



Cost Benefit Analysis of Pollinator-Friendly and Conventional Solar Development

Nicole Perry, Advisors: Dwayne Breger, Zara Dowling
 Department of Environmental Conservation, UMass CEE
 University of Massachusetts Amherst



Introduction

- Concerns surrounding climate change have pushed the world's citizens and scientists to look for solutions to curb a rapidly increasing global temperature. As the US shifts away from its dependency on fossil fuels, Massachusetts has played a leading role in the nationwide transition towards renewable energy.
- To incentivize the development of renewable energy generation across the state, Massachusetts state agencies have been tasked with creating incentive programs to encourage the installation of solar PV systems in order to reach a greater statewide goal of net zero carbon emissions by 2050.¹
- In recent years, the UMass CEE collaborated with stakeholders across sectors to create a pollinator-friendly certification program in which solar PV sites in Massachusetts can apply to and receive certification for the establishment of pollinator habitat within their solar array. These certified sites are eligible for a financial incentive through the state's incentive program (SMART).²
- With solar project costs being relatively high, we **wanted to assess the costs and benefits of pollinator-friendly solar development** through a full financial analysis to understand what level of incentive would be necessary for the continuation of pollinator-friendly solar development across the state.



Fig. 2: A pollinator-friendly solar site (left) and a conventional solar site (right).

Methods

- In the first stages of this project, we gathered cost information from state databases and from various private contractors and company representatives.
- Pollinator-friendly solar certification requirements and direct costs associated with the certification and recertification were retrieved from the UMass Clean Energy Extension's *Pollinator-Friendly Certification Criteria and Procedures and Fees*, made publicly available on their webpage.³
- Seed mix data from a 5 MW pollinator-friendly site was used as a default seed mix to make cost estimates for site establishment. Site management cost estimates were referenced from the *Lawn to Pollinator Calculator* available on Mass.gov.⁴ In addition to pollinator-friendly cost and benefit data, we gathered data on conventional solar site establishment and management costs.
- Following our data collection period, we developed an excel cost calculator and conducted a thorough financial analysis, examining the net present value, cost-benefit ratio, and rate of return under various conditions. We altered project inputs including MW capacity, acreage, project lifespan, and capacity factor. For each scenario, we explored various adder values and examined their financial impact.

Results & Discussion

- For our analysis we ran 210 scenarios and looked at cost-benefit ratio, rate of return, and net present value for each. Upon running these scenarios, we noted a few key observations regarding the current price of the adder and price comparison of conventional and pollinator-friendly projects.
- The outcomes for small site scenarios (<2 MW) run with the current pollinator-friendly adder price maintained produced poor rates of return—either negative or nearing zero—suggesting an ineffective incentive price.
- Site establishment costs for conventional sites were much lower than pollinator-friendly establishment costs, however there were significant cost savings associated with pollinator-friendly management practices (mowing costs, labor costs, etc.).
- I would recommend implementing a tiered adder at the starting price of \$0.0025 per kWh for projects above 2 MW, and increasing this value as project size decreases, as shown in Figure 3. The current adder price is set at \$0.0025 per kWh, which is adequate for sites 2 MW and greater. To incentivize pollinator-friendly solar site development across smaller sites, a higher adder value may be needed.

Total Cost		\$	158,944.92
Fixed Costs			
Name	Total Cost	Timeline	
Certification Base Cost	\$ 2,000.00	Year 1	
Recertification	\$ 20,000.00	Years 4, 7, 10, etc.	
Site Design	\$ 7,000.00	Year 1	
Site Monitoring	\$ 36,000.00	VARIES	
Variable Costs			
Name	Total Cost	Timeline	
Certification Variable Cost	\$ 3,750.00	Year 1	
Site Establishment	\$ 70,252.42	Year 1	
Site Management	\$ 19,942.50	Years 3, 5, 7, etc.	

Fig. 1: Cost overview for default scenario— a 5 MW, 20 acre site— over a project lifespan of 15 years. Site establishment and monitoring costs are the highest costs associated with pollinator-friendly projects.

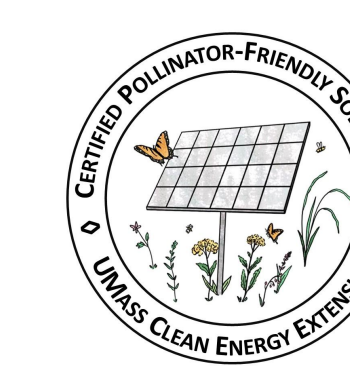
References

- <https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2050>
- masmartsolar.com
- <https://ag.umass.edu/clean-energy/services/pollinator-friendly-solar-pv-for-massachusetts>
- <https://www.mass.gov/info-details/sustainable-landscaping-at-state-facilities>

MW Capacity	Adder Value (\$ per kWh)
<1	\$ 0.0045
1-2	\$ 0.0035
2+	\$ 0.0025

Fig. 3: Recommended tiered pollinator-friendly adder values by MW capacity. Sites below 2 MW required a higher adder value to justify project investment.

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