



Berkshire Photovoltaic Services

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We have been tracking customer's PV systems in Western Mass since 2003, a representative sample of roof and ground mounts with varying tilt angles and orientations. Their average annual production is 1162 kWh per kW per year.

That original group of sample PV systems is now 15 years old. Equipment efficiencies and technology have improved significantly. We have conducted an updated sensitivity analysis that includes a variety of sample PV systems we have installed over the years in hopes to provide you with the most accurate production statistics possible. Our 2017 statistics report represents a sample that of 12 PV systems including PV systems with the outstanding efficiency and production features of Panasonic HIT modules.

Consider the BPVS sample yearly average of 1196.17 kWh per kilowatt a good benchmark. We noted in our emissions table below the average of our highest recent producers at 1662.443 kWh per kilowatt. This represents new, perfectly oriented and unshaded system installations.

Environmental Benefits per 1 kW System

Based on Massachusetts Generation Mix Year 2016

High= BPVS Sample Average of Highest Producer

Low = BPVS Sample Average of Lowest Producer

Emissions		Daily	Yearly	System Life of 30 Years
kWh	high	4.5546383	1662.442967	49873.289
	low	2.8725107	1048.466402	31453.99206
CO2 (lbs) Carbon Dioxide	high	4.6920007	1712.580256	51377.40768
	low	2.9591422	1080.086893	32402.6068
SO2 (lbs) Sulfur Dioxide	high	0.0092703	3.383661787	101.5098536
	low	0.0058466	2.134001449	64.02004347
Nox (lbs) Nitrogen	high	0.0087996	3.211853865	96.35561596
	low	0.0055497	2.025645952	60.76937857
Hg (mg) Mercury	high	0.0007303	0.266551256	7.996537681
	low	0.0004606	0.168108045	5.043241338

AC Production for a 1 kW DC Photovoltaic System

Month	kWh		
	Based on a 20 yr avg*		Based on past 8 yr avg**
	Boston	Albany	BPVS Sample 2017
Jan	71	68	45.87
Feb	81	79	63.57
Mar	111	107	105.70
Apr	122	123	122.14
May	140	135	124.71
Jun	146	139	136.82
Jul	150	149	138.41
Aug	137	143	136.02
Sep	136	127	124.94
Oct	119	109	92.49
Nov	75	67	67.15
Dec	66	56	38.35
Annual Total	1354	1302	1196.17

*AC production generated from PVWatts Grid Data Calculator (Ver.2) with a 0.833 derate factor at a 42° fixed tilt-This tabulation is based on meteorological data- not real system production . PVWATTS data is often used as a basis for estimating production in solar sales presentations.

**Courtesy of detailed data collected from 12 BPVS W. Mass systems from 2009-2017. © BPVS 2018

Emissions were calculated using data from Independent System operator- New England (ISO-NE), the Federal Environmental Protection Agency (EPA), and the Energy Information Administration (EIA).

Massachusetts continues to diversify how its electricity is produced, yet fossil fuels still make up nearly 2/3 of the generation fuel mix. These figures correspond with average emissions for electricity produced found at EIA along with regional producers taken from ISO-NE.

Not shown are trace amounts of cadmium, arsenates, and other heavy metals as well as a host of toxins and radioactive elements which result from conventional electricity generation.

This table was first created by Abby Krich in 2004 when she was an intern from Cornell University. BPVS interns have refined this table over the years- this year Hunter Phillips, our intern from MCLA, updated Walker Phillips' 2016/2017 research.

Rebecca Martin, Vice president of BPVS did the research when she interned in 2007 from MCLA and now guides summer interns on keeping it updated.