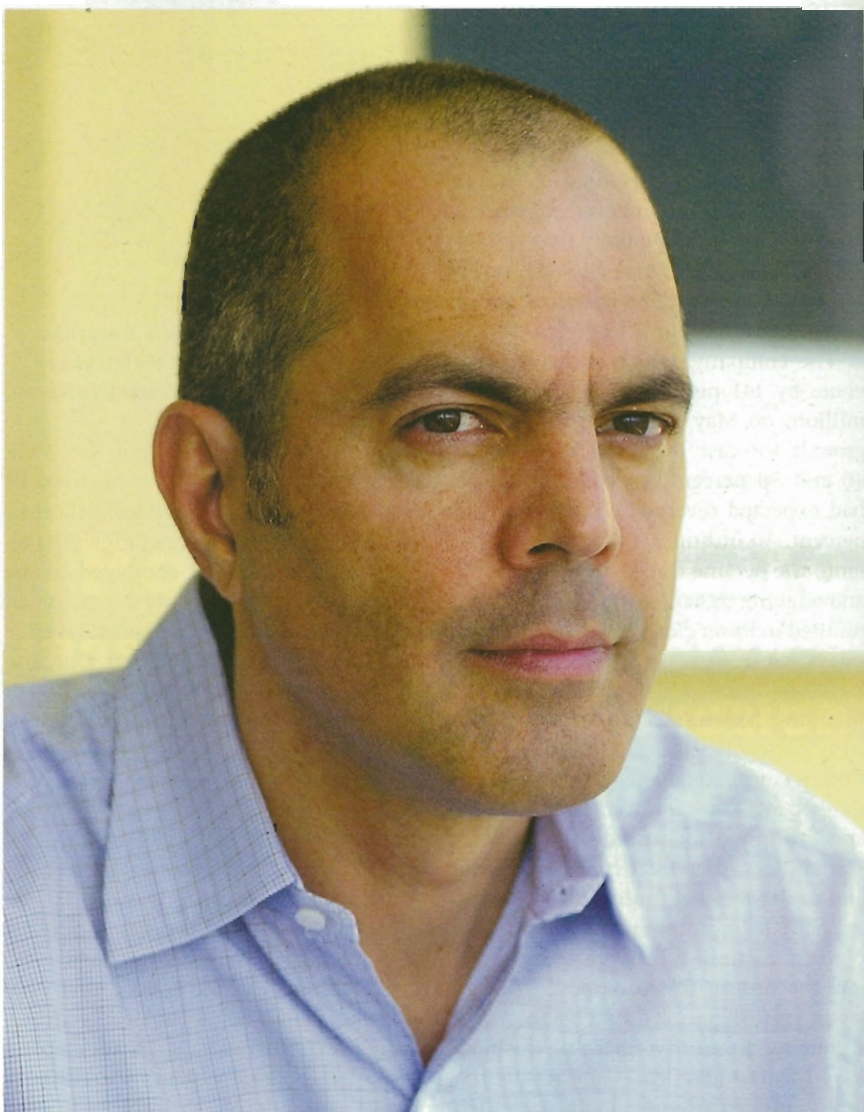


When Canadian smelter Timminco Corp. called on PHOTON Consulting to review its process for making low-cost upgraded metallurgical silicon, a notorious short seller began bombarding the internet and media with nasty press releases to drive the booming share price down – and make a killing in profits. But having already won over the world's biggest PV producer Q-Cells and – according to one source – vertically-integrated CSI, which is already delivering UMG-Si modules, Timminco is not only surviving the onslaught, its share prices have continued to rise.

Manuel Asensio is a short seller. That is no comment on his physical stature, but rather his fiscal bent on the stock market. Since 1993, the US-based Cuban refugee has been making money by going after small companies with questionable claims as they seek stock market stardom. As per the short seller modus operandi, Asensio targets those firms by borrowing shares from brokers, selling them, then relentlessly boring into any company weakness he can find. This media and internet blitz of negative press releases is aimed at driving down the company's image and stock so that Asensio can buy the shares back at a lower price before returning them to the broker. The result? A healthy return for Asensio and often ruin for his prey. According to Asensio's 2001 book *Sold Short*, the media has dubbed him »Demolition Man,« »Attila the Hun« and »a company's worst nightmare.« Depending on your point of view, Asensio is either an investor protector of comic book hero stature or a profit-hungry parasite using any dirty trick in the book.



Hunter: Short seller Manuel Asensio is stalking profit by attacking the Canadian maker of upgraded metallurgical silicon.

Metallurgical silicon meets Demolition Man

Canadian UMG-Si maker badmouthed by profit-seeking short seller

No doubt René Boisvert would lean toward the latter description. He is president of Canadian-based Bécancour Silicon Inc., a subsidiary of publicly traded metal silicon smelter Timminco Ltd. Bécancour is one of about 17 companies working on processes for making upgraded metallurgical silicon (UMG-Si). While this low-cost silicon alternative has long been touted as the answer to the PV industry's Siemens reactor trichlorosilane-based silicon shortage, the promise of a slightly less-pure feedstock sufficient for

solar applications has yet to be fulfilled. But Bécancour thinks it is ready for the big time. Its patented rotary furnace uses an oxy-fuel burner to purify metallurgical silicon three times, requiring just 2 kWh of electricity per kg, constantly exposing the melt to water vapor to remove boron and phosphorous and each furnace is able to handle up to 10 tons. With plans to ramp up rapidly, such potential has put the share price into a climb. It has also unfortunately put Timminco in the crosshairs of Asensio's sight.



The prey: Rene Boisvert of Bécancour is taking Asensio's pursuit in his stride as the parent company's stock continues to rise.

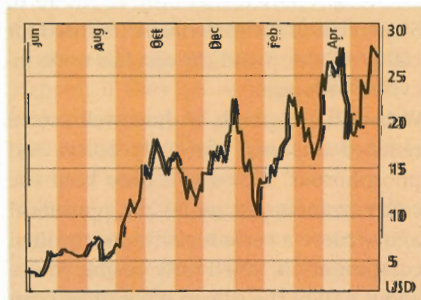
Nasty press releases galore

Boisvert's headaches with Asensio began on April 21 when the short seller picked up on a Barron's article chiding Timminco for a lack of public disclosure on its process. Then when Timminco called in PHOTON Consulting, an independent affiliate of PHOTON International's publishing house Solar Verlag, to conduct an operational review of Bécancour's UMG-Si work followed by a May 14 public conference call, Asensio's attacks gathered speed. By May 21, the short seller had sent out at least 23 nasty press releases, several aimed at besmirching the credibility of PHOTON Consulting's Michael Rogol as a paid and unqualified consultant, even describing him in one press release as a former »Korean taxi cab driver.«

If Asensio's goal was to lower the share price, so far he has failed. During trading on May 16, the share price hit its highest level ever of \$28.95 CAD (\$28.65 USD), closing at a respectable \$27.70 CAD (\$27.41 USD) on May 23. Still, Boisvert admits that the short-selling turmoil has

caused some Timminco shareholders to lose confidence. »I can understand people shorting a stock where there is fraud or something funny going on,« he says, »but the statements Asensio is putting out are incredible.« If Asensio's assessment on Bécancour were correct, he adds, then that would not only mean PHOTON Consulting's Rogol was wrong, but so were »all the other companies.«

Boisvert is referring to its customers. In all, the silicon producer has sent out 100 tons of UMG-Si this year to 40 companies,



Primarily upwards: After Timminco's subsidiary Bécancour entered the PV business a year ago, its stock price has been on the rise.

with samples ranging in size from 50 kg to several tons. Of those recipients, five have signed supply deals.

Premier among them is the world's leading cell manufacturer, Germany's Q-Cells AG. On March 27 it announced that it had signed contracts with Timminco for 410 tons this year and 3,000 tons in 2009 at fixed prices, with negotiations for 6,000 tons annually from 2010 to 2013 slated to be completed by the end of July. Q-Cells, which is working on four other UMG-Si deals—including a contract with Norway's Elkem Solar AS (see PI 3/2007, p. 10)—with the goal of setting up UMG-Si-based wafer and cell lines at a new factory being built in Malaysia (see PI 5/2008, p. 16), characterized the »extensive tests« with Timminco's product as having »achieved very good results in manufacturing cells.« In an April 22 Reuters article, Q-Cells' CEO Anton Milner put the cell efficiency at »well above 15 percent.«

Boisvert, who declined to confirm that efficiency, would only say that Q-Cells' product uses 100 percent UMG-Si for the cells. During his one-day visit to Timminco, PHOTON Consulting's Rogol claims he received verification that several companies were reporting efficiencies above 14 percent. According to Boisvert, one of those is Solar Power Industries Inc. (SPI), a Pennsylvania, US-based »ingot-to-system« PV company. On May 8, Timminco's parent company AMG Advanced Metallurgical Group of Amsterdam revealed that SPI, which had entered into an unannounced deal in March 2007 for 4,000 tons of Timminco UMG-Si spread out over five years, had signed a new contract for 3,000 tons annually from 2010 to 2015.

First UMG-Si modules being delivered?

And according to a high-placed source, who asked to remain anonymous, the feedstock for Canadian Solar Inc.'s (CSI) new e-Module series using 100 percent UMG-Si cells, announced in its first-quarter results on May 13, is also from Bécancour. Shawn Qu, CEO of the Canadian incorporated company with manufacturing facilities in China, declined to confirm this, saying only that his company had two sources of UMG-Si, one Chinese. CSI says it has switched over one of its cell lines to handle UMG-Si wafers, producing 1 MW of cells within four weeks up to mid-May at an average stabilized efficiency of 13.3 percent after light-soaking and using about 12 to 13 g per W. Qu, who admits that CSI has experienced an unquantified rejection rate with »a set of challenges« at the wafer, cell and module levels, is expecting this company to produce between 30 and 40 MW of its e-Modules this year with a module

stability than is required for highly pure material.

PHOTON So, there are two problems: you have to bundle the impurities and keep them away from the p-n junction.

Weber Exactly.

PHOTON How do I bundle them?

Weber Those are the process secrets of time, temperature and phase junctions. In metallurgy, that's called the TTT diagram, that means: Time, Temperature, Transition. You can figure it out through trial and error and generally that's how it's done. Or, you can take a scientific approach and look at the particles under an electron microscope. In the long run, you'll have to do both. I think it requires a good mix of scientific understanding, targeted defect engineering and process technology. On the other hand, there are some very high-ranking members of the PV industry that say: UMG silicon will never work ...

PHOTON ... or at least they say: if a company like Elkem needed 25 years to produce useable material, how can a company like Timminco do it in just two years?

Weber I firmly believe that Elkem was possibly chasing after the wrong horse for a while. Namely, trying to produce material that is equivalent to conventional, highly pure silicon. And the chances of doing that successfully are fairly low. I think the biggest re-adjustment was to say: »Okay, we are dealing with different starting material, we have to treat it differently, too.« That's why we call it UMG – upgraded metallurgical-grade – silicon after all. The name is probably a very accurate description.

PHOTON Q-Cells has now signed large contracts with Timminco, Elkem and others. Modules and cells made with this material will be hitting the market in coming months. In your opinion, is there any reason why end-users should avoid these products for the time being?

Weber Naturally, customers should place a lot of value on reliable certificates. We do that here at ISE: we perform an exceedingly detailed examination. Once the modules are certified correctly, then the products are certainly safer than, for example, thin-film technologies, since silicon is inherently a very stable material.

PHOTON What's your guess: how much UMG silicon will be used in 2015?

Weber Optimistically, I'd say up to 50 percent of crystalline silicon for solar cells

could come from UMG silicon.

PHOTON How quickly can a manufacturer of metallurgical silicon set up a production process?

Weber In my opinion, much quicker than one can start up production with a Siemens process.

PHOTON And how high are the investment costs? The estimate is about €100 million (\$156 million) for a 1,000 ton factory using the Siemens process.

Weber Right, and no one will give you an exact figure for UMG silicon, but I'm sure it's about ten times less expensive. Semiconductor manufacturers should prepare themselves if that's the case.

PHOTON But that also means that we could expect to see an additional 100,000 tons of solar silicon over the next two to four years.

Weber Yes, that could be the case. At that point, the price won't be \$50, but rather \$20 to \$30 per kg.

PHOTON Do you have an estimate or thoughts about how much solar silicon could be produced with UMG?

Weber I think that depends solely on how long the price remains economically interesting. Manufacturers of UMG silicon are very interested in prices above \$15 to \$20 per kg. That means that all potential UMG manufacturers are working to achieve that goal. So, in the beginning, we'll see a decline in the price of highly pure silicon. There will be a lot of jittery stomachs, but it will be to the advantage of the solar industry – after all, for PV's breakthrough, we need lower prices.

PHOTON Essentially, history is repeating itself: BP Solar, or Solarex, purified metallurgical silicon in the 1980s and produced cells using this material.

Weber But then they dropped it, because suddenly there was

plenty of silicon scrap available from the semiconductor industry.

PHOTON Now BP is cooperating with Globe, the world's largest manufacturer of metallurgical silicon. What would happen if they get serious and Globe opens a factory to produce 50,000 or 100,000 tons? They could have that ready in two years.

Weber Yes, I assume so. And then cells will be much, much cheaper – and that much sooner than we had expected. Very exciting!

PHOTON Thank you for the interview.

Interview by Anne Kreuzmann

»Then cells will be much, much cheaper – and that much sooner than we had expected.«

efficiency about 1 percentage point below cell efficiency, tripling to 100 to 150 MW in 2009. CSI claims it has set up deals for one large-scale rooftop in the US, adding that deliveries have already started. While the quantity was not revealed, Qu says CSI has »firm interest« in 100 MW of product, including two European contracts worth 20 MW each, with deliveries slated to start in the first quarter of 2009. CSI, which puts the average selling price for the e-Modules at 15 percent below its other silicon-based modules, is the first company to officially confirm the sale of UMG-Si modules.

Boisvert, who declined to confirm CSI's participation, also would not name the other two companies it has contracted with, except to say that they are planning to blend 30 to 50 percent of Timminco's UMG-Si with regular polysilicon from Siemens reactors. A major factor in selecting additional customers will be companies that Timminco can partner with for downstream ingot and wafer production. Boisvert expects to make announcements by the end of the year. Another factor will be based on the average price the companies are willing to pay. Boisvert puts the current UMG-Si pricing at somewhere just above \$60 CAD (\$59.37 USD) per kg (the company puts the fully-loaded production cost as low as \$22 CAD per kg for 2008). This would put Timminco below the average for long-term polysilicon contracts of about \$70 to \$80 USD per kg. As Bécancour improves its process, Boisvert expects the price would continually beat out regular polysilicon, with PHOTON Consulting putting Timminco's UMG-Si price as low as \$45 USD by 2010. But as more Siemens reactor-based polysilicon comes on line and prices fall, it is more likely that UMG-Si will be used increasingly as a blend rather than in its pure form.

Independent confirmation yet to come

No matter how it is used, the real success will depend on its stability. Bécancour's only feedback so far comes from companies that have tested its samples, with Boisvert claiming an initial degradation due to the higher boron content in its material is basically limited to the first three days. As for independent confirmation, Boisvert says that could come in June when Germany's solar research institute Fraunhofer ISE is expected to make the first wafers using Bécancour's UMG-Si.

Boisvert claims that Timminco, which has an overall production capacity of 50,000 tons of metallurgical-grade silicon annually from its own quartz mine, is looking to divest its magnesium and aluminum wheel divisions by the end of the year, becoming strictly a solar sili-

con company. While it currently has one three-line solar-grade factory producing solid silicon about 500 meters from the main smelter at its Quebec site, in mid-May it broke ground on a new factory next to the smelter to handle the second and third purification passes of the liquified silicon. Adding three new lines, one per month starting in January 2009, this will be followed by a second neighboring factory that will install another three lines from April to June. This is expected to raise annual capacity from the current 3,600 tons to 14,400 tons by mid-2009, based on an anticipated monthly yield capacity of 1,200 tons.

Timminco's parent company AMG will install a directional solidification furnace in July at the original facility for making ingots starting at 250 kg for qualifying experiments on various dopants to improve yield and resistivity of the material. Interestingly, the equipment is from an AMG-owned company, ALD. The vacuum technology equipment maker is also producing special directional solidification furnaces for multicrystalline silicon ingots for Norway's REC, the world's largest solar wafer manufacturer (see article, p. 90).

Timminco says the purity of its UMG-Si is currently 99.999 percent, with 0.8

ppm of boron and less than 5 ppm of phosphorous. Boisvert claims the boron content should fall to 0.5 ppm by the end of the year and to 0.3 ppm in 2009. Each of the customers, he says, are dealing with the impurities in a different fashion, either through sorting for a proper mix in the crucibles or working on special techniques at the wafer and cell stages. But all seem satisfied, he notes, even declining to return the more highly contaminated ingot tops and tails for extra credit offered by Timminco.

Questions of disclosure

Still, without independent confirmation of its claims, the only information coming out of Timminco is an anecdotal interpretation of what its customers are reporting. In PHOTON Consulting's review, Rogol heaped praise on what Timminco has done, saying that if Timminco decided to go the way of Walmart and priced its product low, the company would »have the potential to significantly reshape silicon prices« by 2010. Unfortunately, Rogol's presentation was short on technical data. When challenged in a question during the conference call on the product's ability to match a need for 25-year warranties, his response was less upbeat. Despite noting that Timminco,

a company he put among a handful of top-notch UMG-Si manufacturers, Rogol admitted its product was not the best. »There just isn't enough data to make an informed call on what the degradation rates are, what the performance problems are and what the issues are going to be,« he noted.

Boisvert, feeling Timminco has already disclosed too much about its process, is not eager to invite more scrutiny. »We don't want everybody coming to our plant,« he says. »Our process is so simple that people would immediately figure out the little secrets and tricks we are doing beyond the patent application.« The decision to pick Rogol, he adds, was based on the consultant's experience as an observer of »so many different applications and plants.« When asked why Timminco didn't choose someone with an unassailable metallurgical silicon pedigree, Boisvert pauses. »Is there really a certified expert people will believe?«

That's probably just the kind of question short seller Asensio would be happy to latch onto in his quest to lower Timminco's image among stock market investors. But for now, at least, those investors seem to be sticking with Timminco and ignoring Demolition Man.

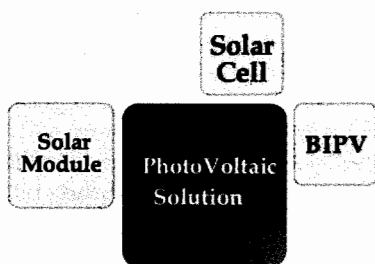
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