SOLAR ENERGY MARKET LEVELS AND TRENDS

For Maryland, the District of Columbia, and Virginia

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MDV-SEIA is pleased to submit this report to the North Carolina Solar Center, under the terms of subaward number 2010-0313-01, prime award number DE-EE0002088.

Data Caveats and Limitations

This report represents a rough, first-cut attempt to estimate the level of solar (PV and solar thermal) market activity in Maryland, the District of Columbia, and Virginia. Data presented relies on a combination of publicly available sources, shared data sets with state energy offices, personal communications with state energy managers, and interviews with MDV-SEIA member company officials. MDV-SEIA makes no guarantees regarding the accuracy of any information provided here, but has indicated our general "level of confidence" in various data sets provided in terms of being both up-to-date (*i.e.,* current with the number and size of solar energy systems actually in place as of December 2010), complete, and inherently accurate.

Renewable Portfolio Standards and SRECs Drive the Market

Nationally, one of the key market incentives for solar energy is the 30% federal tax credit, or the "Residential Renewable Energy Tax Credit" originally established by the federal Energy Policy Act of 2005, now extended until 2016. Through 2011, businesses can also receive a cash grant from the US Treasury in lieu of the tax credit, a benefit for businesses with low tax liability.

Just as important for many states however, is the passage and implementation of a Renewable Portfolio Standard, and the use of Renewable Energy Credits (RECs) to help implement these standards. Solar-specific credits, or SRECS, are a newer development.

The first SREC program was developed in 2004 by the state of New Jersey and has since expanded to several other states, including Maryland, Delaware, Pennsylvania, Ohio, Massachusetts, North Carolina and Pennsylvania. New Jersey currently has the largest SREC market by far; Maryland is a distant second.

The solar market in the mid-Atlantic region is booming. The number of renewable energy certificates issued since 2005, from the PJM Generation Attribute Tracking System (GATS), shows near exponential growth, especially for photovoltaic energy systems.

Year	Number of Renewable Certificates	
	Photovoltaic Energy Systems	Solar Thermal Energy Systems
2005	60	0
2006	345	0
2007	563	0
2008	4,154	1
2009	89,879	133
2010	248,979	379

Source:
PJM EIS: The Generation Attribute Tracking System (GATS)
https://gats.pjm-eis.com/myModule/rpt/myrpt.asp?r=108&TabName=Renewable

PJM Eligible Systems

As of the end of December 2010, there were 11,241 solar PV (11,015) and solar thermal (226) systems registered and eligible to create SRECs in the PJM Generation Attribute Tracking System registry. Of these eligible systems, 36 (~0.3%) have a nameplate capacity of 1 megawatt or greater, of which only 4 systems are greater than 5 MW. The largest system, currently located in Ohio, is 12 MW; the second largest, located in Chicago and eligible for the PA and DC markets, is 10 MW. The third largest system, located in New Jersey, is 9.7 MW.

MARYLAND

Incentives in Maryland

Maryland's renewable energy markets are heavily driven by the Renewable Energy Portfolio Standard and Credit Trading Act, signed into law May 26, 2004 and effective as of January 1, 2006. The law stipulated that by 2022, 9.5% of the electricity consumed must come from renewable resources. A solar "carve out" added in 2007 requires utilities to look to solar for 2% of their electricity generation and adds an overall goal of 1500 MW of solar-generated capacity by 2022. The goal is now 20% renewable energy by 2022.

Maryland also offers a state rebate program: $500 per installed kilowatt for photovoltaic systems (capped at $10,000 for a 20 kilowatt system) and 20% of the installed cost for solar thermal systems (capped at a maximum of $1500.)

Market Activity in Maryland

The demand for solar energy in Maryland has grown dramatically. This announcement from the Maryland Energy Administration that it is updating its calculation of its Solar Energy Grant Program gives an indication of its success:

> "The Maryland Energy Administration's budget for its residential solar and geothermal grant programs has seen a near ten-fold increase over the last two years. Fiscal year 2010 was a record funding year for MEA; supported by funds from the American Recovery and Reinvestment Act of 2009 (ARRA) as well as proceeds from the Regional Greenhouse Gas Initiative (RGGI), MEA was able to award grants to more than 2,000 Maryland residents and small business owners. Demand for MEA's residential Solar Energy Grant Program remains high with several hundred applicants still awaiting grant approval With the strong rate of incoming applications, MEA has now reserved all of its budgeted ARRA funds for its residential solar grant program. Out of a desire to extend our solar and geothermal grant programs beyond this fiscal year to continue reaching as many Marylanders as possible, MEA is announcing an update to the calculation of our Solar PV, Solar Hot Water grants."
>
> Source: http://energy.maryland.gov/Residential/solarGrants.html

Market highlights:

- On March 24th, 2010 the Maryland Department of General Services announced plans to install photovoltaic systems on five of its buildings, through a 20-year power purchase agreement with SunEdison to install, finance, own and operate the systems.

- Jobs: Even though BP moved its manufacturing operations out of the state two years ago, and with it about 350 jobs, Maryland solar jobs numbers are way up, and climbing. One major solar company in state has tripled its workforce in less than five years; two other large companies expect to nearly double their number of full time employees in 2011 from 2010 levels. This growth far exceeds the jobs lost with the BP move. (MDV-SEIA has initiated a jobs data gathering project – in progress – and will report to the NCSC intermittently as data is collected.) Moreover, the Governor's office predicts that an estimated 100 new solar jobs will be created over the next year through Project Sunburst; the Governor's solar acceleration bill would create an estimated 650 additional jobs by 2017.

I. Photovoltaic (PV) Energy Systems

Table 1: Market Level for Photovoltaic Systems in MD as of December 2010

Source	Number of Systems	Capacity (MW)	MDV-SEIA Confidence Level
Private Sector Entity (anonymous)	1050	11	Med-high
MEA (data and personal comm)	1500	14.3	High
GATS	999	10.5	Medium
GATS pivot table	---	13.4	Med-High
SREC TRADE.com	---	6.25	Medium-Low
GTM thru Q3	679 (cumulative) 345 (3Q of 2010 only)	--	Medium

A. Capacity (MW)

The MDV-SEIA best estimate for installed capacity is approximately 14 MW, relying most heavily on the data and information received from the Maryland Energy Administration through system-level data received and personal communication

B. Generation (MWh)

The Maryland Energy Administration estimates that 1200 kWh are generated for every kW installed capacity in the residential sector, and 1300 kWh are generated for every kW installed capacity in the commercial sector. The MEA estimates

that the total number of projects in the state, including Sunburst[1] awards, which should all be online by mid-2011, will generate approximately 24,000 MWh per year. However, this estimate does not include projects online that did not receive assistance from the state, so it underestimates total solar electric generation in Maryland.

C. Sectoral breakdown:

Based on data for the Maryland grant program, the majority of the awards go to the residential sector, with an 80:20 ratio of residential : commercial.

However, MEA expects the ratio of installed capacity per sector to shift once Sunburst projects come on line, to a ratio of 40 : 10 : 50 for residential : commercial : government.

II. Solar Thermal Energy Systems

Table 2. Market Level for Solar Thermal Systems in MD as of December 2010

	Number of Systems	**Capacity**	**MDV-SEIA Confidence Level**
Private Sector Entity (anonymous)	Corroborates MEA		
MEA	304	---	High
GATS	---	0.01937	??
GTM thru Q3	---	---	---

MEA issued grants for 304 solar thermal systems in 2010 and is on pace for another 625 in 2011. Already there are 364 applications pending for this year.

The industry is advocating for solar thermal systems to be included in the RPS and eligible for SRECs in the state. Governor O'Malley recently issued an administration bill, introduced in the MD legislature, that would accomplish this.

[1] Project Sunburst, administered by the MEA, is designed to maximize available incentives and limit upfront costs for public buildings that wish to utilize solar energy. MEA is offering rebates of up to $1,000 per kilowatt (kW) of photovoltaic (PV) capacity installed on public buildings.

VIRGINIA

I. Photovoltaic (PV) Energy Systems

Table 3. Market Level for Photovoltaic Systems in VA as of December 2010

Source	Number of Systems	Capacity (MW)	MDV-SEIA Confidence Level
Private Sector Entity (anonymous)	450	2.3	Med-High
DMME	382 382	2.88 (reserved) 2.07 (redeemed)	High
DMME: net metering	---	3.02 (net metered)	High
GATS	---	1.93	High (lags)
SREC TRADE.com	---	1.41	Med-low
GTM thru Q3	Not available	---	---

A. Capacity (MW)

The MDV-SEIA best estimate for installed capacity is approximately 2.3 MW, taking into account the data from DMME and a best estimate from a reliable (anonymous) source in the SRECs aspect of the industry.

B. Generation (MWh)

MWh could be calculated using the same rule of thumb used by the MEA: 1200 kWh are generated for every kW installed capacity in the residential sector, and 1300 kWh are generated for every kW installed capacity in the commercial sector.

C. Sectoral breakdown:

The residential:commercial ratio is similar to that of Maryland. Of the 2.07 MW redeemed capacity in Virginia, 0.44 MW (21%) is from installations in the commercial sector; the remaining 1.63 MW is in the residential sector.

II. Solar Thermal Energy Systems

Table 4. Market Level for Solar Thermal Systems in VA as of December 2010

	Number of Systems	**Capacity**	**MDV-SEIA Confidence Level**
Private Sector Entity (anonymous)	---	---	
DMME	---	1.70 MW (reserved) 1.57 MW (redeemed)	High
GATS		0.379 MW	Low
GTM thru Q3	2,517 cumulative 286 – as of 3Q 2010	___	Medium

DISTRICT OF COLUMBIA

The terms stipulated by the RPS for the District of Columbia appear in this table:

RPS Percentages			
Compliance Year	**Tier I**	**Tier II**	**Solar**
2010	3.0%	2.5%	0.028%
2011	4.0%	2.5%	0.04%
2012	5.0%	2.5%	0.07%
2013	6.5%	2.5%	0.10%
2014	8.0%	2.5%	0.13%
2015	9.5%	2.5%	0.17%
2016	11.5%	2.0%	0.21%
2017	13.5%	1.5%	0.25%
2018	15.5%	1.0%	0.30%
2019	17.5%	0.5%	0.35%
2020	20.0%	0.0%	0.40%

Source: http://www.pjm-eis.com/program-information/distirct-of-columbia.aspx

I. Photovoltaic (PV) Energy Systems

Table 5. Market Level for Photovoltaic Systems in DC as of December 2010

Source	**Number of Systems**	**Capacity (MW)**	**MDV-SEIA Confidence Level**
Anon.: Private Sector	165	1.0	High
DDOE	98 in 2009 217 in 2010	0.357 in 2009 0.991 in 2010	High
GATS	---	0.93	
SREC TRADE.com	---	0.64	
GTM thru Q3	---	--	

Of the systems installed data in the DDOE database, all are residential systems but for one or two; one is a 5 kW system commercial installation in 2010; the other is a 14 kW system installed in 2009 on a non-profit building (a place of worship).

Already in 2011, according to DDOE, 11 systems have been installed, with a total capacity of 75 kW.

II. Solar Thermal Energy Systems

Table 6. Market Level for Solar Thermal Systems in DC as of December 2010

	Number of Systems	**Capacity**	**MDV-SEIA Confidence Level**
Anon. Source	(waiting for data)	(waiting for data)	
DDOE	(waiting for data)	(waiting for data)	
GATS	---	0.0065	

Despite the fact that SWH is eligible for SRECs, the announcement two years ago that grants would be available for SWH but then never materialized has repressed the DC market; rich PV incentives overshadow and sideline the residential water heating market potential.

Note: The Washington, DC Public Service Commission has recently clarified the requirements associated with registering Solar Thermal facilities to be eligible for the DC SREC market. Moving forward, all eligible residential systems must be certified by the Solar Rating and Certification Corporation (SRCC). Specifically, the system has to be SRCC OG-300 certified. Any changes to the eligibility requirements would have to be made by the legislature, not the public services commission. Source: http://www.srectrade.com/blog/tag/solar-thermal-renewable-energy-credit

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PJM Environmental Information Services, for data through the Generation Attribute Tracking System (GATS), which tracks generators' electric output for issuance of RECs and ownership of RECs for state RPS compliance. http://www.pjm-eis.com/

SEIA®/GTM Research U.S. Solar Market Insight™
The Solar Energy Industries Association (SEIA) and Greentech Media (GTM) Research have partnered to collect and publish quarterly data and analysis on the U.S. solar market. MDV-SEIA received aggregated data from this report that is current through the 3rd quarter of 2010; SEIA and GTM are now collecting data on the fourth quarter of 2010.

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Appendix I

This article, by an MDV-SEIA board member, aptly describes market trends in solar energy, applicable to our region.

The Shifting Landscape for PV Projects in 2011
By Yuri Horwitz | January 18, 2011

Web Source:
http://www.renewableenergyworld.com/rea/blog/post/2011/01/some-changes-ahead-in-2011

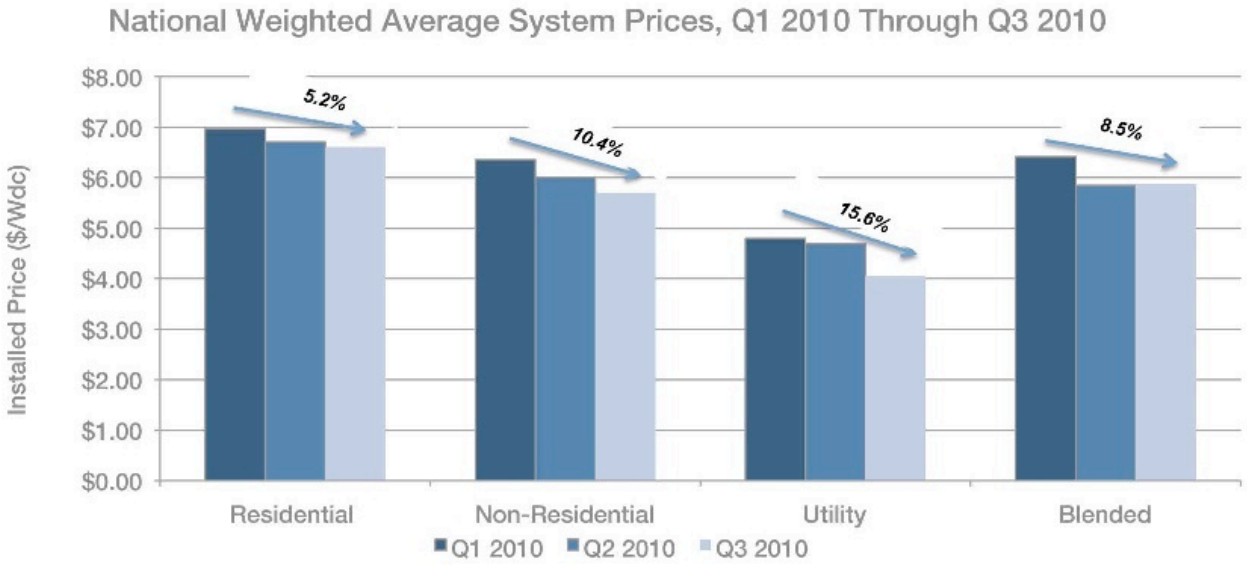
Competition is stiff in the solar manufacturing industry, with companies like Evergreen announcing its departure from the United States to China in order to reduce costs. Enormous global module supply has come online in the last two years to help fuel the rapid build-out in Europe, China and elsewhere, resulting in dramatic declines in solar module pricing. Some investment firms, like Gleacher and Company, are modeling module prices at around $1.30/watt right now. Others are actually predicting wholesale module costs at $1.10 in the next few weeks.

The result is a strange dichotomy of a manufacturing industry undergoing rapid growth and simultaneously dealing with a stressful reallocation of resources and a fairly pessimistic outlook on Wall Street. The WilderHill Clean Energy Index, which includes solar and other alternative-energy stocks, fell 5.3 percent last year, compared with a 12.8 percent rise in the Standard & Poor's 500 index. Companies like SunPower, Yingli, JA Solar, Trina, Canadian Solar, MEMC, Suntech and others all produced significant negative returns, some more than 20 percent down.

This fall in module prices, and the corresponding difficulties for module manufacturers, will likely continue through 2011 as the world's top solar market, Germany, further cuts its solar subsidies and a growing supply of PV modules outstrips demand, putting pressure on prices and producers' profits. As others have noted, a weak euro will compound the problem for Chinese and U.S. manufacturers. Last year, Germany, Spain, France, Italy and Czech Republic all cut back their solar subsidies. Further cuts are expected in Germany and France in the first half of 2011 and in Italy in the second half. Those three markets account for around 70 percent of the global market, according to Bank of America Merrill Lynch. Next year may be the first year in which more solar is built in the United States than in Germany.

For the solar installer and developer community, falling module prices is presumably welcome news (ignoring the risks, of course, that similar reductions in incentives may take place here). As solar module costs decline, so do total system costs since modules compose a significant portion of the overall costs of a solar system.

However, cost reductions do not uniformly impact the solar community. Because of economies of scale, module costs account for a much larger portion of commercial-sized solar system's costs than they do for residential installations. The impact is even more powerful with regard to utility-sized projects. As a result, falling module costs disproportionately benefit larger systems, as illustrated the figure below (courtesy of SEIA).



Not only are commercial and utility costs already significantly lower than residential costs, they are also falling more rapidly. Indeed, utility projects are falling in price at three times the rate that residential projects are. This is an interesting window into the solar industry in the United States, which is showing us that solar systems will undoubtedly get BIGGER in the future.

To compound this trend, as states drastically reduce or altogether cut their rebate and grant programs for residential and small commercial systems, the economics that once favored smaller projects are starting to disappear. States like New Jersey, California, Maryland, Pennsylvania, Ohio and many others have gutted their tax-funded rebate or grant programs. American Recovery and Reinvestment monies that flowed through the states in much of 2009 and 2010 are nearly gone.

Although module costs are falling significantly, they are not falling (nor could they) by two to three dollars a watt, which was often the size of grant and rebate monies. The result is, again a further shift upward in PV project size. In Massachusetts, for example, given the emphasis on a solar renewable energy credit (SREC) market, many developers are starting to focus exclusively on commercial and utility-scale projects.

For residential focused installers and developers, this trend can be viewed as an opportunity or a challenge. Presumably, those firms that can secure large economies of scale in purchasing power will better weather these changes than those that cannot. Additionally, because size matters, the industry may see consolidation. Hopefully, it will

also see aggregation or collaborative models, where residential and small commercial installers work together to secure better financing opportunities and engineer more sophisticated acquisition models. This, of course, is a primary focus of financing firms like Sol Systems. Additionally, power purchase agreements and lease agreements may gain prominence if effective costs rise for residential customers in the absence of rebates. For commercial and utility developers, a move upward in size means a necessary move towards more onerous permitting and complex financing instruments. Large ground-mount projects in the 5-10 MW size range are likely to increase, while environmental regulations and permitting requirements may inhibit growth in the 10MW+ size.

Additionally, it is near impossible to make a pure equity play on a multimegawatt project — a blended debt/tax equity/first loss equity product is typically required to reduce risks and bring down the costs of capital. To see this approach succeed, the capital markets will have to open further to solar projects. A lack of access to debt markets and tax equity was a big part of what slowed the growth in wind and large-scale solar in the last few years. So this may be a challenge. On the other hand, Chinese banks continue to push into the US market to offer debt financing for multi-megawatt portfolios, so it may not only be Chinese modules the US industry is using, it may also be Chinese money.

In sum, as the industry grows, there will be a continued movement towards larger projects. To succeed, players will have to become more sophisticated. This will favor players in the residential space who are able to collaboratively or individually leverage economies of scale and acquisition models, and players in the commercial and utility space who are able to better secure complex financing instruments.