

FIVE THINGS: SOLAR-GRADE SILICON

Timminco has seen its stock skyrocket, as investors debate the long-term potential of what it calls its 'breakthrough' process for making low-cost silicon for solar cells. Richard Blackwell explains the basics

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1 PLENTY OF SILICON

Silicon is the second-most abundant element on the Earth, after oxygen. It is usually found combined with oxygen in the form of sand or quartz. This "silica" is used to make glass, ceramics or cement. When silicon is isolated in a very pure state, its properties make it ideal for the semiconductors used in computer chips, or in solar cells.

2 AN EXPENSIVE PROCESS

The purest form of silicon used in semiconductors, at least 99.999999 per cent pure, is called polysilicon. It has traditionally been created by heating a gaseous silicon compound, which causes the element to build up on a pure silicon rod that acts as a "seed." Since solar cells don't need quite as much purity, the material rejected for semiconductors is often transformed into solar-grade silicon. Still, it's a very expensive process, and quantities are limited while demand is soaring, so companies have come up with new, cheaper, ways to purify silicon for solar cells.

3 98-PER-CENT PURE

Silicon that is refined for industrial processes, such as steel production, is called metallurgical silicon. It is created in large volumes by heating silica in a furnace with carbon. The carbon combines with the oxygen, leaving liquid silicon that is roughly 98-per-cent pure. Companies such as Timminco are further refining metallurgical silicon so it is pure enough for solar wafers - 99.9999 per cent pure. Doing it this way can generate far higher quantities of the material at much lower prices. Polysilicon costs around \$25 a kilogram to refine, while solar grade silicon from the metallurgical process can be as low as \$12.

4 PRODUCTION CAN BE INCREASED FAST

Investors and short-sellers have been debating whether the Timminco process, which involves driving out impurities from metallurgical silicon in a rotary furnace, can really produce the large quantities and high quality of solar-grade silicon the company claims, at prices far below that of polysilicon. Timminco has brought in a consultant who said yes, it works, and yes, production can be ramped up sharply. In fact, Photon Consulting said Timminco could be generating operating profits as high as \$1-billion by 2010. "There is potential for very, very, fast growth," they said.

5 THE COMPANY IS STILL LOSING MONEY

Timminco has a market capitalization of \$3.6-billion, but even though it generated revenue of just \$166-million in 2007, it is still losing money. Still, the stock peaked this week at over \$35 a share, suggesting the bulls are winning out over the shorts, at least for now.