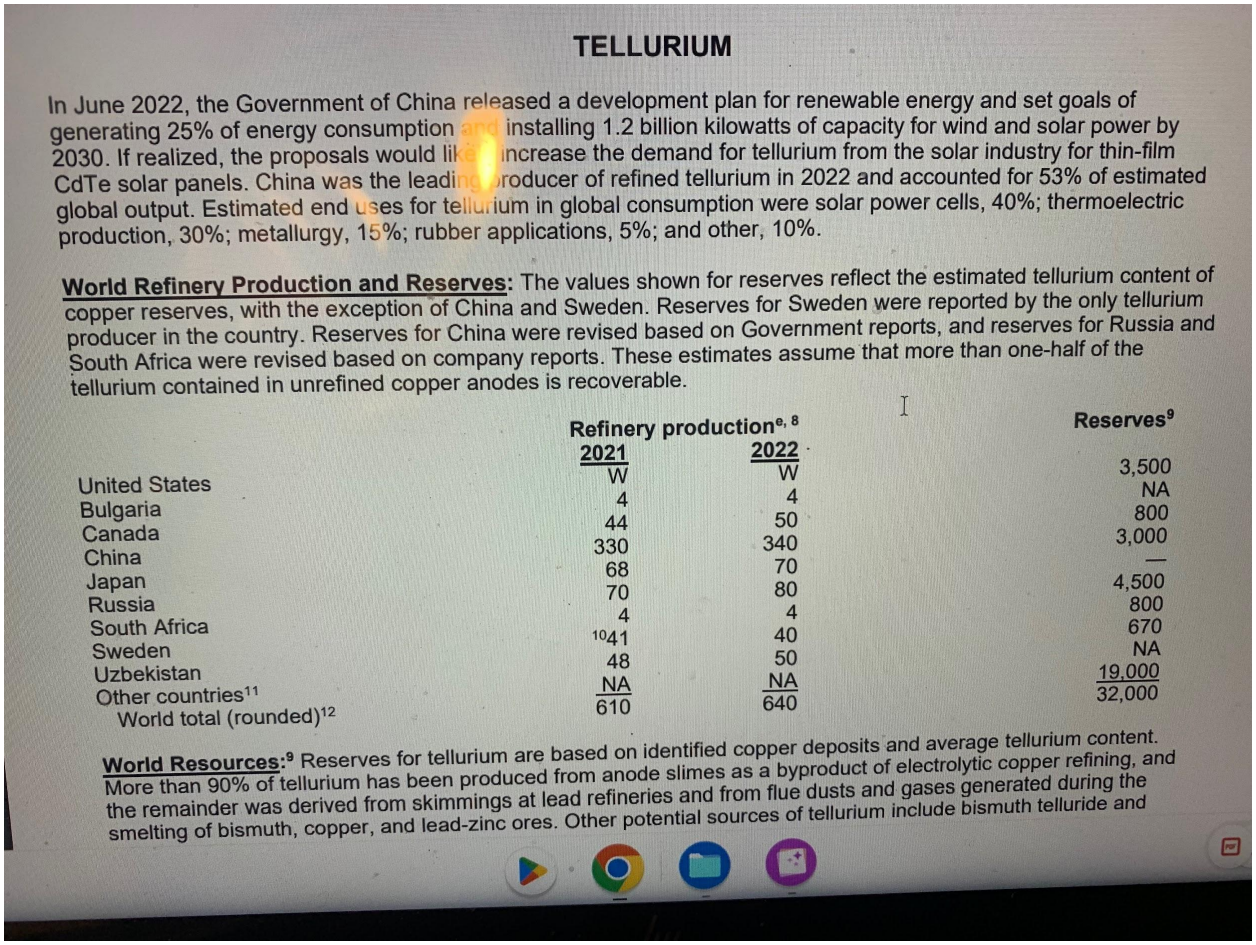
Extraction isn’t Worth the Effort

Mining tellurium in the US hasn’t paid. It’s been cheap from China where forced labor with displaced Tibetans (one report) and state ability to control pricing to undercut competition. Now, the cost of Tellurium is rising as well as rare earth minerals being withheld to leverage against US tariffs on Chinese photovoltaics as part of an all out effort to have American reliant solar. And also so as not to be dependent on China and boost its economy for geo-political reasons, and not to support forced labor industry in China. First Solar’s opacity appears to be referencing its past use of available and affordable and unethical Chinese mining and processing of Telurium in the rare earth mineral rich district of Xianxang where forced labor camps are also constructed for polysilicon mining and processing.

Where does First Solar get all the tellurium it needs? 2 US Mines- One started up last summer and at the end of the year will have mined, not processed, 20 tons. Where does it get processed? 5NP is First Solar’s go to. The numbers don’t add up.

https://pubs.usgs.gov/periodicals/mcs2023/mcs2023-tellurium.pdf



TELLURIUM

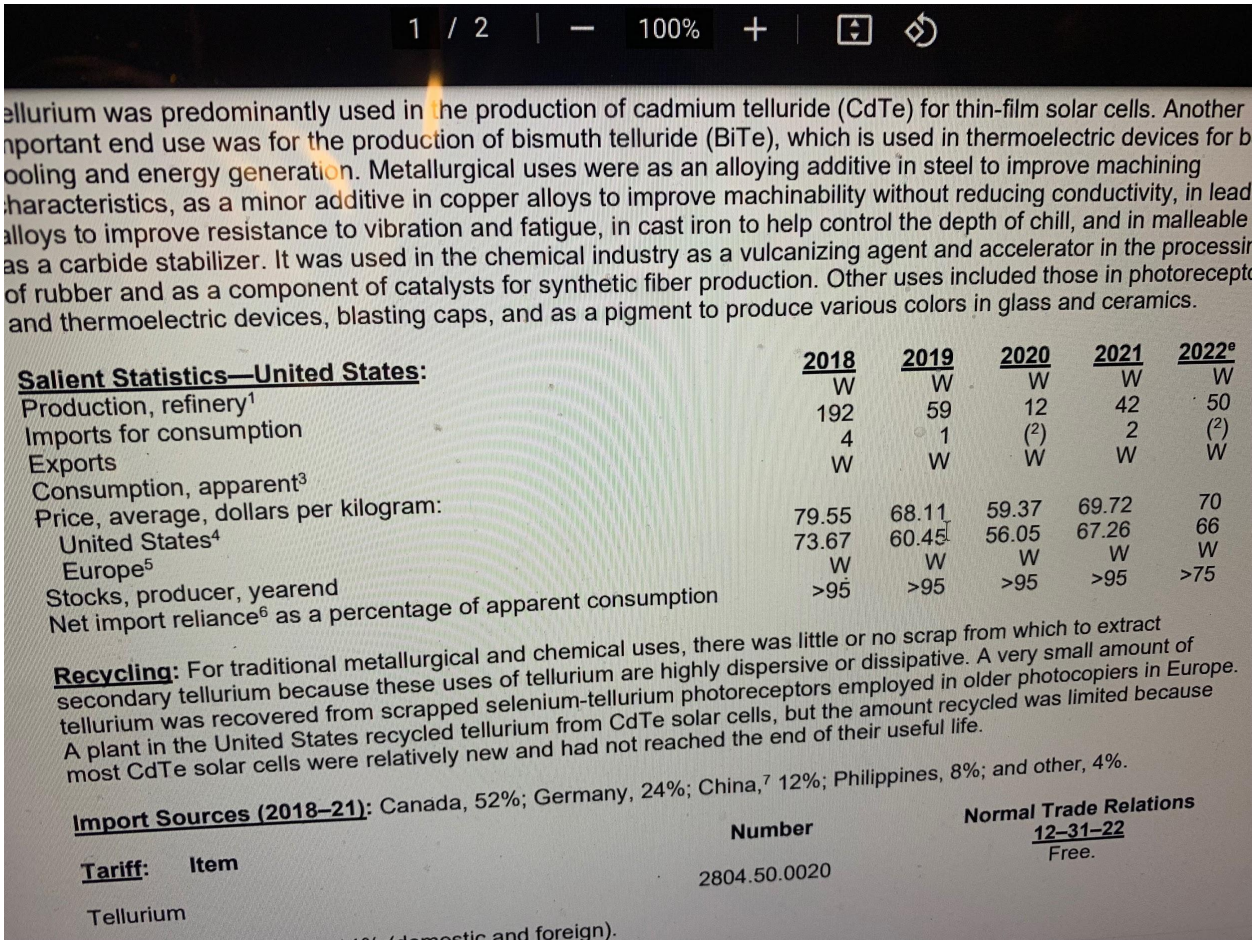
In June 2022, the Government of China released a development plan for renewable energy and set goals of generating 25% of energy consumption and installing 1.2 billion kilowatts of capacity for wind and solar power by 2030. If realized, the proposals would likely increase the demand for tellurium from the solar industry for thin-film CdTe solar panels. China was the leading producer of refined tellurium in 2022 and accounted for 53% of estimated global output. Estimated end uses for tellurium in global consumption were solar power cells, 40%; thermoelectric production, 30%; metallurgy, 15%; rubber applications, 5%; and other, 10%.

World Refinery Production and Reserves: The values shown for reserves reflect the estimated tellurium content of copper reserves, with the exception of China and Sweden. Reserves for Sweden were reported by the only tellurium producer in the country. Reserves for China were revised based on Government reports, and reserves for Russia and South Africa were revised based on company reports. These estimates assume that more than one-half of the tellurium contained in unrefined copper anodes is recoverable.

	Refinery production[e, 8]		Reserves[9]
	2021	2022	
United States	W	W	3,500
Bulgaria	4	4	NA
Canada	44	50	800
China	330	340	3,000
Japan	68	70	—
Russia	70	80	4,500
South Africa	4	4	800
Sweden	[10]41	40	670
Uzbekistan	48	50	NA
Other countries[11]	NA	NA	19,000
World total (rounded)[12]	610	640	32,000

World Resources:[9] Reserves for tellurium are based on identified copper deposits and average tellurium content. More than 90% of tellurium has been produced from anode slimes as a byproduct of electrolytic copper refining, and the remainder was derived from skimmings at lead refineries and from flue dusts and gases generated during the smelting of bismuth, copper, and lead-zinc ores. Other potential sources of tellurium include bismuth telluride and

Where did the US get 3500 tons of reserve and by US, First Solar claims primacy? To many W-withheld- entries when talking with what are called Conflict minerals as China has oppressed Tibetan and Yughur peoples, using them to mine, process, handle fragile products while suffering harsh abuses.



1 / 2 | − 100% +

ellurium was predominantly used in the production of cadmium telluride (CdTe) for thin-film solar cells. Another important end use was for the production of bismuth telluride (BiTe), which is used in thermoelectric devices for b ooling and energy generation. Metallurgical uses were as an alloying additive in steel to improve machining haracteristics, as a minor additive in copper alloys to improve machinability without reducing conductivity, in lead alloys to improve resistance to vibration and fatigue, in cast iron to help control the depth of chill, and in malleable as a carbide stabilizer. It was used in the chemical industry as a vulcanizing agent and accelerator in the processir of rubber and as a component of catalysts for synthetic fiber production. Other uses included those in photorecepto and thermoelectric devices, blasting caps, and as a pigment to produce various colors in glass and ceramics.

Salient Statistics—United States:	**2018**	**2019**	**2020**	**2021**	**2022[e]**
Production, refinery[1]	W	W	W	W	W
Imports for consumption	192	59	12	42	50
Exports	4	1	(2)	2	(2)
Consumption, apparent[3]	W	W	W	W	W
Price, average, dollars per kilogram:					
United States[4]	79.55	68.11	59.37	69.72	70
Europe[5]	73.67	60.45	56.05	67.26	66
Stocks, producer, yearend	W	W	W	W	W
Net import reliance[6] as a percentage of apparent consumption	>95	>95	>95	>95	>75

Recycling: For traditional metallurgical and chemical uses, there was little or no scrap from which to extract secondary tellurium because these uses of tellurium are highly dispersive or dissipative. A very small amount of tellurium was recovered from scrapped selenium-tellurium photoreceptors employed in older photocopiers in Europe. A plant in the United States recycled tellurium from CdTe solar cells, but the amount recycled was limited because most CdTe solar cells were relatively new and had not reached the end of their useful life.

Import Sources (2018–21): Canada, 52%; Germany, 24%; China,[7] 12%; Philippines, 8%; and other, 4%.

Tariff:	**Item**	**Number**	**Normal Trade Relations 12–31–22**
	Tellurium	2804.50.0020	Free.

This USGS report says the US has production and refinery withheld (W).

Imports for consumption 50 when it needs over 400 tons per annum. Consumption apparent W. Net import RELIANCE 75%.

Recycling - very little tellurium recovered because recycling hadn't commenced- new, most panels not at the end of their life.

But in the SEC21 Report, their prepaid recycling project, dropped in 2013, was listed as a liability of 150 million. p.103"Our module collection and

recycling liability was 139.1 million as of Dec. 31, 2021."

"If First Solar achieves its goals, its annual demand for the mineral will exceed last year's estimated global tellurium production by up to 70%, according to researchers at the Institute of Environmental Science and Technology at the Autonomous University of Barcelona."

https://www.miningmagazine.com/design-build/news/1432216/rio-tinto-begins-tellurium-production Two articles on Rio Tinnot- just starting to produce 20 tons of tellurium anually.

Rio Tinto is now one of two producers of critical mineral tellurium in the U.S. Approximately 20 tons of tellurium will be produced each year at Kennecott's new US$29 million circuit. Tellurium is a by-product of copper production, reducing the amount of waste heading to Kennocott's mine tailings. The company is producing the mineral, used in advanced thin film photovoltaic solar panels, at its Kennecott copper mine in Utah. "Approximately 90 percent of the world's tellurium resource is contained in copper ore and no other metal has more critical mineral by-products than copper," Rio Tinto chief operating officer Clayton Walker said. Tellurium is one of 10 metals and products extracted at Kennecott, Rio Tinto said.

As

Kennecott's New Tellurium Recovery Plant Points to Metal's growing importance. "Kennecott reported that the recovered tellurium will be refined in North America by 5N Plus. The refined tellurium will be supplied to Arizona-based First Solar Inc., the lone American company amongst the world's ten largest solar panel firms."

"A recent article by S&P Global Intelligence noted that First Solar's plan to spend $1.36 billion to increase module capacity to 16 GW by 2024 seems certain to strain the tellurium market. Questions about opaque sourcing.

raises questions about 5NPLUS processing in North America. 5NPLUS may have sourced tellurium from China (possibly black market sources said to be prevalent in Xianxang District where rare earth minerals are found). With the increase in tellurium demand, is this still a possibility, against the FLPA?

5N Plus secures multi-year supply contracts with First Solar
Semiconductor today 5N Plus has been a key supplier of semiconductor materials to First Solar since 2007 and over this period several long-term contracts have been signed and executed. During this period 5N Plus has become the leading supplier of engineered semiconductor compounds to the thin-film renewable energy industry, it is claimed.

https://semiconductor-today.com/news_items/2018/jul/5nplus_310718.shtml
5N Plus secures new US$79m syndicated credit facility 5N21 fosters "a new business model which is transforming 5N Plus, as evident by the

significant improvement in profitability, substantial enhancement in return on capital employed, reduction in earnings volatility, recurrent cash flows and a solid balance sheet," says chief financial officer Richard Perron. "Over the past two years we have utilized selectivity as the tenet of our approach to address market opportunities, consolidate assets across the globe, optimize global supply chain and address investment requirements of our business," he adds. "We are now shifting our focus toward growth initiatives and find a combination of a solid balance sheet along with the conclusion of this new expanded and flexible credit facility timely, to efficiently support and deliver growth in-line with our ambitions."

I have to say, not much about end of life responsibility, Aquifer or well protection, or a crisis for all of us to protect a living, healthy, and safe, sustainable earth.