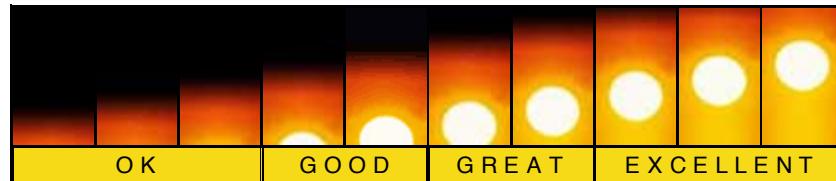


[MY SOLAR ESTIMATOR](#)[MY WIND ESTIMATOR](#)[FIND A PRO](#)

How it Works

[IMPORTANT STUFF](#)[Frequent QUESTIONS](#)[RESOURCES & LINKS](#)[JOIN The Network](#)

YOUR SOLAR RATING



The solar rating of your area is **Good** for adopting a solar system. (4.33 kWh/m² per day).

 [Print view](#)

You may want to change some of the information to better match your situation.

Customize Your Assumptions

Price Installed \$ per watt DC.

Provide % of my electricity, on average, over the course of a year.

Electric Rate: \$ /kWh 

Monthly Electric Usage: kWh/Month 

Utility Annual Inflation Rate: %

Utility Savings Method: 

Federal ITC Based Upon: 

Federal Income Tax Rate: 

State Income Tax Rate: % (Low: 5.30% - High: 5.30%) 

Loan Modeling: Borrow % of \$16,225 estimated cost

at % interest (apr) re-paid over years

[» Update My Assumptions](#)

If you agree **this is a smart investment**, we encourage you to work with a Professional to help you install your very own system.

FIND A SOLAR PRO

Click on the **More** buttons to learn about our assumptions and other important information used to generate your estimate. Also, please review the **notes** below.

Help us improve. We rely on feedback from our users to help keep our service accurate and useful:

[» Send us your Feedback](#)

Your Solar Electric Estimate by the Numbers

Building Type:	Residential
State & County:	MA - Worcester
Utility:	National Grid (was Massachusetts Electric Co)
Utility Type:	Investor-Owned Utility
Your Average <u>Monthly</u> Electricity Bill: (Assumed rate x average monthly usage)	\$ 180 / Month
Tiered Rates Apply:	No
Time-of-Use Metering Offered:	No
Net-Metering Available:	Yes - See Notes, below!

[More](#)

ESTIMATED SYSTEM SIZE

The system size best for your situation will vary based upon product, building, geographic and other variables. We encourage you to work with a [Solar Pro](#) who can better estimate the system size best for your situation. We estimate your building will need a system sized between 2.60 kW and 3.90 kW of peak power. This estimate assumes the mid-point of this range.

Solar Rating:	Good 4.33 kWh/sq-m/day
Solar System Capacity Required:	3.25 kW of peak power (DC watts)
Roof Area Needed:	325 sq-ft
Equivalent Annual Production:	3,806 kWh electricity

[More](#)
[More](#)
[More](#)

ESTIMATED SYSTEM COST

This is only an estimate based upon many assumptions. Installation costs can vary considerably. We encourage you to work with a [Solar Pro](#) who can provide you with a more detailed cost estimate. We estimate that a 3 kW peak DC power system will cost between \$23,400 and \$35,100. This estimate assumes the mid-point of this cost range.

Assumed Installation Gross Cost: "Gross Cost" is the cost <u>before</u> any rebates, incentives, tax credits, etc. are applied. See the Cost Notes , below!	\$29,250 assuming \$9 per watt DC
---	--------------------------------------

[More](#)

FINANCIAL INCENTIVES

Financial incentives shown are totals across all years. So, if an incentive spans multiple years then the value shown is the total of all years. For details, please refer to the table below "Cash Flow by Year and Cumulative Across Years"

MA DOER - Solar Renewable Energy Credits (SRECs) \$ 0.30 per kWh x 10 yrs. 10% escalation » link	\$ 20,005
MassCEC - Commonwealth Solar II Rebates (Residential base incentive) » link	\$ 3,250
Federal Tax Credit (30% of Gross Cost at Installation) » link	\$ 8,775
MA Residential Renewable Energy Income Tax Credit » link	\$ 1,000

[FIND...](#)

[FIND...](#)


ESTIMATED NET COST:	\$ -3,780	More																																																						
ESTIMATED NET COST AT INSTALLATION:	\$ 16,225	More																																																						
Cash & Loan Amounts:	\$ 16,225 Cash \$ 0 Borrowed																																																							
Loan Monthly Payment (6.5% apr, 30 years):	\$ 0																																																							
CASH FLOW																																																								
Cumulative Cash Flow																																																								
<p>The chart illustrates the cumulative cash flow over a 25-year period. It shows initial outlays (negative values) followed by positive utility savings and appreciation, which eventually exceed the initial costs around year 5.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Cumulative Cash Flow (\$)</th> </tr> </thead> <tbody> <tr><td>0</td><td>-12,000</td></tr> <tr><td>1</td><td>-11,000</td></tr> <tr><td>2</td><td>-10,000</td></tr> <tr><td>3</td><td>-9,000</td></tr> <tr><td>4</td><td>-8,000</td></tr> <tr><td>5</td><td>-5,000</td></tr> <tr><td>6</td><td>0</td></tr> <tr><td>7</td><td>5,000</td></tr> <tr><td>8</td><td>10,000</td></tr> <tr><td>9</td><td>12,000</td></tr> <tr><td>10</td><td>15,000</td></tr> <tr><td>11</td><td>17,000</td></tr> <tr><td>12</td><td>19,000</td></tr> <tr><td>13</td><td>21,000</td></tr> <tr><td>14</td><td>23,000</td></tr> <tr><td>15</td><td>25,000</td></tr> <tr><td>16</td><td>27,000</td></tr> <tr><td>17</td><td>29,000</td></tr> <tr><td>18</td><td>31,000</td></tr> <tr><td>19</td><td>33,000</td></tr> <tr><td>20</td><td>35,000</td></tr> <tr><td>21</td><td>37,000</td></tr> <tr><td>22</td><td>39,000</td></tr> <tr><td>23</td><td>41,000</td></tr> <tr><td>24</td><td>43,000</td></tr> <tr><td>25</td><td>45,000</td></tr> </tbody> </table>			Year	Cumulative Cash Flow (\$)	0	-12,000	1	-11,000	2	-10,000	3	-9,000	4	-8,000	5	-5,000	6	0	7	5,000	8	10,000	9	12,000	10	15,000	11	17,000	12	19,000	13	21,000	14	23,000	15	25,000	16	27,000	17	29,000	18	31,000	19	33,000	20	35,000	21	37,000	22	39,000	23	41,000	24	43,000	25	45,000
Year	Cumulative Cash Flow (\$)																																																							
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Cash Flow Breakeven is where the chart crosses the \$0 point - this is when your investment has paid itself back in cash.																																																								
The chart above is a summary of the net cash flow you can expect over time. Net Cash Flow is the total cash after all costs (out-flows of cash) are reduced by financial incentives, annual utility savings and tax effects (in-flows of cash).																																																								
Average values are used together with your assumed income tax rate (33%). Any property appreciation has not been included, as this is generally not a cash flow (it's an investment). The loan modeled, if any, is included. Because individual tax situations vary, we have <u>not</u> included Federal income tax liabilities that may result from having received <u>non-federal</u> incentives, if any (e.g. state rebate programs) as they are usually not taxed as earned income.																																																								
SAVINGS & BENEFITS																																																								
First-year Utility Savings:	\$ 713	More																																																						
Average Monthly Utility Savings: <i>over 25-year expected life of system</i>	\$ 100	More																																																						
Average Annual Utility Savings: <i>over 25-year expected life of system</i>	\$ 1,198	More																																																						
25-year Utility Savings:	\$ 29,938	More																																																						
Return on Investment (ROI):	282%	More																																																						
Internal Rate of Return (IRR):	16.7%	More																																																						
Net Present Value (NPV):	\$ 20,293	More																																																						
Profitability Index:	2.3	More																																																						
Greenhouse Gas (CO2) Saved: <i>over 25-year system life</i>	78 tons 156,000 auto miles	More																																																						

Cash Flow by Year and Cumulative Across Years

This cash flow table includes tax effects applied to utility savings and loan interest payments (if any). For residential (individual) situations

we assume utility savings are in Gross Income dollars ("pre-tax" or what you earned). Therefore for every dollar saved on utility bills, the pre-tax savings will be higher: Pre-tax Utility Savings = (\$'s saved on utility bill) / (1 - Income Tax Rate). You may also earn compounding interest tax free (not shown). Because individual tax situations vary, we have not included Federal income tax liabilities that may result from having received non-federal incentives, if any (e.g. state rebate programs) as they are usually not taxed as earned income. Any income from your system (e.g. performance-based incentives and "SREC's") may be taxed as income (also not shown).

Year of Operation:	at Install	1	2	3	4	5
Gross Cost	(\$29,250)					
MA DOER - Solar Renewable Energy Credits (SRECs) \$ 0.30 per kWh x 10 yrs. 10% escalation	\$0	\$1,256	\$1,381	\$1,519	\$1,671	\$1,838
MassCEC - Commonwealth Solar II Rebates (Residential base incentive)	\$3,250	\$0	\$0	\$0	\$0	\$0
Federal Tax Credit (30% of Gross Cost at Installation)	\$8,775	\$0	\$0	\$0	\$0	\$0
MA Residential Renewable Energy Income Tax Credit	\$1,000	\$0	\$0	\$0	\$0	\$0
Utility Savings	\$0	\$1,110	\$1,152	\$1,196	\$1,241	\$1,288
ANNUAL CASH FLOW	\$-16,225	\$2,366	\$2,533	\$2,715	\$2,912	\$3,126
Cumulative Cash Flow	\$-16,225	\$-	\$-	\$-	\$-	\$-
		13,859	11,326	8,611	5,699	2,573

Year of Operation:	6	7	8	9	10	11
Gross Cost						
MA DOER - Solar Renewable Energy Credits (SRECs) \$ 0.30 per kWh x 10 yrs. 10% escalation	\$2,022	\$2,223	\$2,446	\$2,690	\$2,959	\$0
MassCEC - Commonwealth Solar II Rebates (Residential base incentive)	\$0	\$0	\$0	\$0	\$0	\$0
Federal Tax Credit (30% of Gross Cost at Installation)	\$0	\$0	\$0	\$0	\$0	\$0
MA Residential Renewable Energy Income Tax Credit	\$0	\$0	\$0	\$0	\$0	\$0
Utility Savings	\$1,336	\$1,387	\$1,439	\$1,494	\$1,550	\$1,609
ANNUAL CASH FLOW	\$3,358	\$3,610	\$3,885	\$4,184	\$4,509	\$1,609
Cumulative Cash Flow	\$785	\$4,395	\$8,280	\$12,464	\$16,973	\$18,582
	Breakeven					

Year of Operation:	12	13	14	15	16	17
Gross Cost				(\$2,925) Inverter Replaced		
MA DOER - Solar Renewable Energy Credits (SRECs) \$ 0.30 per kWh x 10 yrs. 10% escalation	\$0	\$0	\$0	\$0	\$0	\$0
MassCEC - Commonwealth Solar II Rebates (Residential base incentive)	\$0	\$0	\$0	\$0	\$0	\$0
Federal Tax Credit (30% of Gross Cost at Installation)	\$0	\$0	\$0	\$0	\$0	\$0
MA Residential Renewable Energy Income Tax Credit	\$0	\$0	\$0	\$0	\$0	\$0
Utility Savings	\$1,670	\$1,733	\$1,798	\$1,866	\$1,937	\$2,010
ANNUAL CASH FLOW	\$1,670	\$1,733	\$1,798	\$-1,059	\$1,937	\$2,010
Cumulative Cash Flow	\$20,252	\$21,985	\$23,783	\$22,724	\$24,661	\$26,671

Year of Operation:	18	19	20	21	22	23	24	25
Gross Cost								
MA DOER - Solar Renewable Energy Credits (SRECs) \$ 0.30 per kWh x 10 yrs. 10% escalation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MassCEC - Commonwealth Solar II Rebates (Residential base incentive)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Federal Tax Credit (30% of Gross Cost at Installation)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MA Residential Renewable Energy Income Tax Credit	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Utility Savings	\$2,086	\$2,165	\$2,247	\$2,331	\$2,420	\$2,511	\$2,606	\$2,704
ANNUAL CASH FLOW	\$2,086	\$2,165	\$2,247	\$2,331	\$2,420	\$2,511	\$2,606	\$2,704
Cumulative Cash Flow	\$28,757	\$30,922	\$33,169	\$35,500	\$37,920	\$40,431	\$43,037	\$45,741

FAQ's: Frequently Asked Questions for MA:

- Does Massachusetts offer a sales tax exemption for solar systems?
- Where can I find more information about Massachusetts Renewable energy programs and incentives?

Notes & Assumptions: Solar Electric (PV) Systems

* HOW TO REDUCE THE SYSTEM SIZE NEEDED & INCREASE SAVINGS

The estimate provided above assumes "base" electric rates apply. Other taxes and surcharges may be applied to your utility bill. We suggest you review a recent utility bill and change the "Assumed Electric Rate", above, as needed to better match your situation.

You may have other metered-rate options with your utility. Options such as Tiered billing rates, Time-Of-Use (TOU) metering, and Net-Metering, if available, can help reduce the system size you need to provide a "net-zero" energy bill. Sometimes people also reduce the size of their solar system to accommodate planned improvements in their building's energy efficiency, or to match a budget and/or the available space for installing a solar system.

Energy production from a solar electric (PV) system is a function of several factors, including the following. Our assumptions are:

Factor	Assumption
Solar resources	Assumed solar availability: As per Solar Radiance chart
Soiling or contamination of the PV panels	Clean, washed frequently: 100% design sunlight transmission
Temperature	25C, calm wind
System configuration (battery or non-battery)	Non-battery
Orientation to the sun	tilted at your latitude, full sun

Shading	None
PV Energy delivered as % of manufacturer's rating	95%
Soiling, wiring & power point tracking losses	9% (91% delivered)
Inverter Efficiency	90%
<u>Total Energy Delivered</u>	<u>95% x 91% x 90% = 78%</u>

Energy Efficiency: Improving your building's energy efficiency will reduce the system size you need to attain a "net-zero" energy bill.

Tiered Rates: Often people are paying a "Tiered" rate for their electricity. This is a higher rate (higher than the "Base" rate) for electricity charged when a home or building uses more than a "Base" amount allocated for the building. Installing a solar system will reduce your electrical demand from the utility. This can result in a lower utility rate because you stay within the "Base" rate level. In this case, the more expensive "Tiered" rate electricity is eliminated, reducing your average electricity rate.

TOU Metering: Many utilities offer Time-of-Use (TOU) meters. This allows the price of electricity to vary by time of day (called "Peak" or "Off-Peak" periods) and by season (usually "Winter" versus "Summer" rates). If TOU metering is offered by your utility, a solar system may result in additional savings. This is because peak (more expensive electricity) rates often occur during the daytime. This is usually when a solar system is producing the most output, thus reducing your demand for peak-rate electricity from the utility.

Most utilities do charge for the purchase and installation of a time-of-use meter (normally a few hundred dollars). We have assumed the cost for this is part of the "Estimated Installation cost" shown above.

Net-Metering: With [Net-Metering](#), surplus electricity generated by your renewable energy system will be credited back to your utility account. So if your solar system makes more electricity than you are using, the "meter spins backwards". You are not actually "selling" electricity, since in most states the utility will not reimburse you for excess electricity. But, if your utility offers "Net-Metering" you may be able to get credit for electricity provided back to the grid during peak periods. Combined with TOU metering, Net-Metering can result in multiplied savings since your electricity account may be gaining electricity credits during the time of peak utility rates -- Think of a hot, sunny summer day ... your solar system is producing power, spinning your electric meter backwards, and supplying the grid with electricity to run other people's air conditioners -- you're "spinning back" cost at peak rates! That's the savings power of Net-metering, combined with TOU rates.

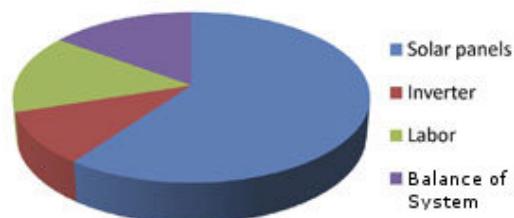
Solar Power "Fixes" Energy Costs: The cost of sunshine is free. While the sun rises every morning, the cost of sunshine does not. Utility rates, on the other hand, tend to rise steadily in cost. So, the value of your savings from a solar system are likely to increase as time goes on. If you are on a fixed income (e.g. nearing or in retirement) this may be of particular interest to you.

THE COST TO GO SOLAR

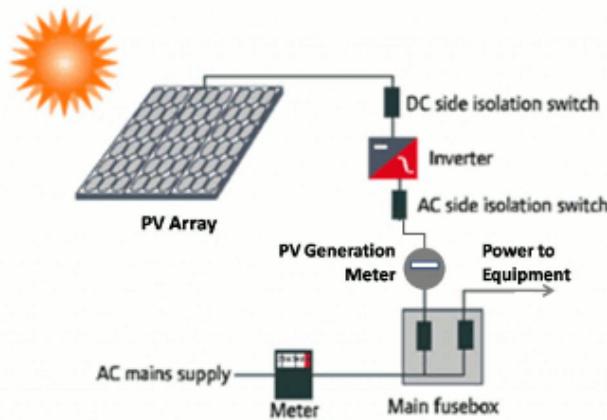
This is only an estimate based upon many assumptions and limited data entered by you: Installation costs can vary considerably. The cost to purchase and install a complete grid-tied solar photovoltaic (PV) system on a residential home is typically as further defined in the table, below. This includes the PV array, inverter and associated balance of system costs. It does not include the cost of options you may select, such as battery backup power storage, or the costs of building preparation work, like new shingles. Costs can also be higher if you add other features or have special installation needs (such as application over tile roofing) or you choose to use special mounting systems (such as sun tracking systems). Other factors may also affect price, including, but not limited to, your location, the building condition, type and location, its wiring, and warranties offered.

Item	Assumed Cost, per Watt DC	
	System Size < 2kW	System Size ≥ 2kW

Assumed Total

\$9 per watt DC
(+/- 20%)\$8 per watt DC
(+/- 20%)

About 60% of the cost to install a solar-electric (PV) system goes to the solar photovoltaic (PV) panels, 10% to an inverter, 15% to direct labor, and 15% to the "balance of system" (BOS) costs.



OTHER ASSUMPTIONS

This summary is based upon many [assumptions](#) and the limited data you entered. An actual site assessment by a qualified solar system retailer or contractor will be needed to determine the actual costs and benefits of installing a solar electric system.

HELPFUL PDF's & Links



[Report on Solar-Estimate.org Estimator: Comparisons, Methods & Assumptions](#)



[Payback & Other Financial Test for Solar on Your Home](#)

[The Dept. of Energy's: PVWatts Online PV Calculator](#)

[Natural Resources Canada's: RETScreen Renewable Energy Calculators](#)



Contractor verification assisted by » [ContractorCheck.com](#)



Pre-screened, Customer-recommended Solar Pros
See: » [How it Works](#)



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SOLAR-ESTIMATE.ORG is a free, public service. We believe the efficient use of energy and renewable energy systems makes for comfortable living and a more secure future. So we want to help you reduce your energy demands, increase your energy efficiency and help you utilize more energy from renewable energy systems and sources -- like solar electric (PV - photovoltaics), solar space (air), water & pool heating, wind turbines, biomass furnaces and ground-source heat pumps. Our mission is to serve as a convenient, user-friendly means for home and small commercial building owners to make preliminary evaluations of renewable and solar energy options for their location, run financial analysis and help find and verify the experience, quality and business status of certified solar contractors, and other professionals who can design, install and service renewable and solar energy and energy efficient power systems. (See How It Works). As a business verification service, we maintain the largest directory of current local solar installer and solar contractor profiles including extensive customer reviews and ratings of these professionals. Profiles are not limited to solar energy professionals, but include many other renewable energy, design, engineering and support professional services. We also serve as a consolidator of national and region-specific solar and energy efficiency programs, and utility information about renewable energy, solar energy and energy efficient measures. Our software tools and content include: Online solar estimator (solar calculator, analysis) to help you determine the costs and benefits of a renewable or solar energy system for your particular location and building needs, including financial analysis tools. We also provide a trusted means by which you, as a consumer, can review and access solar panel installers, solar contractors, solar pros and other solar, renewable energy and energy efficiency professional services. And we offer answers to frequently asked questions about renewable and solar power, links and resources to current information about solar power, solar energy, renewable energy, energy bill savings, energy efficiency data, solar incentives, tax credits, rebates and other programs and helpful information so you can learn about solar energy, help us promote renewable and solar power adoption and, hopefully, install a solar system for your home, building, company or community and/or improve your energy efficiency and use. [Site Map](#)

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