



Solar discussion with the Clean Energy Caucus
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**sunbug
solar**



As B Corps, we balance profit with purpose as we help to build an inclusive, sustainable future.

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Topics:

- Shape of the industry: Big Solar vs. Small Solar
- Solar Economics in Massachusetts
- Land use for solar
- A successor to SMART
- Solar interconnection
- Solar wish list

Massachusetts

Ranks **11th**
for total installed solar capacity

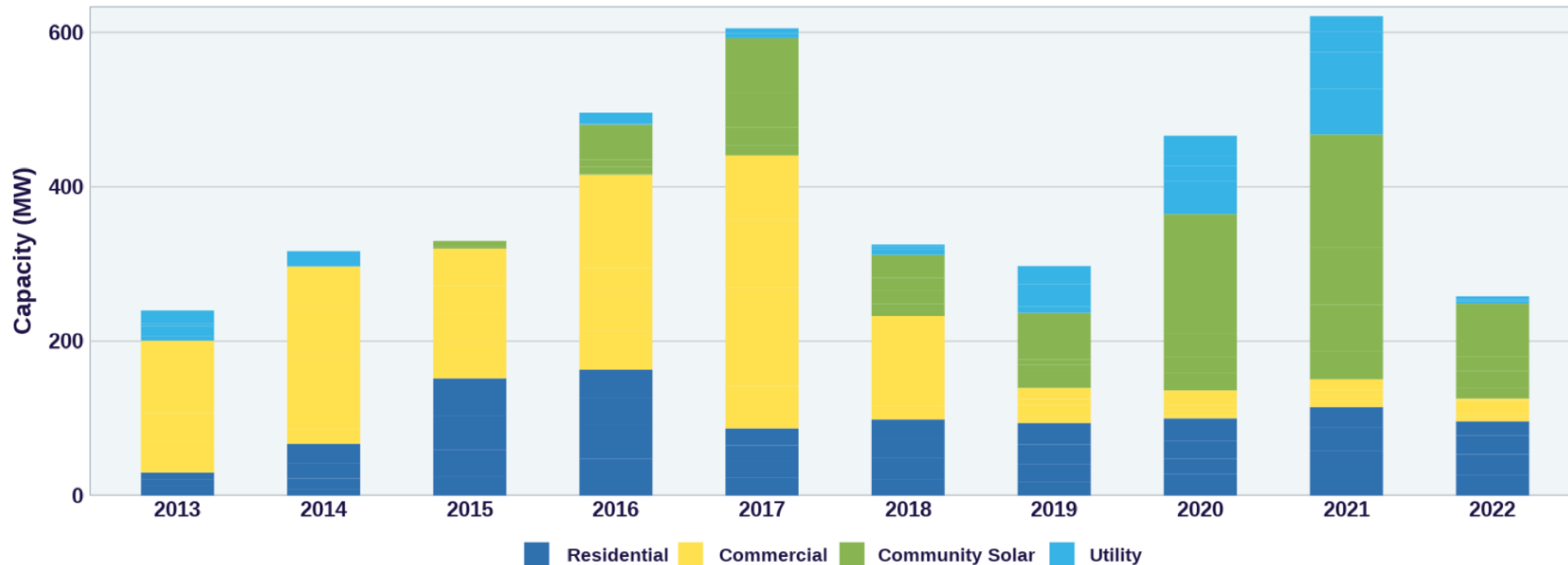
Total solar installed (MW)
4,236
295 MW in 2022

Growth projection over the next 5 years (MW)
1,815
Ranks 28th

Solar jobs in the state¹
10,548
Ranked 3rd in 2021



Massachusetts Annual Solar Installations





Big solar



Small solar

SOLAR CASE STUDY: 100KW COMMERCIAL SYSTEM

SYSTEM INPUTS & ASSUMPTIONS

Nameplate capacity	99.9 kW DC
Price per watt	\$2.68
System purchase price	\$267,636
Investment Tax Credit	30%
Tax bracket for depreciation deductions	35.0%
Net purchase price after tax incentives	\$187,345
Annual module degradation rate	0.54%
Annual utility kWh rate escalator	2.5%
SMART Block	Block 9
Tariff rate	\$0.2070/kWh
BTM Tariff rate	\$0.0417/kWh
Tariff duration	20 years
Specific yield (kWh/kWp)	1,100
First year production (kWh)	109,890

SYSTEM PERFORMANCE

Payback/breakeven year	Year 10
10-year cumulative cash flow	\$118
20-year cumulative cash flow	\$217,969
30-year cumulative cash flow	\$473,697
10-year IRR	0.0%
20-year IRR	7.9%
30-year IRR	9.6%
10-year ROI	0.0%
20-year ROI	81.4%
30-year ROI	177.0%

SOLAR CASE STUDY: 100KW COMMERCIAL SYSTEM

Case Study: 100kW Commercial Solar System

Behind-the-meter Facility | Net Metering Interconnection (NM) | Direct Purchase | Eversource | Block 9

	Solar kWh Production	Utility Rate per kWh	Solar kWh Consumed On-site	Avoided Utility Costs	Net Metering Rate	Solar kWh Exported	Net Metering Credits	SMART (tariff) Income	Class I REC Income	Investment Tax Credit	Inverter Replacement	Insurance	Operations & Maintenance (optional)	Annual Cash Flow	Cumulative Cash Flow
Purchase Price														\$ (267,636)	\$ (267,636)
Year 1	109,890	\$ 0.165	94,396	\$ 15,605	\$ 0.099	15,494	\$ 1,255	\$ 4,579		\$ 80,291		\$ (749)	\$ (3,343)	\$ 97,638	\$ (169,998)
Year 2	109,297	\$ 0.169	94,210	\$ 15,964	\$ 0.102	15,087	\$ 1,253	\$ 4,554				\$ (757)	\$ (3,376)	\$ 17,638	\$ (152,360)
Year 3	108,706	\$ 0.174	94,025	\$ 16,331	\$ 0.104	14,681	\$ 1,250	\$ 4,529				\$ (764)	\$ (3,410)	\$ 17,936	\$ (134,424)
Year 4	108,119	\$ 0.178	93,841	\$ 16,707	\$ 0.107	14,278	\$ 1,246	\$ 4,505				\$ (772)	\$ (3,444)	\$ 18,241	\$ (116,182)
Year 5	107,536	\$ 0.182	93,659	\$ 17,091	\$ 0.109	13,877	\$ 1,241	\$ 4,481				\$ (780)	\$ (3,478)	\$ 18,555	\$ (97,628)
Year 6	106,955	\$ 0.187	93,477	\$ 17,484	\$ 0.112	13,478	\$ 1,236	\$ 4,456				\$ (787)	\$ (3,513)	\$ 18,876	\$ (78,752)
Year 7	106,377	\$ 0.192	93,296	\$ 17,887	\$ 0.115	13,081	\$ 1,229	\$ 4,432				\$ (795)	\$ (3,548)	\$ 19,205	\$ (59,547)
Year 8	105,803	\$ 0.197	93,116	\$ 18,299	\$ 0.118	12,687	\$ 1,222	\$ 4,408				\$ (803)	\$ (3,584)	\$ 19,542	\$ (40,005)
Year 9	105,232	\$ 0.201	92,934	\$ 18,719	\$ 0.121	12,297	\$ 1,214	\$ 4,385				\$ (811)	\$ (3,620)	\$ 19,887	\$ (20,118)
Year 10	104,663	\$ 0.206	92,703	\$ 19,140	\$ 0.124	11,961	\$ 1,210	\$ 4,361				\$ (819)	\$ (3,656)	\$ 20,235	\$ 118
Year 11	104,098	\$ 0.212	92,472	\$ 19,569	\$ 0.127	11,626	\$ 1,205	\$ 4,337				\$ (828)	\$ (3,692)	\$ 20,592	\$ 20,710
Year 12	103,536	\$ 0.217	92,243	\$ 20,009	\$ 0.130	11,293	\$ 1,200	\$ 4,314				\$ (836)	\$ (3,729)	\$ 20,957	\$ 41,667
Year 13	102,977	\$ 0.222	92,015	\$ 20,458	\$ 0.133	10,962	\$ 1,193	\$ 4,291				\$ (844)	\$ (3,767)	\$ 21,332	\$ 62,999
Year 14	102,421	\$ 0.228	91,788	\$ 20,918	\$ 0.137	10,633	\$ 1,186	\$ 4,268				\$ (853)	\$ (3,804)	\$ 21,715	\$ 84,714
Year 15	101,868	\$ 0.234	91,562	\$ 21,388	\$ 0.140	10,306	\$ 1,178	\$ 4,244			\$ (5,612)	\$ (861)	\$ (3,842)	\$ 16,495	\$ 101,209
Year 16	101,318	\$ 0.239	91,338	\$ 21,869	\$ 0.144	9,980	\$ 1,169	\$ 4,222				\$ (870)	\$ (3,881)	\$ 22,509	\$ 123,718
Year 17	100,771	\$ 0.245	91,114	\$ 22,361	\$ 0.147	9,656	\$ 1,159	\$ 4,199				\$ (879)	\$ (3,920)	\$ 22,921	\$ 146,638
Year 18	100,226	\$ 0.252	90,892	\$ 22,864	\$ 0.151	9,334	\$ 1,148	\$ 4,176				\$ (887)	\$ (3,959)	\$ 23,342	\$ 169,980
Year 19	99,685	\$ 0.258	90,672	\$ 23,379	\$ 0.155	9,014	\$ 1,135	\$ 4,154				\$ (896)	\$ (3,998)	\$ 23,773	\$ 193,754
Year 20	99,147	\$ 0.264	90,452	\$ 23,905	\$ 0.159	8,695	\$ 1,122	\$ 4,131				\$ (905)	\$ (4,038)	\$ 24,215	\$ 217,969
Year 21	98,611	\$ 0.271	90,233	\$ 24,444	\$ 0.163	8,378	\$ 1,108	\$ 4,108	\$ 2,761			\$ (914)	\$ (4,079)	\$ 23,320	\$ 241,289
Year 22	98,079	\$ 0.278	90,016	\$ 24,995	\$ 0.167	8,063	\$ 1,092	\$ 4,085	\$ 2,746			\$ (923)	\$ (4,119)	\$ 23,790	\$ 265,079
Year 23	97,549	\$ 0.285	89,800	\$ 25,558	\$ 0.171	7,749	\$ 1,075	\$ 4,062	\$ 2,731			\$ (933)	\$ (4,161)	\$ 24,271	\$ 289,351
Year 24	97,023	\$ 0.292	89,585	\$ 26,134	\$ 0.175	7,437	\$ 1,057	\$ 4,039	\$ 2,717			\$ (942)	\$ (4,202)	\$ 24,764	\$ 314,115
Year 25	96,499	\$ 0.299	89,371	\$ 26,724	\$ 0.179	7,127	\$ 1,038	\$ 4,016	\$ 2,702			\$ (951)	\$ (4,244)	\$ 25,268	\$ 339,382
Year 26	95,978	\$ 0.306	89,159	\$ 27,327	\$ 0.184	6,819	\$ 1,017	\$ 3,993	\$ 2,687			\$ (961)	\$ (4,287)	\$ 25,783	\$ 365,166
Year 27	95,459	\$ 0.314	88,947	\$ 27,943	\$ 0.188	6,512	\$ 995	\$ 3,974	\$ 2,673			\$ (970)	\$ (4,330)	\$ 26,311	\$ 391,477
Year 28	94,944	\$ 0.322	88,737	\$ 28,574	\$ 0.193	6,207	\$ 971	\$ 3,955	\$ 2,658			\$ (980)	\$ (4,373)	\$ 26,851	\$ 418,327
Year 29	94,431	\$ 0.330	88,528	\$ 29,220	\$ 0.198	5,903	\$ 946	\$ 3,936	\$ 2,644			\$ (990)	\$ (4,417)	\$ 27,403	\$ 445,730
Year 30	93,921	\$ 0.338	88,320	\$ 29,880	\$ 0.203	5,601	\$ 919	\$ 3,917	\$ 2,630			\$ (1,000)	\$ (4,461)	\$ 27,968	\$ 473,697
30-Year Totals	3,051,117		2,742,901	\$ 660,747		308,216	\$ 34,268	\$ 87,026	\$ 26,950	\$ 80,291	\$ (5,612)	\$ (116,274)	\$ (116,274)	\$ 473,697	

SOLAR CASE STUDY: 3MW COMMERCIAL SYSTEM

SYSTEM INPUTS & ASSUMPTIONS

Nameplate capacity	3000.0 kW DC
Price per watt	\$2.75
System purchase price	\$8,250,000
Investment Tax Credit	30%
Tax bracket for depreciation deductions	35.0%
Net purchase price after tax incentives	\$3,320,625
Annual module degradation rate	0.54%
	0.0%
SMART Block	Block 10
Tariff rate	\$0.1819/kWh
Adders: LICSSW, ESS	
Tariff duration	20 years
Specific yield (kWh/kWp)	1,300
First year production (kWh)	3,900,000

SYSTEM PERFORMANCE

Payback/breakeven year	Year 13
10-year cumulative cash flow	-\$1,577,371
20-year cumulative cash flow	\$4,342,772
30-year cumulative cash flow	\$5,681,005
10-year IRR	-3.0%
20-year IRR	5.8%
30-year IRR	6.6%
10-year ROI	-19.1%
20-year ROI	52.6%
30-year ROI	68.9%

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- Solar Economics in Massachusetts
- **Land use for solar**
- **A successor to SMART**
- **Solar interconnection**
- Solar wish list

2050 Decarbonization Road Map (2020)

- Initiated by the Baker / Polito Administration in order to develop a framework for achieving the GWSA 2050 GHG emissions limits.
- Achievement of the Commonwealth's GHG emissions limit of at least 85% below the 1990 baseline level and net-zero emissions in 2050.

An Act Creating A Next-Generation Roadmap for Massachusetts Climate Policy (2021)

- The 2030 emissions limit shall be at least 50% below the 1990 baseline, the 2040 emissions limit shall be at least 75% below the 1990 level, and a 2050 emissions limit that achieves at least net zero statewide greenhouse gas emissions, provided that in no event shall the level of emissions in 2050 be higher than a level 85% below the 1990 level.

Clean Energy and Climate Plan 2025/2030 (2022)

- 2025: GHG emissions limit of 33% below 1990 level
- 2030 (interim): GHG emissions limit of 50% below 1990 level

An Act Driving Clean Energy and Offshore Wind (2022)

- Allows for \$35,000,000 OSW tax incentive, and increases OSW procurement to 5,600 MW and authorizes regional procurement for wind and solar
- Increases rebates for ZEVs, establishes a council for deployment of EV charging infrastructure
- Established Grid Modernization Council

MASSACHUSETTS SOLAR OPPORTUNITIES AND CHALLENGES

OPPORTUNITIES

- Healey / Driscoll Administration's clean energy and climate priorities
- SMART Program
 - Agrivoltaics, Floatovoltaics
 - Solar paired with storage
- Grid Modernization Council
- Siting Commission
- DOER's Technical Potential of Solar Study
- Inflation Reduction Act
 - 30% ITC, low income / energy community adders.
 - EPA GHG Fund - \$7 billion

CHALLENGES

- Interconnection timelines and costs
- Inflation / supply chain issues
- Federal tariffs / trade issues
- Siting challenges/concerns
- State code issues
- Lack of mechanisms to deliver access to low income customers
- Timing for updates to SMART

Solar Wishlist

1. Adjust SMART program as follows:
 - Set annual targets for solar based on a goal to develop 10 GW of solar by 2030
 - Ensure that SMART adders accurately reflect true costs and incent adequate additional capacity to meet annual targets
 - Make SMART tariffs consistent across all utility service territories.
- 2. Eliminate the cap on the state investment tax credit for residential installations, and make it refundable.**
- 3. Provide funding to the MassCEC to establish a new Mass solar loan program.**
4. Allow manual reporting for new systems under 60 KW.
- 5. Instruct DOER to eliminate the Critical Natural Landscapes restriction from the BioMap 2 language to ensure that ground-mount solar is not unfairly excluded from SMART program participation.**
6. Instruct the Grid Modernization Advisory Council (GMAC) to permit the utilities to recover any grid modernization costs determined by the GMAC to be reasonable and prudent in order to create adequate capacity to interconnect 10 GW of new Solar by 2030.
7. Direct DOER to decouple solar and storage by eliminating the requirement that an ESS must be paired with solar.
8. Establish annual goals for the implementation of energy storage systems (ESSs) to meet the State's 2030 storage target goals, and enable net metering for mobile and stationary storage systems.
9. Direct DOER to establish a separate solar and storage incentive program in cities and towns with Municipal Light Plant (MLPs), and to fund the programs through general revenues of the Commonwealth, through a surtax on those Cities and Towns that opt into this program, or through another funding vehicle.

Thank you.



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