This 3DAdvisors Report Covers:
✓ **Insider Trading**: Insider Trading Behavior
✓ **Accounting**: Quality of Earnings Issues
✓ **Governance:** Corporate Governance Issues

CEO Pumps Up Shares, But MEMC Looks Vulnerable
MEMC Electronic Materials Inc. (NYSE:WFR)

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Business Description

MEMC Electronic Materials, Inc. produces wafers for the semiconductor industry worldwide. The Company's product categories include polished wafers, such as OPTIA and annealed products; epitaxial wafer that contains AEGIS product; and test/monitor wafers. These wafers are used for the manufacture of various types of semiconductor devices, including microprocessor, memory, logic, and power devices ranging from 100 millimeter to 300 millimeter in diameter. The Company's semiconductor devices are used in computers, cellular phones and other mobile electronic devices, automobiles, and other consumer and industrial products. Its customers include semiconductor device manufacturers, including the memory, microprocessor, and applications specific integrated circuit manufacturers, as well as foundries in North America, Europe, Japan, and the Asia Pacific. MEMC Electronic Materials was founded in 1984 and is based in St. Peters, Missouri.

Key Statistics

Sector:	Last Close:	Market Cap:	Avg Vol (3m):
Technology	**$51.68**	**$11.49B**	**4,730,600**
Industry:	**52 Wk Range:**	**Trailing P/E:**	**Shrs Out:**
Semiconductors - ICs	**$26.26 - $56.00**	**32.16**	**222.31M**
F/T Employees:	**FYE:**	**Forward P/E:**	**Short % of Float:**
5,000	**Dec-31**	**13.82**	**2.20%**

Summary of 3DAdvisors Findings for WFR

- **Insider Trading:** CEO pumps up the stock with outlook, then dumps shares
- **Governance:** Recent trading behavior puts new focus on TPG relationship
- **Fundamentals:** CapEx appears inconsistent with bullish outlook
- **Fundamentals:** CapEx also looks anemic in the face of increasing competition
- **Fundamentals:** Ceding market share in 300mm wafers and margin pressures
- **Accounting:** Miscellaneous noteworthy items from Phase II forecast

Discussion of 3DAdvisors Findings for WFR

MEMC Electronic Materials (WFR) is a focused player in the semiconductor wafer market, providing wafers in sizes ranging from 100 millimeters (4 inch) to 300 millimeters (12 inch) in three general categories: prime polished, epitaxial and test/monitor. WFR also produces polysilicon, which the Company has historically used to meet internal wafer manufacturing requirements. In 1995, with polysilicon prices rising due to a global shortage, WFR began to sell excess polysilicon to customers.

The Company had already been experiencing a convergence of bullish analyst opinion driven by the global shortage of polysilicon and continuing demand from solar cell manufacturers. The strong January 25th Q4 earnings release, combined with management outlines for its Phase II plan (Phase I being the period between MEMC's emergence from the verge of bankruptcy in 2001 and FYE 2006) caused the shares to rally sharply, closing up $10 or 22% on heavy volume over two subsequent sessions.

The new Phase II outlook is interestingly devoid of specific detail. Most of the targets are simply stated as "long term" with that period being loosely defined as "two to three years", but the Company still ventured a revenue forecast for the end of the period of between $3 and $4 billion and non-GAAP EPS between $5 and $7. The underlying drivers of the "forecast" are not new: It is no secret that shortages in the polysilicon market have inured directly to WFR's benefit as it is one of a handful of producers of granular polysilicon. Additionally, the Company's recent concentration on the frothy solar market has generated plenty of buzz as recent long-term contracts have provided the cornerstone for management's projections that as much as 33% of WFR's revenues may be coming from this market "in the long term" according to CEO **Nabeel Gareeb**. This, he says, will smooth out the traditional cyclicality that comes with supplying wafers to the semiconductor market. He added "we are providing these three to five year targets and investors may choose to use different assumptions to arrive at these targets". Though these very vague projections clearly excited analysts, we noted with much interest that the Company provided very little with regards to interim benchmarks along the way, even though pressed for details during the conference call.

The combination of the trading behavior of several senior operating executives in Q4 of last year, some interesting governance issues and the well-known controls and procedures difficulties had caught our attention late last year, which we reported on for our clients in December. Since then, we have been studying a curious deceleration in capital expenditures that seems seriously disconnected from the very bullish outlook, while the Company's larger competitors are investing heavily to expand capacity or develop alternative technologies. And now, in the wake of strong Q4 earnings and the unveiling of a very bullish "long term" outlook, which caused the shares to rally over 20%, the CEO files a very misleading 10b5-1 plan and immediately dumps a third of his actionable holdings while the largest outside shareholder sells off 20 million shares into the rally. If the future is so bright, why sell so much stock here?

In this full report we focus on the recent 10b5-1 filing by Gareeb and his immediate sale of stock and the sale by TPG of 20 million shares which in turn has caused us to revisit the relationship between Gareeb, several of the directors and TPG. We also examine what we think are core fundamental issues of capital expenditures and related competitive threats, which may provide some clues as to why there is such an extreme disconnect between the observed trading behavior and the very bullish outlook.

Insider Trading: CEO pumps up the stock with outlook, then dumps shares

As we reported in the Insider Research Bulletin published on 01/08/07, the trading behavior that initially attracted our attention at MEMC involved unprecedented sales by four key operating executives last November. Just two months after a period where insiders were locked out for only a 2 month period from trading because of a controls and procedures issue that caused the Company to delay the filing of financial statements, its Research & Development head, Sales & Marketing head, head of Manufacturing and the General Counsel all moved to sell between 96% and 100% of their actionable holdings. We also noted in our initial coverage that these sales took place in the same time frame that Texas Pacific Group sold 19.5 million of its shares, dropping its ownership stake to 15% of the shares outstanding.

Though CEO Gareeb was not among the selling group last November, he was quick to surface immediately after the aforementioned post-Q4 earnings rally which took WFR shares up 22% to their current all-time high ground. On January 31st, just days after the Q4 earnings rally, the Company announced in a press release (which was also filed in an SEC Form 8-K) that Gareeb had filed a new 10b5-1 trading plan. As it turns out, this press release related to Gareeb's new trading plan is one of the more obfuscated disclosures of its type that we have ever seen.

On the surface, the press release appeared harmless enough, but there were several important subtleties easily overlooked. At first glance, it seems to indicate that his intent was to sell 10% of his options holdings under the plan, giving the justification often seen in such situations that he is simply pursuing prudent estate planning on the advice of his financial advisor. However, close inspection of the passage below, taken from the press release on 01/31/07, subtly reveals that the 10% of his holdings (more on the 10% number below) that are to be sold are *separate* from the shares to be sold under the plan. In fact, the press release does not disclose the number of shares to be sold under the plan at all, just those that are being sold separately [bolding is ours]:

> Mr. Gareeb stated, "As part of my estate planning, I had established a 10b5-1 plan in July 2005 through a trust based on the recommendation of my financial advisor as a way of achieving prudent diversification of my concentrated position without causing undue concern in the investment community or the employee base. I terminated that plan in August 2006 to accommodate Section 409A. I am establishing a new 10b5-1 plan for the same reasons as stated above. **I am also taking advantage of this open window to directly exercise and sell approximately 10% of my outstanding options as part of my estate diversification plan.** I believe that MEMC remains on a positive trajectory as indicated by the results over the last five years, and I am confident about our future as indicated by the long-term nature of this plan."[1]

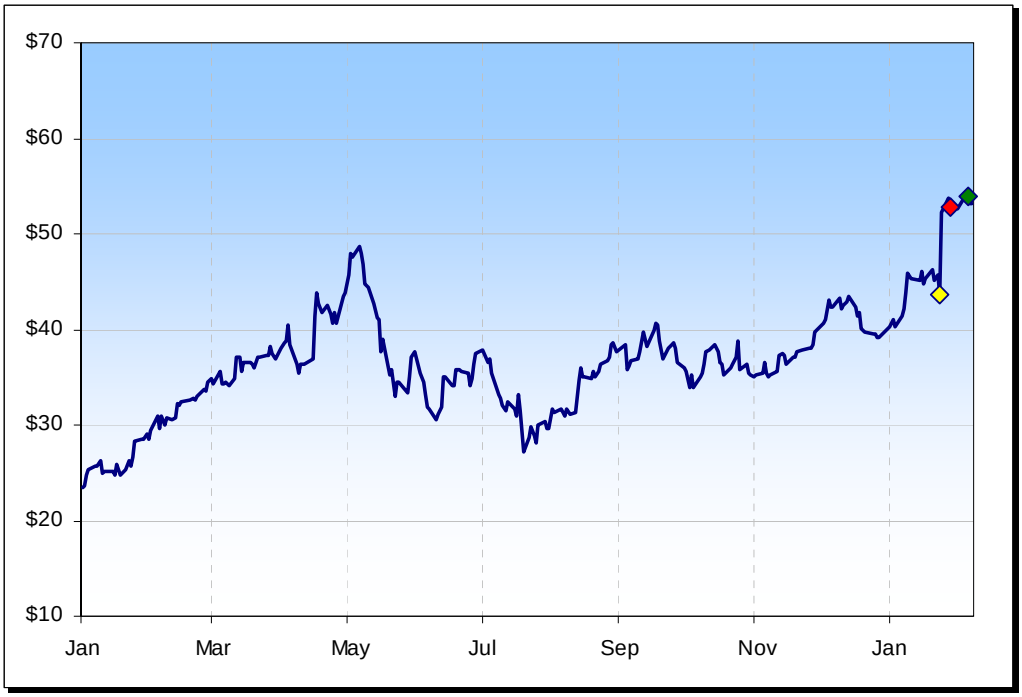
But the obfuscation does not end there. Just two days later, Gareeb filed a Form 4 indicating the exercise of 450,000 options, and the immediate sale of the acquired

[1] "MEMC CEO Files 10b5-1 Trading Plan", Press Release, January 31, 2007. The press release can also found in an SEC Form 8-K filed on same date.

shares. As expected, nowhere on the filing is it indicated that the transaction has anything to do with a 10b5-1 trading plan (in his prior trading plan sales, the Form 4s indicate the sales were executed under a trading plan). Not only that, this transaction reduced his actionable holdings (common stock plus exercisable options) by 32%, not the 10% suggested in the press release. The 10% number used in the press release was based on a calculation that included un-vested (i.e. not actionable) options. We also note that the plan expires in 2010, which also just happens to be when his current option holdings will become fully vested and exercisable, which makes us wonder if he intends to sell off his entire position under the plan.

The story gets still more interesting. It is broadly known that TPG's lock-up on another 20 million shares was going to expire on 02/07/07, shortly after the Q4 earnings release. And sure enough, on the day the lock-up expired, they filed a Form 144 announcing their intention to sell all 20 million shares, followed immediately by the accompanying Form 4. In total, between the 19.5 million shares sold in November, and the just-sold 20 million shares, TPG has reduced its holdings by 70% (from 56.2 million to 16.7 million). As a postscript, we would add that the $10 rally in WFR shares following the Q4 earnings, which was arguably orchestrated by Gareeb's bullish outlook for the newly revealed Phase II, netted Gareeb an extra $4.5 million from his sale of 450,000 shares, and TPG an astonishing $200 million extra from their sale of 20 million shares. What is unclear are how much Gareeb and other WFR directors netted from TPG's sale of stock (see next section below for details on the related-party relationship between TPG and certain WFR directors).

Figure 1. WFR Daily Closing Price 01/03/06 through 01/09/07. Yellow diamond is the date of the Q4 earnings announcement (after the close); Red diamond is the date of Nabeel Gareeb's sale of 450,000 shares; Green diamond is the date of TPG's 20 million share transaction. Sources: Reuters and WFR SEC Filings.



These extraordinary holdings reductions (see table below) represent an obvious and extreme disconnect from the bullish sentiment expressed by Gareeb, and indeed most of the sell side analysts following the Company. If anyone on the management team, or anyone at TPG for that matter, had strong belief that the Company could achieve what Gareeb had outlined for Phase II, why would they have collectively sold off well over a billion dollars worth of stock now? In wrapping up his comments on the Phase II projections, Gareeb proclaimed, ""We have demonstrated strong results through the first half of this decade, through good markets and bad. Our financial, technological and strategic positioning continues to strengthen, and we are excited about our prospects as we anticipate Phase II of MEMC's evolution during the second half of this decade and beyond." [2]

Insiders	Position	Shares Sold Since Q406	Holdings Reductions
S. Sadasivam	SVP, Research & Devl.	230,000	97%
J. Kauffmann	SVP, Sales & Marketing	145,600	96%
S. Hunkler	SVP, Manufacturing	50,000	100%
B. Kohn	VP, General Counsel	25,000	100%
N. Gareeb	CEO	450,000	32%
Texas Pacific Group	Private equity investor	39,500,000	70%

Governance: Recent insider trading behavior puts new focus on TPG relationship

We reported on the relationship between Gareeb and certain directors and Texas Pacific Group in the Insider Research Bulletin on 12/08/06. But the recent rally in WFR shares and subsequent trading behavior by Gareeb and TPG make revisiting this issue more than worthwhile. To recap:

Back in November 2001, an investor group led by Texas Pacific Group (TPG) acquired 72% of MEMC's outstanding common stock and at one point since, owned as much as 90%. Unlike many such situations, where there is dissonance between controlling institutional shareholders and management, there appears to be instead a very unusual interlock between MEMC and TPG: A number of key executives, including CEO Gareeb and Audit and Compensation Committee members **Robert Boehlke** and **C. Douglas Marsh**, have personally invested millions in TPG investment vehicles in exchange for "membership interests". It is even disclosed that Boehlke and Marsh each put up funds used by TPG to guarantee MEMC's credit facility. The kicker is that these individuals, who are listed as "independent" directors, receive sizeable payouts when TPG sells its ownership, which it recently did in November, cashing out 19.5 million shares and lowering their stake to roughly 15% of the shares outstanding. Both Boehlke and March received $5.52 million each from the proceeds of that November sale. It has yet to be revealed how much their take was in the recent sale of 20 million shares for $1.06 billion by TPG interests.

[2] "MEMC Announces Fourth Quarter and Full Year Results", Press Release via BusinessWire-First Call, January 25, 2007.

The relationship between Gareeb, certain board members and TPG also raises questions about Gareeb's compensation agreement, which strikes us as a bit over the top, at least as compared to the way other executives have been compensated at the Company. Despite the numerous issues the Company faced in 2006, CEO Nabeel Gareeb was rewarded handsomely by the Compensation Committee. After receiving 1.65 million options for signing his original employment agreement in 2002, Gareeb was issued another 1 million options in May 2005 (in addition to his regular 2005 option grant) as a retention incentive for him to stay beyond the expiration of his original contract. He received more than 30% of the total option grants issued to MEMC employees in 2005. As if this were not enough, the Company provided him with a new four-year employment agreement in October 2006 which granted him a 40% base pay increase, a target bonus increase greater than 40%, and an additional 2 million stock options.

Meanwhile, Gareeb's top lieutenants received either no base salary increase or just slight raises from 2005 to 2006 while also contending with declines in their equity compensation. Some of our clients may have noticed a 100,000-share acquisition by Gareeb on December 4th. At the time of the transaction, Gareeb was one of the lone chief executives in the mid-to-large cap semiconductor arena who held no stock in their respective companies. After clearing out 70% of his ownership, or 1.04 million shares valued at $20.4 million, just after receiving the retention options in 2005, it is hard for us to put much stock in his going out of pocket for $150,000 to pick up shares exercising low-priced options. We suspect that his decision was more out of necessity to show some semblance of direct stock ownership. The actions of his peers, who hold far less equity, are, in our estimation, more representative of the general insider sentiment.

The intricate web of interdependence between TPG and certain members of MEMC management brings into question the motives of certain managers and legitimacy of the independence of committee members. When two Compensation Committee members are affiliates (partners) of the largest shareholder (TPG), the other two are investors in that shareholder, and the CEO, who also has personal funds tied up in the investor group, receives an inordinate number of stock options and a very generous new employment agreement, the whole situation smacks of self serving patronage. It is not a stretch to say that these relationships could be good reason why we have yet to see any changes made in the Audit Committee, which has failed to resolve the numerous internal control issues that have plagued the Company for over two years.

<u>Fundamentals: CapEx appears inconsistent with bullish outlook</u>

Amidst recent conference call dialogues are repeated questions about MEMC's capacity expansion plans and the fact that MEMC's CapEx spending had been lagging its model levels for almost a full year. Any pullback in CapEx has added to MEMC's ability to show Free Cash Flow growth at 25% of sales, which it has been highlighting of late. For 2004 and 2005, for instance, MEMC had maintained its CapEx spending at between 14.2% and 14.7% of sales. For the first three quarters of 2006, however, this had been trimmed to between 8.3% and 8.9% of sales. This picked up in Q4, but only enough to put 2006 CapEx at 9.6% of sales for the full year (2006). Had MEMC maintained this spending at previous levels, the Company's Free Cash Flow generation would have slipped to just 19.8% of sales.

The Company continues to feature its healthy FCF generation and implies that it will remain at 25% of sales looking forward. Interestingly enough, MEMC also leaves the door open for a potentially lower level of CapEx expense during its "three-to-five year" long range forecast. We say this because the CapEx model is now being articulated as being "between 10% and 15% of sales" whereas prior to the January 25th release, the Company had stated it as "not to exceed 15% of sales". Whether MEMC is holding back on CapEx in order to perpetuate its claims of Free Cash Flow generation in the range of 25% of sales or, as the Company submits, to compensate for imbalances in the marketplace is not the operative concern. What surfaces here is that conservative CapEx spending at the point of the curve that Gareeb implies his Company is at potentially puts it at risk of ceding market share in both the polysilicon and the all-important 300mm wafer markets (more on this below).

Fundamentals: CapEx also looks anemic in the face of increasing competition

The questions about CapEx, which management seems to deftly side-step under analyst questioning, logically lead to questions about MEMC's competitive position in its key markets. The Company faces current and future potential competition from many rivals, some of them much larger and better capitalized. While management seems to want to avoid such topics, we have provided an overview of the key issues:

- **Polysilicon Capacity:** MEMC has long maintained that it possesses a competitive advantage on the polysilicon production side in the form of a proprietary technology called the fluidized bed reactor (FBR) process. This FBR process produces granular polysilicon. FBR technology is the process by which silane gas is deposited on small particles in the reactor, which then provide a surface area for deposition much larger than in the traditional Siemens reactor.[3]

  The FBR process yields granular polysilicon, which is desirable because it allows a longer silicon ingot crystal without the need to shut down the furnace and it enables innovations in high-speed, high-volume solar cell and module manufacturing.[4] Essentially it is a more efficient method of production yielding a value-added product.

  This was true for a period of time. In fact, MEMC was the only manufacturer utilizing the FBR process and had been doing so for approximately 10 years. However, the key players within the polysilicon industry have continued to pursue not only capacity expansion plans (discussed below) but have also have pursued technological advancements in order to achieve more efficient methods of production. As such, the FBR process and the production of granular polysilicon may no longer be the strong competitive advantage that it once was for MEMC. In fact, MEMC has never been the number one player in this industry. This might cause one to ask whether or not granular polysilicon really ever was a significant competitive advantage in the first place, especially given that MEMC holds just a 12% market share in an industry

[3] Definition from REC's 2005 annual report.
[4] Renewable Energy Access: "2005 Solar Year-end Review & 2006 Solar Industry Forecast", by Jesse W. Pichel and Ming Yang, Research Analysts, Piper Jaffray, January 11, 2006.

where the top five players constitute roughly 89% of the world's polysilicon production? See Table 1 below: [5]

Table 1. Global Market Share for Polysilicon Production.

Company	Market Share in 2005
Hemlock (owned by Dow Corning (63.25%), Shin-Etsu Handotai Co. (24.5%), and Mitsubishi Materials Corp (12.25%)	25%
Siltronics (a segment of Wacker AG)	18%
REC (Norway: REC)	17%
Tokuyama (Tokyo: 4043)	17%
MEMC (ticker: WFR)	**12%**
Other	11%

Nearly every player in the industry has emphasized a focus on research and development. Siltronics, Tokuyama and REC have initiated programs to develop processes for granular polysilicon with Siltronics and REC utilizing the FBR process and Tokuyama the vapor to liquid deposition (VLD) process. The VLD process involves the deposition of liquid silicon directly from gas in a tubular reactor at a much faster rate than the Siemens method, which allows the polysilicon to be manufactured with greater efficiency. Yes, new technology does take time to develop and test to meet customer standards, but market demands for silicon are propelling technology forward. It seems only reasonable that MEMC's competitors will make inroads with any type of technology that yields greater efficiency.

The industry began facing capacity issues on the back of rapidly increasing solar cell production that occurred in 2004 and rising integrated circuit (IC) unit volumes in 2005. As such the industry has been in a global polysilicon shortage that is expected to last well into 2008 until new capacity comes on line and potentially may be extended into 2010 as demand continues to outpace supply. Much of this increased demand is expected to be fueled by the solar industry, which has been growing more than 30% per year for the past six years. Although growth rates slowed from 50% in 2004 to 9% in 2006 on the back of the global polysilicon shortage, growth is expected to resume as capacity comes on line and industry dynamics are supported by government subsidies (notably in Germany and Japan) and the growing concern for the need to develop alternative energy sources. Some sources predict a rebound in the solar growth rate to 18% in 2007 with the primary driver being the extra capacity provided by thin film technology (see below) that circumvents the need for

[5] Prometheus Institute. "An Assessment of the Global Silicon Production Capacity and Implications for the PV Industry", by Hilary Flynn & Travis Bradford, July 12, 2006.

polysilicon. As noted in a recent article in the New York Times, China "has voracious energy needs and the most serious environmental problem in the world". [6] Solar seems to fit the bill and the market potential appears to be gaining significant traction. In fact, some research suggests that the solar industry is projected to "gobble" up more silicon for panels than semiconductor makers use in all of their chips and devices. [7]

As one would expect, these forecasts have been worked into capacity expansion plans and we are seeing Tokuyama, Siltronic, REC and Hemlock all either building pilot plants or expanding capacity that is expected to come on line from 2007 to 2010. In addition to the established players aggressively adding capacity, new entrants are emerging, namely Elkem of Norway and several companies in China, with equally aggressive expansion plans of their own. Estimates indicate that Elkem will account for 12% of the global market and new Chinese entrants 7% by 2010. However, capacity expansion at MEMC does not seem to be taking place at the same rate as the expansion plans of its competitors. In addition, there seems to be an issue with capacity on the wafer side as well. In the transcript of MEMC's 3Q06 conference call, management says that they don't have the solar wafer making capacity.[8] Recent reports suggest that WFR is looking for silicon wafer capacity from players Green Energy Technology (a subsidiary of Taiwan's Tatung) and Sino-American Silicon (SAS) to fulfill the supply agreements recently closed with Suntech and Gintech Energy.[9] To this, the Company's stated objective is to utilize excess capacity currently existing in the marketplace with the eye towards eventually bringing production in house at a later date. Currently, however, many of MEMC's competitors are adding capacity with long-term contracts in place with solar and other customers. Yet without the capacity plans, can MEMC expect to attract new customers and new long-term contracts?

- **New Technologies:** Another response to the tight polysilicon situation has been the development of alternative technologies – specifically those that require little or no silicon and those that make more efficient use of silicon. Although the wide spread use of these technologies is far from making significant in-roads to the use of silicon, they are nevertheless receiving significant investment and research and development dollars. In fact, it is interesting to note that one of the world's leading equipment manufacturers, Applied Materials (AMAT), recently restructured its internal financial reporting in order to break out a new segment entitled, "Adjacent Technologies", which encompasses solar and other high growth activities. Furthermore, several solar cell companies are initiating stakes in those companies that are developing new technologies, presumably to ensure participation in which ever technology eventually proves to be dominant. Here are two technologies that are making head-way and receiving investment dollars.

[6] The New York Times, "A Light Bulb Goes On, and China Starts Thinking 'Alternative Energy'", By Matt Richtel, January 19, 2007, page C7.
[7] BusinessWeek online. "What's Raining on Solar's Parade", February 6, 2006. & & UBS Research Report, MEMC Electronic Materials, November 27, 2006.
[8] Conference Call Transcript. WFR – Q3 2006 MEMC Electronic Materials Earnings Conference Call. Pg 29, October 26, 2006.
[9] DigiTimes Bits + Chips. "MEMC reportedly seeking silicon wafer capacity from Green Energy and SAS", November 9, 2006.

Table 2. Global Capacity of Polysilicon Forecast[10]

Company	2004	2005	2006E	2007E	2008E	2009E	2010E
Hemlock	7,000	7,400	10,000	10,000	15,000	18,000	18,000
Wacker/ Siltronics	5,000	5,000	5,500	6,500	10,000	14,500	14,500
REC (ASiMI)	2,600	3,000	3,300	3,300	3,300	13,000	13,000
REC (SGS)	2,200	2,400	2,700	3,900	7,400		
Tokuyama	4,800	5,200	5,400	5,400	8,400	8,400	8,400
MEMC (Texas)	2,700	2,700	2,700	4,000	8,000	8,000	8,000
MEMC (Italy)	1,000	1,000	1,000				
Mitsubishi	1,600	1,600	1,600	3,800	3,800	3,800	3,800
Mitsubishi Polysilicon	1,200	1,200	1,200				
Sumitomo Titanium	700	700	1,000	1,500	2,000	2,000	2,000
Elkem (Norway)				2,500	5,000	5,000	10,000
Total China	0	130	300	1,250	3,300	3,300	5,500

- Thin Film Technology: The high cost of crystalline silicon wafers (silicon comprises 40-50% of the cost of a finished solar module) has led the solar industry to look at cheaper materials to make solar cells. Three such materials are amorphous silicon (silicon in a different form), cadmium telluride and copper indium (gallium) diselenide. Each of these three materials works with large area deposition and therefore high volume manufacturing. The thin film semiconductor layers are then deposited onto glass or stainless steel sheets. Efficiencies however with this type of technology are still progressing.[11]

- String Ribbon Technology: In the String Ribbon technique, high temperature strings are pulled vertically through a shallow silicon melt, and the molten silicon

[10] Piper Jaffray Global Capacity of Polysilicon Forecast (metric tons). Table embedded within "2005 Solar Year-end Review & 2006 Solar Industry Forecast", by Jesse W. Pichel and Ming Yang, Research Analysts, Piper Jaffray, January 11, 2006; and Prometheus Institute, "An Assessment of the Global Silicon Production Capacity and Implications for the PV Industry", Hilary Flynn & Travis Bradford, July 12, 2006.
[11] Solarbuzz.com.

spans and freezes between the strings to form a ribbon of silicon. Each pair of strings produces a single ribbon. The process is continuous: long strings are unwound from spools; the melt is replenished; and the silicon ribbon is cut into strips for further processing, without interrupting growth.[12] Utilizing lasers to pull ingot rather than sawing saves 30% of the silicon. String Ribbon combines the best attributes of conventional crystalline silicon and emerging thin films. It achieves the reliability, stability, high efficiency, and market acceptance of crystalline silicon - without the inherent cost and waste of sawing. And it embodies the efficient material utilization and potential for continuous processing of thin films, but with a more manufacturable process.[13]

The question is whether or not advances in non-silicon utilizing technologies, partially driven by the demand from the solar industry, will be so great as to limit MEMC's growth potential. That is, if the solar industry moves significantly away from the utilization of silicon could the kick in long-term revenue growth for MEMC diminish? Solar now accounts for roughly 10% of total revenues but is forecasted by MEMC to constitute 33% of total revenues in its three to five-year long term Phase II forecast. This potential revenue generating segment is a segment that one would think MEMC would want to participate in and defend especially if the solar growth potential and industry dynamics (for example continued support by government subsidies, growing energy demands, declining fossil reserves and high oil prices) are to be endorsed. One would presume that any player in this market now will want to remain a player and will only want to consolidate its position.

➲ **Joint Ventures/Market Position:** Within the solar market we are also seeing players move up and down the value chain as a means to either secure silicon supply and/or to invest in alternative technologies.

As such we have to ask whether or not MEMC is taking the necessary steps to secure its position as a significant player in the solar market? Yes, they do have two contracts in place with Suntech and Gintech. MEMC's competitors are also securing contracts with solar players but in addition to securing contracts they are also adding capacity at a faster rate than MEMC and seemingly therefore have the potential to add more solar contracts as the industry expands. Additionally, we should question whether MEMC is an attractive candidate for other types of ventures? The industry has recognized that there are alternatives to silicon and they seem to be coming together to utilize resources, capital expenditures and research and development in an effort to keep the growth momentum of the solar industry on a high upward trajectory. MEMC does not seem to have a significant hand in any other pot.

Below is a look at some of the deals done over the past year:

<u>MEMC</u>:

- Contracts in place to supply wafers to Suntech Power Holdings over the next 10 years
- Contracts in place to supply wafers to Gintech of Taiwan.

[12] Press release: January 22, 2004. Energy Business Association of New England. Evergreen Solar Announces Latest String Ribbon Technology Advance.
[13] www.evergreensolar.com

- Rumored to be looking for additional silicon wafer supply in order to meet supply agreements with Suntech and Gintech.

REC:

- Contracts in place to supply wafers to Suntech Power Holdings.
- Contract in place to supply wafers to Motech of Taiwan.
- JV with Evergreen Solar: EverQ. EverQ produces wafers.
- Buys polysilicon operations of Komatsu of Japan.

Siltronics:

- Joint venture with Samsung to manufacture wafers. Interesting to note that prior to JV with Siltronics/Wacker, Samsung had and still has a JV with MEMC. This new joint venture causes one to question why Samsung established a second joint venture with a competing wafer manufacturer rather than simply expand the joint venture that is in place with MEMC?

Hemlock:

- Contracts in place to supply ErSol AG with wafers over the next 10 years.

Q-Cells:

- Initiated a 67.5% stake in Solibro. Solibro produces silicon free photovoltaic film.
- Initiated a 33.3% stake in EverQ. EverQ is a JV between REC and Evergreen Solar that produces wafers utilizing String Ribbon technology.
- Initiated a 21.9% stake in CSG Solar. CSG Solar utilizes thin-film technology.

AMAT:

- Purchased Applied Films Corporation In July of 2006. Applied Films is a leading supplier of thin film deposition equipment. Indication that perhaps the move to silicon free technology is taking hold.
- Invests in Solaix (November 2006) a privately-held manufacturer of single-crystal silicon wafers.
- Signals its dedication to solar and other high growth activities by restructuring operations to break out a new business encompassing these two areas.

AVANCIS:

- 50/50 Joint venture created by Saint-Gobain Glass Deutschland and Shell Erneuerbare Energien GmbH. AVANCIS will develop, produce and market next generation non-silicon solar technology based on Shell's advanced copper-indium-selenium (CIS) thin-film deposited on glass. Production expected to begin in 2008.[14]

Hoku Scientific:

[14] Renewable Energy Access. "Non-Silicon Manufacturing Plant to Open in 2008", November 28, 2006.

- Established a contract in January 2007 with Sanyo Electric to supply polysilicon over the next seven years. The contract will commence in January 2009. Announced plans to build a plant capable of producing 2,000 metric tons of polysilicon per year.

Fundamentals: Ceding market share in 300mm wafers and margin pressures

MEMC has managed to stave off margin pressures from the semiconductor side of its wafer business through increased sales of polysilicon in the tight spot market. Gareeb, however, downplays the significance of MEMC's high margin spot sales of polysilicon and avoids revealing their amount, other than to confirm that they exist. He explains this by stating that polysilicon is not a core business; wafer production is. Consequently, he is more focused on MEMC's market share in the wafer business, either chip or solar, than he is with the Company's share of the polysilicon market. To this, we remain intrigued that a certain amount of MEMC's polysilicon capacity that is not being sold into the spot market has, of late, been diverted away from 300mm wafer production and into 200mm upgrades [from the Q406 conference call]:

> **Nabeel Gareeb:** We had stated that we would try to get to about 350,000 wafers per month capacity (300mm) by the end of '06. Then in the middle of '06, we said, based on market conditions, we may choose not to do that and reroute some of those funds into either 200mm or poly or what have you. We told people that you can assume we did a little bit of that.

Gareeb maintains that market conditions caused MEMC to delay capacity expansion in the 300mm area in 2006. Whatever the reason, the delay seems to have allowed at least one competitor to move in: As mentioned above, Samsung has a joint venture in place with MEMC to produce 300mm wafers. On January 23rd however, Samsung announced that it was entering into a similar J/V with Siltronics/Wacker to produce 300mm wafers. The facility will be a large one, expected to produce 300,000 raw wafers per month by 2010. Though Samsung dismissed concerns that this new facility conflicts with its already-existing deal with MEMC, one must wonder what prompted its decision to seek an alternative supplier. It would seem that the MEMC venture is not seen, by Samsung, as being able to deliver what Samsung will need downstream. This raises the question as to whether, by delaying capacity expansion of 300mm wafers, MEMC may be ceding market share.

Within a week of the Samsung announcement, Japanese wafer maker SUMCO announced its plans to build a $2.9 billion plant to triple its output capacity for 300mm wafers. The announcement caused SUMCO shares to rally 4%.

Also, Gareeb seems to be in denial regarding the inevitable pricing pressures that will materialize once additional capacity comes on line. Although we may see silicon inventory issues work themselves out in 2008, many industry analysts suggest that this correction may not potentially arrive until 2010. Gareeb seems to avoid dealing with the subject of downstream supply additions and pricing environment. When asked, for instance, what he was baking into his forecast in terms of polysilicon pricing for 2007, his answer seemed decidedly evasive:

> **Nabeel Gareeb:** Well, the assumptions, again, are a healthy demand. So, polysilicon-- our belief is polysilicon continues to be in a reasonably tight supply situation. Some people are speculating that it's going to ease up at the end of this year. Who knows if it's going to ease up at the end of this year, next year or the year after, based on the data we see. So, I don't have any specific aggressive assumptions about polysilicon pricing.

And again, during the same conference call, Gareeb seemed to dodge the issue:

> **Analyst:** When you look at the overall industry polysilicon capacity that's coming online, do you guys have some reference of how much you think was added in '06 as an industry and how much you think will be added in '07?
>
> **Nabeel Gareeb:** I think we have that chart we show in the investor presentation. We updated it once every six months, based on industry data that's announced. We will be updating it again here in the next month or two. But, there wasn't-- based on our viewpoint, there wasn't a whole lot of capacity, if you will. There was a nominal amount of capacity added in '06. There's supposed to be a little bit more added in '07, obviously, than in '06. To the best of our knowledge, that's going to come online. But that doesn't account for or doesn't satisfy, if you will, the anticipated growth rates for both semi and solar markets.

And finally, during the same call, Gareeb seems to be in denial about the effects of polysilicon supply coming online:

> **Analyst:** To that extent, SunPower said this morning that poly prices are stabilizing maybe, at most, up 10% this year. So, how can I reconcile that with your earlier commentary regarding poly capacity?
>
> **Nabeel Gareeb:** I don't necessarily agree with that conclusion because, if I take your statement about-- whoever made that statement; let's assume it's true. They're saying it's going to be only 10% up. Well, (a) that implies, again, it's a tighter market because the prices are going up. They're not flattening or going down. (b) the fact that they're up compared to last year just means more favorable terms compared to any term that we had last year. That would be the implication to me, anyway. So, that's how I would reconcile it.

CEO Nabeel Gareeb sees high sustainable margins being supported by cost cutting. One wonders, however, as new technologies and new competitors enter the picture, at what point do the new players attempt to buy market share through price cutting. Should these new technologies prove to be cost effective, MEMC's reputation for being a low-cost producer could be short-lived and find its current margins unsustainable as additional polysilicon capacity continues to come online.

<u>Accounting: Miscellaneous noteworthy items from Phase II forecast</u>

- **Solar Revenue Mix:** MEMC provides no near-term guidance on its solar revenue mix. The Company has not changed its disclosures on this since the 2005K when it

was 10% of revenues. All management will say now is that, long term, “three to five years”, they see solar at 33% of revenues.

- **Tax Rate Tailwinds:** The Company is assuming a 15% tax rate in its “long term” projections. When pressed, Gareeb concedes that this is baked into the Company’s assumptions for margin expansion.

- **Growth Rate for Solar:** MEMC is assuming a 30% growth rate for solar industry wide and just 10% for semiconductors. This in spite of below 10%, for solar, in 2006 and with some projections of just 18% for 2007. Also today, Morris Chang, chairman of TSMC, the largest chip contract maker, forecasted the annual growth in the global semiconductor industry will show to have slowed to 6% for the entire 2000 to 2010 period.