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## 2009 EXAMINATION OF THE MARKET AND SALES: US SOLAR HEATING

TODAY, IT IS UNCERTAIN WHETHER THE STIMULUS OR ITC WILL OFFER SOLAR THERMAL A BOOST OR IF THE CREDIT CRUNCH AND DECREASING IN FUEL PRICES WILL INSTEAD DECELERATE GROWTH

**In 2008, the U.S. solar thermal industry was gearing up for explosive growth, projecting over 24,000 additional manufacturing and installation jobs within six years for water heating alone.** After years of waiting, the

opportunity for solar thermal hot water had finally arrived. But today, it is uncertain whether the federal stimulus package and investment tax credit (ITC) will give the promising technology its needed boost or whether the credit crunch and decreases

## LOWER YOUR ENERGY BILLS TODAY

*The average U.S. household spends approximately \$2,200 per year on energy bills, with more than half of this sum going to heating and cooling* <sup>1</sup> EIA



in oil prices will instead decelerate growth. Right now, the U.S. solar thermal industry is reaching only a sliver of its potential. Although solar thermal hot water never grew into the industry for which many had hoped, by the mid 1980s, it was a reliable business, with over 300 U.S. companies involved in the manufacturing, sale and distribution of collectors and systems. But by the early 1990s, lost tax incentives and low U.S. oil prices diminished the number of companies to less than 30.

The solar thermal industry is predominantly a facilities-based, customer-owned system for heating water. Until recently, solar thermal technology was mostly used in the

U.S. for heating swimming pools, prompted by utility rebates and state tax credits, and primarily in just a few states (such as Hawaii, California and Florida). Solar thermal is, of course, an especially compelling system to heat swimming pools. From 2004 through 2007, approximately 30,000 solar pool heating systems were installed each year.

In 2006, because of higher energy prices and the ITC, demand for solar hot water systems increased and began to rival pool heating sales. Between 2006 and 2008, on average, roughly 20,000 solar water heating systems were installed each year.

Meanwhile, solar installations for pool heating grew roughly 10% each year over the last 10 years until 2006. Perhaps as result of declining real estate values, pool heating installations decreased slightly in 2007.

Still, compared to those of other major building products, the preceding numbers are small. As a result, product marketing for solar thermal is undeveloped. Dedicated trade shows, advertising platforms and dealer networks are only just beginning to take shape.

Today, the U.S. solar thermal firms, along with those involved in concentrated solar power, represent almost half of the Solar Energy

Industry Association's (SEIA) 850 members, with each sector splitting that portion of membership equally. Photovoltaic companies comprise the slightly larger other half of SEIA.

The number of solar thermal industry members nearly quadrupled in 2007, with many companies anticipating future growth in space heating, cooling and more elaborate systems, according to Scott Hennessey, SEIA's manager for climate and energy markets. Space heating and cooling are nascent ventures in the U.S.

Along with other alternative energy industries, the last quarter of 2008 and first quarter of 2009 changed all the notions of what the short term future of solar thermal sales might look like. Adding to the woes of some of the more established industry players is that while the market has remained small, the number of companies getting ready for future growth has taken off. In the short term, solar thermal companies should expect a significant increase in competition.

Historically, solar thermal sales slow down during the winter months, making it all the more difficult to determine what the market really looks like right now. Although 2008 was very strong, the third quarter of 2008 was trending downward, because of both the tightened credit markets and because the industry was waiting to see if the ITC

would be extended (which it was, in October 2008).

Commercial and export sales seemed to fare better than residential sales during the recent downturn. For instance, residential sales in Hawaii, which are heavily dependent on lending, were frozen. But sales came back to life early in the first quarter of 2009, although lagging behind previous levels.

Moreover, Ken Zmich, vice president of service for roofing company CentiMark Corp., has noted that during the first quarter of 2009, commercial customers were beginning to spend money on rooftop installations.

Ironically, the good news in the solar thermal industry is also the bad news: The market is still so small in the U.S. that it has nowhere to go but up. The residential market is more than 10 times the size of the commercial market, with swimming pool heating and flat-plate collector applications currently representing the largest market segments. In terms of evacuated tubes and integral collector storage systems/thermosiphons, each segment claims about 13% of the U.S. market. The largest export customer for the U.S. in solar thermal products is Canada, with well over one-third of total exports shipped north. Mexico and Brazil each receive about 20% of U.S. goods. For the most part, solar thermal today is sold through

wholesale and retail distribution, whereas sales direct to installers and end users are minimal.

Compared to the rest of the world, the U.S. solar thermal industry is almost too small to accurately measure. Some estimates suggest that the U.S. represents less than 0.5% of the world market. Europe encompasses 14% of the world's solar thermal installations, and China has a global market share exceeding 70%.

But by all accounts, things are about to change. Since the ITC first passed in 2005, the number of companies in the U.S. solar thermal market has grown from less than 30 to over 70. About half of those companies view solar thermal as their primary or only source of revenue. The recent long-term extension of the ITC will further boost the industry.

To experience real growth, solar thermal technology will need to evolve in step with policy advancements. Today's prevalent technology, flat-plate collectors, remains mostly unchanged from what it was in the mid-1970s. To some professionals, that longevity affirms the technology's unassailability. To others, that longevity represents stagnation.

In either case, solar thermal technology seems to be gearing up for a change. Jim Huggins, technical director of the Solar Rating and Certification Corporation (SRCC),

says many new certifications – upwards of 100 - are on the way. Some of these new developments are on the applications side, such as those pertaining to long-term storage, solar cooling and space heating.

To grow further, solar thermal will likely need more than just new technologies. It may need marketing prowess. European manufacturers - who, in other industries, have traditionally looked to the U.S. for marketing savvy - may find themselves in the position of dominating the U.S. solar thermal market.

In particular, German companies are preparing to make a significant push into the U.S. For instance, Germany-based Alanod-Solar recently solidified its commitment to the U.S. market with a dedicated solar thermal sales team. According to Alanod's Andy Sabel, the company expects to take advantage of the growing U.S. demand for solar thermal by advancing the best practices of Europe.

But North American companies are unlikely to sit back and watch Europe take the lead. Indeed, several major solar thermal companies – such as Alternate Energy Technologies, Heliodyne, Dawn Solar, EnerWorks and SunEarth - are ramping up marketing and manufacturing operations.

Billy Byrom, managing director of Alternate Energy Technologies, says U.S. manufacturers have learned

quite a lot from the ups and downs of the solar thermal industry over the last 30 years, giving him, and others like him, a competitive advantage.

Who will install solar thermal hot water in residential and commercial applications remains a matter of speculation. A network of professional solar thermal installers may develop, or the installations may be handled by plumbers or roofers - each with their own set of business practices.

As the domestic market builds, it is likely that numerous companies will create a somewhat disparate channel of distribution, even as larger companies begin to dominate and set rules. On the commercial side, architects, specifiers and contractors may become customers for the industry to woo or agents of change for the industry to follow.

Also, how solar thermal is marketed may follow the technologies that are introduced, from hot water to space heating and space cooling, to some combinations of solar thermal and photovoltaics.

There is little question, however, that the low-hanging fruit for solar thermal in America is domestic hot water. Roughly 100 million conventional and inefficient water heaters need to be replaced about every 10 years. Right now, about 20,000 solar thermal hot water systems

are installed annually. That figure equates to just 0.2% of the potential hot water market.

On the residential side, the state of Hawaii has set a trend in motion to begin tapping the remaining 99.8% of the market. Starting in 2010, single-family homes in Hawaii that do not feature solar water will not be able to obtain building permits. Combined with residential and commercial incentives, Hawaii is primed for growth.

Nationwide, with solar thermal mandates for federal buildings, unit prices should steadily drop as greater efficiencies are created from economies of scale, and products should become more efficient as the increasing market size invites competition. Growth should benefit U.S. domestic manufacturers because of the high cost of transportation for moving collectors.

Beyond the technology, what is most exciting for the industry is that Washington has, once again, discovered solar thermal. In Europe, the most established and integrated markets are those that have significant political support, says Ole Pilgaard, president of solar water heating equipment manufacturer Heliodyne. For instance, nations such as Germany and Austria - not countries further south that have more solar radiation - enjoy strong solar thermal policies. In turn, such markets are equally strong.

Over the next two years, large energy and climate bills are expected in Congress. SEIA wants those bills to specifically recognize solar thermal. The organization is advocating for a system similar to the European Union's, in terms of utilities' ability to meet renewable portfolio standards. SEIA would like to see solar thermal energy traded in a fashion akin to how solar electric power is handled: via renewable energy credits.

But over the past year or so, the most critical issue for SEIA was related to the \$2,000 monetary cap for residential solar heating installations. Some manufacturers were disappointed with SEIA's decision to initially lobby for keeping the cap. According to Hennessey, the cap was intended to assure a high-quality product at a reasonable price, reasoning that without the cap, manufacturers would have no incentive to build the most efficient products at the best price.

However, many new solar thermal members joined SEIA recently, which changed the landscape. For one thing, some of the products anticipated in the market are in the space-heating arena rather than in hot water. Space heating would be a much more expensive system, making a \$2,000 cap onerous. As a result, SEIA successfully lobbied Congress to remove the cap.

A good barometer of how the solar thermal industry is growing is SRCC

activity. The SRCC certifies product durability, thermal performance and component functionality. But the organization's most important function may be that it ensures products are eligible for tax credits. Without SRCC certification, solar water heater installations are ineligible for the ITC. Since the ITC was first introduced in 2005, the number of SRCC certification requests grew significantly. In 2006, four new certifications were awarded by SRCC for individual collectors. In 2007, the number increased to 94. Thirty-two collectors were certified last year.

Complete-system certifications also increased dramatically, with 48 new certifications in 2006, 141 in 2007 and 118 in 2008. As of February 2009, SRCC has certified a total of 264 solar collectors and 750 solar systems.

But the long line of nearly 100 new products awaiting certification paints an even clearer picture of how the industry is growing.

However, as much as the abundance of new products is a benefit for end users, the proliferation of new certification requests is an albatross for manufacturers. SRCC is not a testing facility, but rather, a quality standard. In order for a manufacturer's collector or system to obtain an SRCC rating, the company must submit its products for testing to either of two SRCC-approved labs: the Florida Solar Energy Center (FSEC)

or Bodycote.

In the past three years, both FSEC and Bodycote have been overrun with submissions. FSEC reports a backlog of as much as 48 months for new testing, according to FSEC's Sue Blum. Speaking for Canada-based testing lab Bodycote, Alfred Bunger reports a 16-month backlog.

Once SRCC receives a test report from the laboratory, the process moves quickly; it takes only four to eight weeks for SRCC to complete the certification process.

To stave off complaints about the long wait times, especially from some European manufacturers that have grumbled that the lead times are tantamount to a trade barrier, SRCC management met in late January with FSEC to expedite testing turnaround times.

As a result of that meeting, FSEC is implementing a number of improvement measures. Also, SRCC is actively soliciting applications from a small number of new testing laboratories.

With the residential market slowed by the credit crunch – because homeowners are unable to finance their solar thermal water heaters against their home values – some in the industry are banking on commercial installations to take up the slack until the residential market kicks in.

Commercial installations have no cap, and the tax benefit can include the boiler and entire infrastructure. These elements make commercial solar thermal installations more viable. Hospitality, healthcare and education institutions are particularly strong targets, CentiMark's Zmich says.

The commercial market has a good understanding of how to most effectively use energy, which could prove highly beneficial to the solar thermal industry. A case in point is energy efficient commercial lighting, which has made major inroads into commercial and industrial facilities over the past 10 years.

For instance, across the U.S., much of the older lighting in commercial facilities has been replaced with energy-efficient T8 and T5 fluorescent lighting and advanced reflector systems, while compact fluorescent bulbs and similar technologies have had little penetration in U.S. households.

However, stumbling blocks in the commercial market will need to be addressed for commercial solar thermal to accelerate. Zmich says he fields far more requests from commercial customers about photovoltaic systems than he does about solar thermal.

On the residential side, the hope is that the lifted \$2,000 monetary cap will provide a jolt, just as PV sales

grew when various states enacted incentives. A return on investment of five years or less should help solar thermal professionals sell hot water systems. According to Byrom, five years has always been the magic number for residential customers.