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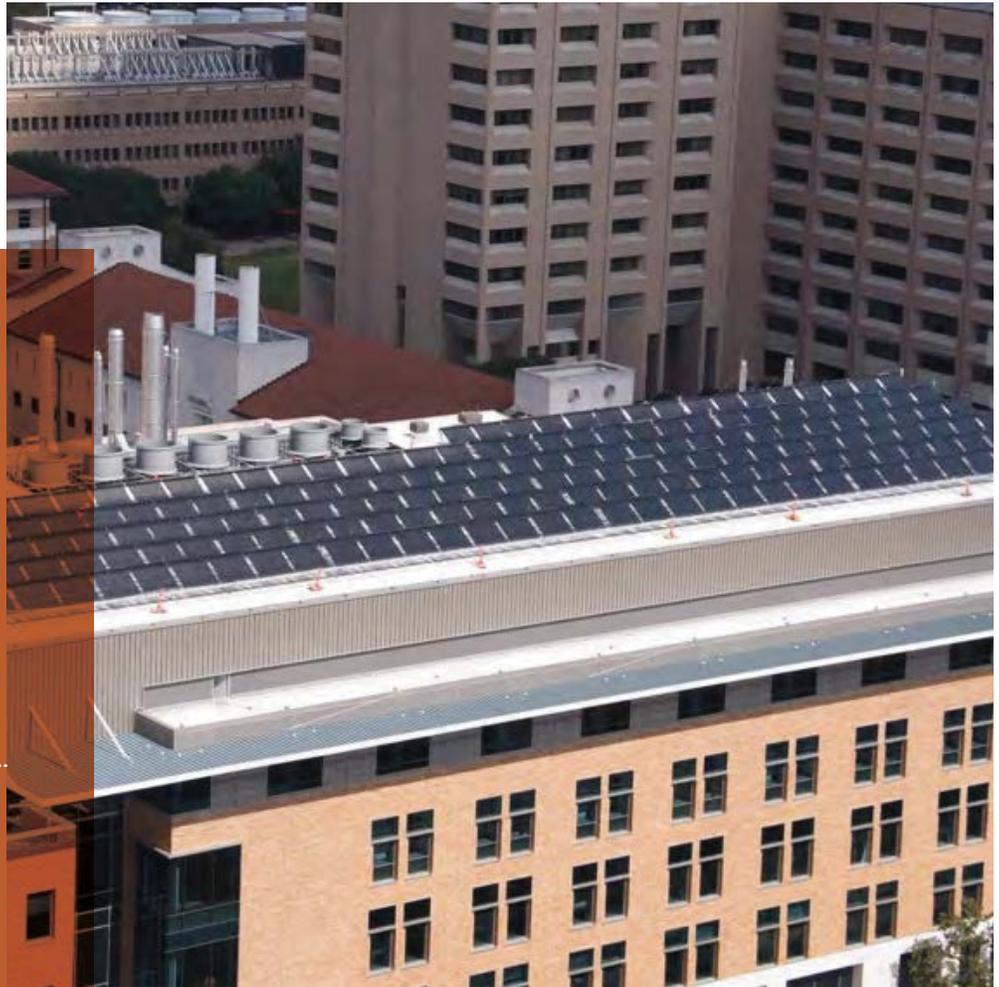
SOLAR INDUSTRY, USA MAR 2011

2011 EXAMINATION OF THE MARKET AND SALES: US SOLAR HEATING

ENDURING DECADES OF DIMINISHED SALES AND LOW EXPECTATIONS, SOLAR THERMAL HAS CRAWLED BACK TO CAPTURE A SLIVER OF AN ENORMOUS OPPORTUNITY.

Several new state-level solar thermal incentive programs – and especially California Solar Initiative (CSI) - will influence the solar hot water industry in 2011, nearly as much as natural gas rates. Meanwhile, although manufacturers

will find what is still a virgin marketplace and contractors will benefit from a choice of well-made products they will also find customer resistance and confusion that could be exacerbated if, as the market grows, a few inferior products or installations taint



UNIVERSITY OF TEXAS AUSTIN, TX

Solar space heating system at The Norman Hacker Science Building at the University of Texas at Austin, TX.

the industry. Enduring decades of diminished sales and low expectations, solar thermal hot water has crawled back to capture a sliver of an enormous opportunity. The US Department of Energy's (DOE), Energy Information Administration estimates the current total revenue for solar thermal collector shipments at only \$100 million annually.

Last year, for everyone from installer to manufacturer, forecasting business decisions was difficult because of uncertainty in the economy, incentive ambiguities and the unpredictability of fossil fuel markets -- especially natural gas. Despite these concerns, the quality and number of

sales leads to arrive in the second half of 2010 led many to see the industry finally beginning to get back on track, and even grow.

Most industry executives expect the next five years to be quite robust. Uniformly, commercial and industrial markets offer the most optimism. Compared to customers in the residential market, commercial customers today are more aware of solar thermal hot water technology and willing to install it.

However, in order to compete with taxpayer-funded oil and gas exploration, solar thermal needs incentives to drive sales. Today, the typical incentive program includes an upfront

payment of approximately \$1,500 for a single family residential hot water system. A commercial incentive would typically be based on the square footage of installed collectors, and complicating the picture is that public benefit funds may pay for thermal incentives, which funded by surcharges on electric bills while replacing natural gas.

For both residential and commercial incentives to be most effective, lawmakers must enact well-designed, consistent programs. Poorly designed programs often turn out to be difficult to implement. On the other hand, consistent, long-term programs have the maximum

impact, create the best opportunities and ultimately transform the market. But extended programs cost more than short term programs, so legislators are motivated to enact programs incrementally.

This year, the entire solar thermal industry has its eyes on the level of participation for the ambitious \$350 million (CSI) which was championed by the California Solar Energy Industry Association (CALSEIA). Sue Kateley, Executive Director of CALSEIA, was key in building industry consensus, and necessary legislative leadership came from Assembly Member Jared Huffman. Environment California provided crucial advocacy support.

The residential program was introduced in May, 2010 and its commercial counterpart launched in October. Unlike the commercial program, participants in the residential program cannot reserve its funding prior to installation which means it's too early to gauge participation.

Sun Light & Power installed the first commercial application to receive a CSI rebate check for solar hot water in California. In November of 2010, the company installed 2 Heliodyne Gobi 410 collectors on the roof of the Taco Bell restaurant in Albany, Calif. The combined rebate of \$3,654 on top of the 30% Investment Tax Credit (ITC), paid for half of the total project cost.

The planned \$25 million marketing program to broadcast the CSI has not yet been implemented, but the marketing of the CSI may be as important as the structure of the program itself. State programs underperform when they lack the necessary marketing support, as, as we saw recently in New Jersey and Texas. A 200-home New Jersey pilot program, which began in September of 2009, registered only 10 applicants and was canceled a year later.

In addition to state programs is the Federal ITC, for solar thermal installations. This incentive which no longer caps out at \$2000, offers 30% of expenditures, and congress has extended this credit until 2016. For commercial customers without the tax appetite, the U.S. Department of the Treasury's cash Grant Program is available instead of ITC until the end of this year; CSI sunsets the same year as ITC, in 2016.

Although many U.S. states renewable Portfolio Standards includes solar carve-outs Solar thermal qualifies in only five solar carve outs: those of Nevada, Arizona, North Carolina, New York and Washington DC. The good news on this front is that things are moving in the right direction. The carve-outs in Washington D.C., North Carolina and New York were all added in the past four years.

An especially positive sign is that solar thermal was specified in new

construction more frequently last year than previously, indicating that engineers and architects are now more comfortable with the technology. As this trend continues, it will make the case for retrofit installers easier as well.

In addition, two years ago a shortage of well-trained installers expected to bottleneck the solar thermal expansion. This concern was quieted by the slow economy which decreased demand, added more installers to the labor force and gave tradesmen time to learn. Manufacturers aided this learning process by creating training programs, as did community colleges, technical institutes and national solar trainers. Unfortunately, the industry expansion has its share of threats as well. Disappearing federal stimulus funds, low natural gas prices and cash-poor solar thermal companies could decelerate industry growth in the short term.

For instance, much of 2010, installers were awarded projects funded by the American Recovery Reinvestment Act (ARRA). However by the end of 2010, the majority of those funds had dissipated, and most of the government building projects paid for by the stimulus had already been awarded.

At the start of ARRA era, the number of state-level incentive programs grew, but they are now declining. Nationally, 16 direct-cash

rebates for solar thermal water heating were available in May 2009. By November, there were 19 rebates, and 28 rebates by June 2010. Although some states are still creating new programs, other state programs are disappearing.

Furthermore, the capability of extracting natural gas from tight shale formations, along with new discoveries in New York and Pennsylvania, could increase the supply and lower the price of natural gas, which is solar thermal's fiercest competitor. Yet new markets for liquefied natural gas, expiring leases and the environmental impact from drilling may reduce supplies. Ten years ago the price of natural gas began a steady rise, but it dropped at the start of the recession.

As for internal challenges, one problem that currently plagues the solar thermal industry is the lack of consistent requirements between municipalities, involving everything from HVAC certifications to a high velocity hurricane zone, according to Steve Elkins, CEO of SolarUS Inc.

As solar thermal markets open up, companies will need deep enough pockets to invest—something few American solar thermal companies have today. On the other hand, Chinese manufacturers, flush with cash, are entering the American market with evacuated tubes, touting the technology as an advancement over flat-plate collectors,

though their products are still relatively untested in the US.

Many solar thermal companies had an outstanding sales year in 2008, but they saw a substantial decline in 2009 that continued throughout much of 2010. Across the board, however, commercial installations grew more than residential installations last year. For many companies, stimulus money and stimulus-funded rebates helped carry 2010, and by the end of the year business began to increase. Even for those whose revenues did not rise, the quality of their sales leads did, in many cases, increase.

For 2011, promising new incentive programs in Pennsylvania, Massachusetts and New York will bring solar thermal attention to the region. New York's program is a substantial \$25 million (\$4.3 million/year), and the first few applications submitted in January.

Elsewhere in the U.S., some states are still underperforming relative to expectations, while others are now moving in the right direction. Hawaii, with historically vigorous sales, still offers much opportunity, and both U.S. and European companies are competing for that business. Despite its oil, Texas is destined to take the lead in alternative energy. Austin is especially favorable to solar thermal, but other cities, such as San Antonio are growing more aggressively, where only a handful of contractors

are competing for that business.

With the state already a leader in solar thermal installations, California's CSI is expected to reshape the solar thermal sector for the entire nation. Furthermore, in September 2010, the tragic explosion of a PG&E gas pipe – the second deadly natural gas blast in two years – focused attention on the aging infrastructure of natural-gas pipelines in California and may encourage interest in solar thermal as an alternative.

For solar thermal installers and contractors, the Internet is still the best place to spend marketing dollars. There are no national trade-shows specifically for solar thermal, and manufacturers have found that the Solar Power International Conference, presented annually by the Solar Energy Industries Association (SEIA) and the Solar Electric Power Association, appears more overwhelmingly dominated by PV. More solar thermal companies are now exhibitors at AHR, the annual air conditioning, heating and refrigeration expo, but AHR is still underrepresented by the industry. In late 2010, several dozen of the leading solar thermal manufacturers and installers agreed to establish an association called Solar Thermal Advantage, which was created to get the word out about solar thermal's benefits and counter end-user confusion.

Within the industry, market niches are beginning to develop, indicating that solar thermal is emerging into a more mature market. Whereas only recently, PV contractors were moving into solar thermal, and vice versa, that trend is now slowing, with more contractors choosing to concentrate only on thermal. Furthermore, more installers are shedding their residential side of the business giving them the advantage of scale for commercial installations. For the sales and installation business, the commercial sector is distinctively different business from the residential sector. For example, covering a 75-mile radius of homeowners is unlike working with a facility manager from project planning through completion.

Currently, only a handful of manufacturers control the lion's share of the US market, but that picture could change as more foreign players and U.S. start-ups compete. In the second half of last year, the anticipated growth in commercial business began to materialize, as did more significantly the number of sales leads from commercial projects.

Breweries, hotels, restaurants, community colleges, military bases, correctional facilities and fire stations all started to come aboard last year as solar thermal installations sites. Many of these projects took advantage of incentives. Historically, commercial has only represented

one-tenth of the solar thermal market, so the industry is enthusiastic about this expanding opportunity.

Still, as an overall product category, PV far outshines solar thermal and also has better funding mechanisms. Additionally, PV's costs will continually decrease while material costs for solar thermal, such as copper and aluminum, will only increase. With large storage capacity so expensive, solar thermal is a slave to its location; it must be available where and when it's needed.

The increased interest in solar thermal is seeding more diverse financing options. For instance, Alternate Energy Technologies (AET), a Florida-based solar thermal collector manufacturer, cites Wisconsin's program for state-run buildings as an example of a successful program. Under this model, the state surrenders ownership of the collectors to an energy service company and pays them 90% the cost of natural gas for the thermal energy. Reginisis Power sold the solar thermal system to Wisconsin and installed AET's AE-Series collectors.

Still the U.S. is well behind Europe financial structuring options, as several European countries are creating Feed-in Tariffs (FIT) for solar thermal. This year, the UK also introduced the Renewable Heat Incentive, a FIT payable to businesses, homeowners or even tenants. Denmark, Germany and Sweden

have district heating schemes, where a single renewable heat system provides heat or hot water to multiple properties.

On the application side, manufacturers continue to develop plug-and-play systems that are designed to reduce contractor's labor. Although some installers have complained these systems will be more difficult to service and that parts will become proprietary and problematic to inventory, these concern could become less relevant as economies of scale make solar thermal more common.

This year, manufactures are expressing increased interest in developing solar thermal space heating systems, which may finally develop into a viable market. The DOE has encouraged this development with a new 222,000 square-foot Research Support Facility for the National Renewable Energy Laboratory. This building demonstrated solar space heating with a 9,000 square-foot Conserval's SolarWall system integrated on the south wall to pre-heat the fresh ventilation air.

Space cooling is also an attractive market, because it works best when demand is high (on sunny days) and because air conditioning is the largest load of a commercial building. Equipment manufacturer, Chromasun has taken the lead in this segment by demonstrating the viability of their solar thermal cooling

system for the 2007 Solar Decathlon House at Santa Clara University.

The absorption chiller in this system allows the building to use the thermal collectors to power its air conditioning. The water heated by solar energy in the collectors is used to initiate a thermal dynamic process involving low-pressure chambers that chill water to around 44 degrees F.

Chromasun completed the beta test site to reveal technologies the company will deploy in commercial systems going forward. The system, installed by SunWater Solar, employed MIRO Aluminum, Alanod's most reflective material with 95% solar reflectivity.

Another new technology dehumidifies air using a reusable desiccant – not unlike the small packets that keep packaged products dry – and uses solar thermal heat to evaporate the moisture from the desiccant. This dehumidification process handles only the latent load or the heat responsible for humidity.

Sales in process heating trended upward during 2010, with interest from agricultural livestock businesses, especially poultry farming and domestic pigs. More leads came in from those businesses last year than during previous years.

Hospital laundry services, food processing and dairy farms are commonly cited as ideal candidates for

solar thermal process heating. Even though process heating is eligible for an ITC, it is the accumulated cash flow over the 30-year life of the system that is especially attractive.

The Solar Rating and Certification Corp (SRCC), which tests solar thermal collectors and other equipments, has continued to restructure its operations in the face of challenges caused by testing delays. Over the last several years, demand on the only two accredited testing labs grew significantly, causing costly certification delays for manufacturers.

To address this, SRCC instituted an interim certification process – offering manufacturers a temporary listing for their collectors to get collectors into the market faster. More significantly, SRCC accredited 15 new testing labs worldwide.