Topline Strategy Group

Massachusetts Surprising Candidate for Solar Power Leadership

There has been a huge controversy over the Cape Wind project, with alternative energy proponents on one side and people worried about the environmental impact of having 130 471-foot high wind turbines off the cost of Nantucket on the other. However, this controversy has overshadowed an even bigger clean energy opportunity for Massachusetts – Solar power. Not only can solar power deliver four times the amount of electricity as Cape Wind within the next ten years, it has no environmental side effects and has the potential to bring thousands of new jobs to the state.

Massachusetts isn't the first place that comes to mind when you think of solar power. Most people think of California where plenty of sunlight and a $3.2 billion subsidy program have combined to create a thriving solar industry. When asked which states are likely to follow California as a hotbed of solar power activity, most people respond with Arizona, Nevada, or Florida. However, it is Massachusetts, and not those Sun Belt states, that is the second most economical place in the country for solar power.

This surprising finding comes from the fact that the economics of solar power are driven by a combination of latitude, cloud cover, and the price of electricity. In Massachusetts, high electric rates and relatively light cloud cover combine to make it number two on the most economical list. Nevada, Arizona and Florida rank third, tenth and eleventh respectively. While Florida is the furthest South, it is also very cloudy and has electric rates that are only slightly higher than the national average. Nevada and Arizona rank first and second in terms of the amount of total sunlight but enjoy cheap power.

For a region concerned about its job base, this natural competitive advantage in solar power presents Massachusetts with a golden opportunity. Not only can solar power deliver clean energy for the state, it can also position Massachusetts as a leader in what the U.S. Photovoltaic Industry Roadmap envisions as a $44 billion industry employing 260,000 people in the United States[1] by 2030. The only missing ingredient is a solar power subsidy program.

Even in California, solar power has not yet reached the point where it cost effective on its own. It requires a subsidy of 26.4%[2] to make it breakeven – meaning that with the government picking up 26.4% of the tab, it cost the same for a business or homeowner in California to purchase solar panels as it would to buy the same amount of electricity from the electric company. Today, California's program subsidizes 31%[3] of the cost of a system, making solar power a good investment. That is why California outpaces the rest of the country combined when it comes to solar power installations.

In Massachusetts, solar power currently requires a 26.8% subsidy[4]. Our calculations show that a 10 year program that funded enough solar equipment to generate 5% of Massachusetts's electricity would cost $80 million per year[5]. Adjusting for size, that level of investment is comparable to California's $3.2 billion subsidy program passed in 2005. By subsidizing solar power, the region will develop a local hub of solar expertise. Solar distributors, retailers and installers will spring up, solar equipment companies from outside the area will open offices in the region, and companies currently in the region such as Evergreen Solar will get access to a real world laboratory for their products right in their own backyard. Combining a robust market for

solar equipment with Massachusetts's venture community and its research universities is a recipe for market leadership. Without subsidies, Massachusetts risks permanently falling behind California and Silicon Valley, whose market for solar power and own venture and research communities will serve as the magnet for the industry.

To build the leadership position in what promises to be one of the major growth industries of the next half century, it is an investment that Massachusetts cannot afford not to make.

Figure 1: Required Subsidies to Make Solar Power Breakeven by State

(Ranked by Lowest Subsidy Required to Breakeven as a % of System Cost)

Rank	State	Subsidy Required for Breakeven (% of System Cost)	Sun Index[6]	Average Electricity Cost[7] (cents/kilowatt-hour)
1	California	26.4%	1.00	13.72
2	Massachusetts	26.8%	0.83	16.58
3	Nevada	31.6%	1.19	10.49
4	New Hampshire	33.8%	0.83	14.58
5	New York	34.2%	0.83	14.86
6	Rhode Island	35.3%	0.82	14.53
7	Connecticut	36.4%	0.79	14.82
8	Maine	38.2%	0.84	13.48
9	Texas	39.9%	0.98	11.15
10	Arizona	42.8%	1.18	8.54
11	Florida	43.5%	0.95	10.55
12	New Mexico	44.3%	1.16	8.36
13	New Jersey	44.9%	0.81	11.98
14	Maryland	44.9%	0.84	10.93
15	Vermont	45.2%	0.77	12.61
16	Mississippi	47.9%	0.92	9.69
17	Delaware	49.9%	0.84	10.14
18	Colorado	51.0%	0.99	8.38
19	Louisiana	51.9%	0.90	8.92
20	Pennsylvania	52.8%	0.83	9.67
21	Georgia	53.1%	0.92	8.51
22	Oklahoma	53.3%	0.98	7.96
23	Alabama	54.3%	0.89	8.43
24	South Carolina	54.4%	0.92	8.29
25	Wisconsin	55.2%	0.81	9.32
26	Kansas	55.8%	0.95	7.65
27	North Carolina	56.0%	0.90	8.14
28	Iowa	56.0%	0.87	8.49
29	Michigan	56.7%	0.77	9.31
30	Tennessee	58.0%	0.85	7.82
31	Montana	58.4%	0.86	7.76
32	Arkansas	58.5%	0.91	7.39
33	Utah	58.7%	0.95	6.96
34	Wyoming	58.8%	0.96	6.85
35	Ohio	58.9%	0.74	8.91
36	Illinois	59.1%	0.79	8.22
37	Minnesota	59.2%	0.84	7.89
38	Indiana	59.8%	0.83	7.72
39	Virginia	60.6%	0.87	7.27
40	South Dakota	60.8%	0.87	7.12
41	Nebraska	62.0%	0.89	6.67
42	Missouri	62.1%	0.87	6.82
43	Kentucky	63.7%	0.83	6.60
44	North Dakota	63.8%	0.84	6.56
45	Idaho	64.3%	0.93	5.77
46	Oregon	65.9%	0.71	7.17
47	West Virginia	67.6%	0.79	5.90
48	Washington	68.8%	0.67	6.56

Figure 2: Massachusetts Solar Subsidy Program and Installed Capacity Projections 2007 to 2016

Year	Installed Capacity (kilowatts)	Capacity Added (kilowatts)	Subsidy ($/kilowatt)	Total Subsidies ($M)	Share of MA Electricity[8]
2007	4,000	4,000	2,700	10,800,000	0.0%
2008	10,000	6,000	2,400	14,400,000	0.0%
2009	25,000	15,000	2,100	31,500,000	0.0%
2010	50,000	25,000	1,800	45,000,000	0.0%
2011	93,000	43,000	1,500	64,500,000	0.0%
2012	172,000	79,000	1,200	94,800,000	0.0%
2013	318,000	146,000	900	131,400,000	0.2%
2014	588,000	270,000	600	162,000,000	1.1%
2015	1,088,000	500,000	300	150,000,000	3.2%
2016	1,700,000	612,000	150	91,800,000	5.0%
10 yr Total	**1,700,000**			**796,200,000**	**5.0%**

[1] Solar Energy Industries Association, *U.S Photovoltaic Industry Roadmap*, 2004.
[2] Source: Topline Strategy analysis
[3] California currently offers a rebate of $2.60 per kilowatt installed on an average cost per kilowatt of $8,490, 31% of the cost.
[4] Massachusetts subsidy required to breakeven. Source: Topline Strategy analysis.
[5] See Figure 2. Annual average of a 10 year subsidy program totaling $796.2 million. Source: Topline Strategy analysis.
[6] The Sun Index is an index of the amount of direct sunlight received in each state and accounts for latitude and cloud cover. California is indexed at 1.0. The amount of direct sunlight was derived from the figures provided by the Renewable Resource Data Center. It was calculated as the average number of hours of peak direct sunlight hours per year from 1960 to 1990. Source: Renewable Resource Data Center, *Averages of Solar Radiation For Each of 360 Months, 1961-1990,* http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/mon2/state.html (Nov 2006)
[7] Linear Average of Residential and Commercial Rates. Source: Energy Information Administration, *Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State,* http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html (Nov 2007)
[8] Based on 2005 Massachusetts usage of 52.7 billion kilowatt-hours. Source: StateMaster.com, Energy Statistics – Total Electricity Consumption by State, http://www.statemaster.com/graph/ene_tot_ele_con-energy-total-electricity-consumption (Nov 2006)