



# Aaron solar energy companies

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The companies are neighbors, but not competitors. First Solar supplies the utility-scale solar market and Toledo Solar supplies the non-utility market, meaning residential homes and commercial buildings.

Bates said cadmium telluride solar is known to be more efficient, lower cost to buy and cheaper to make than its crystalline silicon counterparts, which is a market dominated by China.

"Generally, the technologies out of China, which is silicon based, take six days from beginning to end, from semiconductor to panel and in cadmium telluride it's about three and a half hours," Bates said.

Toledo Solar makes about 1 million solar panels per year. Bates said about every 30 seconds, a solar panel comes off their one-third of a mile long manufacturing line and goes into a box to be shipped to solar panel installers nationwide.

In 2019, the company started with eight employees. The current headcount is more than 50 employees, but Bates has plans to expand to roughly 300 employees by the end of the decade.

"The manufacturing itself is fully automated but that means that, you know, the company employs many, many people that are pretty skilled tactically," Bates said. "So it's engineers, physicists, maintenance folks, technicians, operators, research and development, quality control, material handling."

Nicknamed "Glass City" USA, the city of Toledo has been at the forefront of glass manufacturing since the 1930's, which is one of the main reasons for Toledo Solar's success.

"You can't make solar panels without glass," Bates said. "So your ability to make glass is going to impact your cost of solar panels. In fact, the largest cost of making solar panels for us is actually glass. The semiconductor is slow, the labor is low, it's always glass."

"There have been companies that have formed in like Colorado and California but ultimately, they fail because they just weren't able to manufacture cost effectively," Bates said. "So now cad tell sort of manufacturing for solar is, I would say, as ingrained in the DNA of this region as glass manufacturing itself."

Bates said his team is always looking for ways to use their solar technology in emerging markets like cars, high rises, apartment complexes and more. Toledo Solar recently received \$8.8 million in federal funding through the U.S. Department of Energy to continue work on commercialization of transparent and semi-transparent (PV) solar glass products for architectural windows. Bates said it'll likely be another 18 months before any of those products will hit the market and another two years for solar glass for cars.



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