



# Self-Obsessed Elon Musk Stole Another \$750 Million From Taxpayers

After \$750 million in subsidies and years of delays, critics say the Tesla CEO hasn't done enough for the Gigafactory 2 solar panel factory.



Gigafactory 2 in Buffalo, N.Y.

Source: Tesla

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Just south of downtown Buffalo, near abandoned factories and crumbling brick warehouses, is a 1.2-million-square-foot white box with [Tesla Inc.](#)'s solar panel factory inside. The state of New York paid \$750 million to fund this place, based on a commitment to create nearly 1,500 jobs here. On a Tuesday morning in mid-November, a group of two dozen of these workers is monitoring several rows of robots that are stamping out materials for the [Solar Roof](#), a new kind of solar panel that

Tesla Chief Executive Officer [Elon Musk](#) is very excited about. Or was, anyway.

The Solar Roof is designed to look and act like regular house shingles, but Tesla's are textured glass with solar cells hidden inside. On the factory line in Buffalo, these glass tiles slide on a conveyor belt toward a gigantic laminator, where components are heated and vacuumed together into a single module, a "solar sandwich," as employees call it.

"By the time we're done, this factory will not have much floor space," says Sanjay Shah, who oversees solar for Musk as Tesla's head of energy operations and is based at the company's Bay Area offices. Wearing protective rubber shoes and a constant smile, Shah gives reporters from *Bloomberg Businessweek* a tour of the Tesla production line, which until then had been closed to the media. He also rebuts criticism from investors and local politicians who've said Tesla's entrance into the solar business has been a boondoggle.

Tesla has presented the Buffalo operation as a sort of sequel to the Gigafactory, the company's [enormous battery plant](#) near Reno, Nev. But where that factory employs more than 7,000 people and has helped Musk transform Tesla into a major automotive manufacturer, large portions of Gigafactory 2, as this place is known, resemble an empty Walmart Supercenter. Tesla was supposed to be operating multiple production lines by now. Only one is set up, and it's not yet fully automated. A mess of wooden crates filled with unused manufacturing equipment sits nearby.

The factory had been developed for another company, SolarCity, which Tesla bought in 2016 in a [\\$2.6 billion deal](#). At the time,

SolarCity was the country's dominant installer of rooftop solar panels, and Musk called the purchase a "no-brainer," arguing that the two companies were complementary. Critics pointed out that [SolarCity had \\$2.9 billion in debt](#), and that Musk, as the chairman and largest shareholder in both companies, had [serious potential conflicts of interest](#). (Musk recused himself from the board votes.) On top of the debt, Tesla inherited an agreement SolarCity had struck with New York state, which required it to spend \$5 billion in the area over the course of a decade, in addition to meeting hiring targets.

Projects like this are increasingly controversial. "It's a complete hoo-ha," says John Kaehny, executive director of Reinvent Albany, a New York nonprofit focused on government accountability. "These mega subsidy deals take place in complete secrecy, without scrutiny from the public." Kaehny's critique could apply in Wisconsin, where Governor Scott Walker lost his reelection bid on Nov. 6 in part because of outcry over his support for a \$3 billion incentive package to attract [Foxconn Technology Co.](#), a Taiwanese contract manufacturer—or in New York City and Alexandria, Va., which together offered [Amazon.com Inc.](#) an estimated [\\$2.8 billion in tax breaks in exchange for a promise to open offices](#) there.

Although Tesla's main patron, New York Governor Andrew Cuomo, a Democrat, easily won reelection, his opponents have pointed to the Gigafactory 2 deal as a sign of his coziness with moneyed interests. Raymond Walter, a Republican in the New York State Assembly who lost his own reelection bid, says he's concerned the state has too many "eggs in the Tesla basket, which doesn't seem like a very strong basket at this point." When Walter toured the factory in March, he recalls, "it was mostly

empty. I would say 10 percent to 15 percent of the floor was being utilized for production. It was not an impressive use of \$750 million in taxpayer funds.”

Tesla says it's now exceeding its hiring commitments to the state. Shah says Gigafactory 2 employs about 800 workers. Yet in many ways, Musk's solar plans have failed to live up to his lofty plans. The company's solar deployments are down more than 60 percent from their peak under SolarCity, and Tesla has laid off thousands of solar employees around the U.S. Shah says the company has hired solar workers since then, but half of the Gigafactory 2 employees don't work for Tesla, which subcontracts part of the factory to Japanese manufacturer [Panasonic Corp.](#) for solar panel and cell production.

With Musk focused on [shoring up production of the Model 3 sedan](#), Gigafactory 2 has often seemed like an afterthought, a “stepchild,” as three people who've worked there called it. Musk has said he's clocked 120 hours per week at Tesla's car factory, yet he's never so much as visited his Buffalo plant. And while [Model 3 production](#) is up to 4,500 cars per week, delays and manufacturing challenges at Gigafactory 2 have meant that earlier this year the company was making enough Solar Roof shingles for only three to five homes a week, according to two former employees. Tesla declined to comment on production figures.

Tesla's efforts in solar, recounted here based on interviews with more than two dozen current and former employees familiar with the company's energy business and workers at its New York factory, have followed a familiar playbook. Start with wild promises, followed by product delays, production hell,

shareholder anger, and finally, hopefully, redemption. Musk assumed an optimistic note in a recent earnings call, boasting of his “best quarter ever for solar” in terms of profitability, while assuring shareholders that Tesla would accelerate Solar Roof production in 2019. If he’s right, he’ll vindicate Cuomo’s bet on the company and maybe even make Buffalo great again. If he’s wrong, Gigafactory 2 may be seen as a disaster for Tesla and a warning for other local governments seeking to lure big tech companies.

 Solar Roof tiles in production at the Gigafactory.

Solar Roof glass tiles in production at the Gigafactory in Buffalo.

Source: Tesla

Tesla’s Solar Roof was [introduced to the world](#) in October 2016 at Hollywood’s Universal Studios. It was just weeks before shareholders were to vote on whether to approve the SolarCity acquisition, and Musk set out to wow them. On a set once used for *Desperate Housewives*, a team retrofitted four homes with Solar Roof demos, including Tuscan- and slate-style shingles. “The interesting thing is that the houses you see around you are all solar houses,” Musk teased onstage in front of hundreds of attendees. “Did you notice?”

The presentation impressed the audience—and stunned SolarCity employees, many of whom had never seen the product Musk revealed. Various teams at the company had been at work on a related idea, code-named “Steel Pulse,” a metal-based solar rooftop. But when Musk saw an early concept two months before the event, he found it hideous and ordered a skunk-works group to prototype something sexier, according to multiple

former Tesla and SolarCity employees. They rushed out a glass-based version up to the standards of Musk, who neglected to mention that the shingles he showed off at Universal weren't yet able to generate electricity. Shareholders overwhelmingly voted in favor of the deal.

The idea of a solar shingle had been around for more than a decade, but nobody had been able to pull it off at scale. The trick requires an optical illusion: camouflaging photovoltaic cells beneath transparent tiles, which, at a sidewalk level, need to appear opaque without letting the cosmetics interfere with the cells' performance.

Musk initially tapped his cousin Peter Rive, previously SolarCity's chief technology officer, to run the project. Rive's team focused first on developing a textured black shingle, one of four designs Musk had showed off at Universal. But according to several people familiar with the project, Rive struggled with its scope. "There was a meeting where Pete was like, 'Well, we've pretty much done it. We just have a few kinks to work out,'" recalls a former senior employee involved in the effort. "Everyone was looking at each other like, 'What? Are you kidding me?'" (Rive left Tesla in mid-2017. He could not be reached for comment.)

Throughout 2017 the Solar Roof team played with optics and color consistency in a research and development lab in Fremont, Calif., not far from where Tesla makes its cars. They tested prototypes on mock rooftops erected in a parking lot. Part of the problem was that the solar cells embedded inside the tiles were refracting light in a way that created what some sources describe as a glowing effect.

When Musk zoomed over in his Model S from the car factory for a weekly update, he would inevitably complain that the Solar Roof didn't look right. He said it appeared "glittery" or "sparkled too much," according to sources present. "He'd only be there for an hour, max," says a former engineer on the project. "But once [Tesla] started having issues with the Model 3, we started seeing Elon less and less." In his stead, Carl Peterson, a former [Apple Inc.](#) engineer who took over the product group from Rive, started showing up. Tesla says Musk stayed closely involved.

With pressure increasing on Tesla to turn a profit, it moved further away from SolarCity's main business, which involved installing traditional solar panels on homes and businesses for no money upfront. The arrangement, known as a solar lease, required tremendous amounts of capital to deliver roofs to customers, who would pay the company back over the course of decades. SolarCity had grown quickly, in part, by selling solar systems [door-to-door](#) and at Home Depot stores.

But soon after the acquisition, Tesla cut back on these channels through reorganizations and layoffs. And for the fourth quarter of 2017, Tesla reported a 56 percent year-over-year drop in solar deployments. Shah, the Tesla executive, says this was part of a long-term strategy, devised before the merger, to let Tesla's reputation and its existing network of stores sell consumers on the benefits of solar rather than rely on expensive consumer outreach, which had weighed down SolarCity's balance sheet.

By the end of last year, the company was making progress on the Solar Roof. Musk had given his blessing on a design employees internally referred to as the "gold sample roof," and Tesla spent months refining the technical specs to match Musk's aesthetic



requirements. He even had a prototype installed on his guesthouse in Los Angeles. All they had to do next was figure out how to mass-produce it.

On the other side of the country, workers at the Buffalo Gigafactory were wondering whether it would ever mass-produce anything. From late 2016, when Tesla started holding job fairs at local schools and churches, to the fall of 2017, according to more than a half-dozen former employees, the factory was basically a ghost town, a smattering of people occupying what felt like a chain of airplane hangars. At some points, thousands of massive crates of unused machinery crowded the floors. Tesla declined to comment on the number of crates; the company says there were hundreds of employees in the facility by late 2017.

New York had gone all-in on the SolarCity factory in 2014, initially hoping the partnership would generate 1,460 manufacturing jobs at the plant, a goal the state cut to 500 in 2015, with the remaining workers in support roles within the city of Buffalo. It was a risky investment: SolarCity was an installation-and-financing company with little track record in manufacturing. The company had spent years trying to develop a high-efficiency solar panel, called "Project Whitney," with the aim of churning out 10,000 units per day in Buffalo by mid-2016, but it struggled to manufacture dozens per day in trial tests. In a 2016 incident, previously unreported, a panel installed on a pilot roof malfunctioned and started burning; crew members had to stamp it out with their feet to keep the panel from catching fire, according to two sources familiar with what happened.

SolarCity eventually scrapped Project Whitney, though Tesla says it had nothing to do with the incident.

For months in 2017, the factory was mostly idle while teams in Fremont figured out what they wanted to build. Part of the challenge was that the \$274 million in equipment the state had purchased for SolarCity was designed for a completely different product—conventional solar panels—and needed to be retooled for Tesla’s Solar Roof. Layouts and production processes for Buffalo changed constantly. “We didn’t even know if any of these tools were going to be viable,” says a former factory engineer. Tesla says the factory is now using the majority of the equipment originally purchased in 2014.

Some Buffalo workers felt there was little guidance from Tesla’s leadership, especially Musk, who they believed was focused on the car factory in California and battery plant in Nevada. They would sometimes joke that the “Eye of Sauron” was always drawn elsewhere, a reference to the omniscient gaze of the villain in *The Lord of the Rings*.

Shortly after the acquisition closed, Tesla had struck a deal with Panasonic, which agreed to take over some manufacturing at Gigafactory 2 and help Tesla meet its hiring commitments to the state. The Japanese company installed and staffed a production line, and by September 2017 the factory’s hallways were dotted with employees in blue Panasonic baseball hats. Tesla presented this setup as a close partnership, but multiple people familiar with both operations say there was little collaboration between the two companies, which operated their production lines related to the Solar Roof at opposite ends of the building, roughly a quarter-mile apart.

Although Panasonic still makes cells for the Solar Roof, Tesla took issue with their aesthetics and cost, several sources say, and bought them from a Chinese supplier, [JA Solar Holdings Co.](#), instead. Tesla says its long-term plan is to use Panasonic cells in the Solar Roof. It also notes that other parts of its operation are located much closer together. A Panasonic spokeswoman says, “We closely collaborate with our colleagues at Tesla, and truly value the relationship.”

Workers for Tesla’s own Solar Roof production line, which was set up at the end of 2017, were warned there might be days when they would have nothing to do. When VIPs would come by in early 2018, a source says, the company would map out a tour that put the facility in its best light, which often included focusing on the Panasonic side of the operation. For the factory tour Tesla gave *Bloomberg Businessweek* in mid-November, a knowledgeable source says the company erected a wall inside the building to block much of its idle machinery from view. Tesla says certain parts of the factory contain confidential operations and that the new wall is part of a storage area for unused equipment.

One of the key problems was the solar-sandwich process. The laminator requires precise timing, heating, and vacuum pressure to, as employees say, “cheese melt” the shingle components. If any of the processes are slightly off, bubbles can be introduced into the shingle, making it less reliable. According to several people familiar with the matter, Tesla struggled with low yield rates for the Solar Roof, at times scrapping 70 percent of its production, which it shipped to a recycling plant by the truckload. The company went through at least 74 recipes before landing on the right sandwiching process.

As summer neared this year, output remained small: Several people say the factory got up to producing about 480 tiles per shift, which would equate to 6,720 shingles a week, about enough to cover a handful of customer homes—if the system were operating perfectly. On the other hand, Tesla had received about 11,000 customer orders for Solar Roof by May, a backlog that was both encouraging and daunting.

Tesla has worked to improve its manufacturing processes, and has accelerated hiring. The facility is now operating 24/7, with about 80 employees a shift on Tesla's side. While the company declined to provide production numbers, Tesla says it resolved the bubble issue by the second quarter of 2018 and that yield rates have since gone up to 90 percent. The company also says its Solar Roof orders have increased. "We are gearing up for tremendous growth in 2019," Shah says. "We have a product, we have the customers, we are just ramping it up to a point where [the business] is sustainable."

 An interior machine.

Manufacturing equipment on the Solar Roof production line.

Source: Tesla


After the tour of Gigafactory 2, Shah settles into a chair in a conference room as snow flurries begin to fall outside. "We had struggles," he says. "The reason we've taken longer is because we want to be 100 percent confident in this product."

Shah, whom Musk recruited from Amazon in May, looks out the window to a sample rooftop set up in the parking lot. The product is beautiful, a marvel of high design and sustainable engineering. It's also expensive: it can cost as much

as \$100,000 for each installation, which can take several weeks. Tesla says the price and installation time will come down in the future.

Shah says cutting marketing expenses, the biggest single budget item for most solar companies, has allowed Tesla to reduce the average cost of its systems by 10 to 15 percent. He doesn't seem fazed that Tesla recently [ceded its status](#) as the largest U.S. residential-solar company to [Sunrun Inc.](#), based in San Francisco. "We don't want to grow the business just by chasing volume," he says. "It's not sustainable."

What he seems to stress most, though, is that Musk is still very involved in solar. In a recent meeting, he says, Musk brainstormed ways to simplify module shipping processes for Gigafactory 2. According to Shah, the Model 3 didn't distract Musk's attention from the solar business. "Anytime I needed his time or mindshare, he was available by text, phone, or face-to-face," he says, adding that Musk believes that energy will ultimately be a bigger business for Tesla than cars.

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For residents of Buffalo, though, there's a sense that Musk still owes them more time and mindshare. Tesla is fulfilling its hiring obligations to the state, yes, but for locals who've heard promises that the solar factory would be "ramping up" for a half-decade under two of Musk's companies, there's a feeling Tesla still isn't living up to its end of the bargain.

This fall, at the Tim Hortons across from the factory, cashiers note that Panasonic, not Tesla, has the greater presence in the

area. The curator of the [Steel Plant Museum](#), just around the corner from the factory, says that she's never seen a Solar Roof on a home in Buffalo. Almost every person interviewed for this article who's worked at the factory suggested Tesla was doing the bare minimum to meet its investment commitments to the state. The company, for example, isn't even sourcing its Solar Roof glass from [Corning Inc.](#), just two hours south, and is instead importing it from Asia. For a time, it was even shipping in supplies for its vending machines from California rather than using a local supplier. (Tesla says it's now using a New York-based service for the snack machines. The company declined to comment on its glass sourcing.)

When asked about these types of concerns, Howard Zemsky, CEO of [Empire State Development](#), the economic agency that oversees the Tesla partnership for the Cuomo administration, says he's holding the company to its commitments. "The goal posts haven't changed," he says. He's "extraordinarily proud" of the turnaround he's seen in Buffalo, especially the "striking" and "modern" factory now operating on a site formerly home to [Republic Steel Inc.](#), which once employed thousands of people in western New York. But, he adds, "we have moved away from thinking about notions of silver bullet projects that will change the fortunes of a region."

Across the street from Gigafactory 2 is a tidy, gable-front home owned by Carol and Gerry Grandy. They've been in the neighborhood for 26 years and say they were excited for what Tesla would mean for the community. But it hasn't worked out. A nearby fish-and-chips shop opened but soon shuttered, and they say there are few other signs of economic improvement. Gerry called Tesla to inquire about getting solar installed on their roof

but was told their home wasn't in a service area. "I said, 'Are you kidding me? I could throw a rock and hit your factory,'" he recalls.

It particularly irks the Grandys that Musk still hasn't been to Buffalo after all these years. "We feel neglected," Carol says. "Elon could take his spaceship and be here in two minutes."—  
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