

DATE: October 2, 1998  
TO: Gale Greenleaf, Instructor  
FROM: Tom Penick, Student  
SUBJECT: Executive summary of Edward O. Welles, "Going for BROKE," *Inc.*, vol. 20, no. 8, pp. 66-78, June 1998.

## **OVERVIEW**

In his article, "Going for BROKE," Edward Welles details the efforts of Solar Cells Inc. (SCI) to develop the technology that will make solar cells practical for large-scale power generation. SCI founder, Harold A. McMaster, pushes his organization to this goal by limiting their activities to research and development. Investors have been patient, but critics and some SCI team members feel SCI should use its superior technology to begin manufacturing now.

## **BACKGROUND**

Businessman and inventor, Harold A. McMaster, founded Glasstech Solar in 1984. Glasstech attempted to improve the process of depositing amorphous silicon on glass to build solar panels. The first five years produced few results other than consuming \$12 million of the investors' money.

### **Solar Cells Inc. (SCI) is Organized**

In 1990, McMaster gave up on the amorphous silicon research, reorganized the company as Solar Cells Inc., and began to investigate the use of a lesser-known material, cadmium telluride. He offered to pay back any of his investors and then raised another \$15 million. In 1993, a prototype production machine was built. Refinements have brought its annual production capacity to about 20 megawatts. McMaster, who thinks big, refers to this unit as a "toy" even though its capacity is equivalent to about one-sixth of the global production for 1997.

At the end of 1995, SCI was again low on cash. McMaster issued more stock and bought it himself, stipulating that the investment be used for development. At the same time, he brought in a new company president, Michael J. Cicak. At the time the article went to press, not a dime had been returned to investors.

### **Founder, Harold A. McMaster**

McMaster holds a master's degree in nuclear physics and is known for his work in the development and manufacturing of tempered glass. He holds 100 patents and has built three cutting-edge companies in the glass industry. He founded Glasstech (parent company of Glasstech Solar) in 1971 and sold the company in 1987 for \$100 million. Glasstech essentially created the market for tempered glass and its machines virtually monopolize production. Machines built by Glasstech produce 80% of the world's automotive glass.

McMaster hopes to repeat the Glasstech story with solar panels. His vision is to develop photovoltaic technology to the point that it will be practical to manufacture solar panels for large-scale use by electric utilities. Despite the long-term financial drain and appeals from key SCI personnel, McMasters continues to dedicate SCI resources to development.

## **Status of Photovoltaic Production and Applications**

Manufacturers are producing solar panels at a cost of \$3 to \$4 per watt. In 1997, the global market demand for solar panels was 125 megawatts. For comparison, a typical nuclear plant generates 600 megawatts. Solar panels is a niche market—most applications are in underdeveloped areas. There is only limited use of solar panels on the power grid.

## **REALIZING THE DREAM**

According to Ken Zweibel, head of the Thin Film Partnership program at the Department of Energy's National Renewable Energy Laboratory, SCI is clearly the industry leader in photovoltaic technology. This assertion comes in response to a recent breakthrough at SCI.

### **SCI Breakthrough in Manufacturing Efficiency**

In the fall of 1997, SCI scientists perfected a manufacturing technique for rapidly coating glass with thin-film, photovoltaic cells. This technique could bring the cost of solar panel production to near \$1 per watt. SCI can coat glass panels measuring two feet by four feet at the rate of one every 30 seconds. Its nearest competitor requires six hours to coat a similarly sized panel. The SCI process uses the cadmium telluride material, while most manufacturers are using amorphous silicon.

### **McMaster's Goal**

McMaster's vision is to bring the cost of solar panel production to \$0.60 per watt using a continuous process with a ribbon of molten glass going in and solar panels coming out. He wants to create a manufacturing capacity of 100-megawatts per year. To accomplish this, he envisions modifying the production lines of existing glass manufacturers so they can shift between producing windows and producing solar panels.

### **Enthusiastic Leadership**

Where McMaster thinks big, Michael J. Cicak, SCI president, talks big. Speaking of SCI's bright future, he says, "It's incredible. The only people who can screw this up now is us [p. 68]." He frequently speaks of SCI as the "next Intel."

## **PROGNOSIS FOR SUCCESS**

When SCI is ready to build a 100-megawatt per year manufacturing capacity, it's going to need an estimated \$100 million. Although SCI's technological advances have attracted attention in the industry, investors are not lining up. They may be concerned about the company's long, profitless history or wary of large-scale involvement in an industry that has shown more promise than profit.

### **Detroit Edison Steps Forward**

Several companies have considered a manufacturing alliance with SCI but have backed out. The current prospect is Detroit Edison, a major local utility. Detroit wants to control the technology and only wants to commit to a 20- to 30-megawatt production line. SCI still envisions the 100-megawatt line. As the article went to press, negotiations continued. Although SCI is the leader of the pack, putting their ideas to work will require turning over substantial control to an

undetermined partner. Therefore, while the potential for success exists, SCI's future remains uncertain.

## **EVALUATION OF THE ARTICLE**

I found "Going for BROKE" engaging, easy to read, and informative. It reports on a significant recent development in the field of photovoltaics, which could have an impact not only on the industry but on the general public as well. The author, Edward O. Welles, paints a vivid picture of Solar Cells Inc., that both technical and non-technical readers should appreciate. He qualifies his statements with quotations from key people.

### **One Inconsistency Stands Out**

At one point, the train of thought is derailed. Near the end of the article, the image of SCI changes from a company resolved to stay out of manufacturing until its development goals are met, to a company with unrealized development goals courting a manufacturing agreement. The author fails to announce or explain this shift in SCI's ideology.

The article leads me to believe that SCI is determined to develop solar panel manufacturing technology to the point that solar panels can be produced for \$0.60 per watt. At that point, they will turn to production. The cost is reported above \$1.00 per watt and yet SCI is seeking a manufacturing alliance. Perhaps the whole point of the article is that SCI's recent breakthrough is the event that has shifted its focus from development to production. This thought may have been so obvious to the author that he overlooked stating it.

### **Another Nit to Pick**

In the subject of power generation, *megawatts* usually refers to the capacity of the generator. The author sometimes used the word this way, but more often *megawatts* described the production capacity of manufacturing. This is an uncommon use of the word and the author should have offered clarification.

### **Organization**

Subtopics in the article are: The Man, The Vision, Not So Fast, Cost, Control, A White Knight?, and Coda. These topics do not define the framework of the article, but are used to steer the reader through some of the more abrupt turning points. The article opens with its most interesting point, SCI's technological breakthrough. From there we follow a jagged course through the state of the photovoltaic industry, the background of SCI, the background of its founder, etc. The author skips rapidly from present, to past, back to present, and into the future.

While this may sound like whiplash, the author is drawing the reader into the story by introducing the more interesting points first. The chronological roller-coaster is the result of the author explaining each new point. Numerous quotes add dimension and provide support. However, the article winds down to a weak finish. The author covers business negotiations which either failed or are unresolved, and offers speculative statements supported by more quotations. The conclusion that SCI's future is uncertain does not require the careful construction and validation seen in other sections of the article.