

Achieving SolSmart Status on Nantucket



(Image provided by Town of Nantucket Energy Office)

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Achieving SolSmart Status on Nantucket

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Abstract

The goal of this project was to assist the Town of Nantucket in achieving the criteria and prerequisites necessary to earn SolSmart Silver status. The project was sponsored by the Town of Nantucket's Energy Office to achieve national recognition for the island's many past solar and energy achievements and grant the Nantucket community access to program benefits such as free technical assistance. To help the team further understand SolSmart, a variety of stakeholders were interviewed. To initiate the official SolSmart designation process, Nantucket produced a "Solar Statement" committing the town to specific actions to encourage local solar development by improving the solar permitting and installation processes. Working with a SolSmart-appointed technical assistant, an analysis of Nantucket's public information and resources related to local solar energy development was conducted to identify areas of improvement and to establish a "road map" for achieving designation of various levels (i.e. Bronze through Platinum). Based on this information, documents were created and used to update Nantucket's online resources related to the solar installation process. Ultimately, the team assisted the town in completing the majority of the remaining necessary tasks to earn SolSmart Silver status and provided recommendations of further tasks necessary to earn Silver designation and higher.

Acknowledgements

Throughout this project, we were supported and guided by many.

- We would like to thank our advisors, Dr. Fred Looft and Dr. Susan Jarvis, for their expert guidance throughout the entire project. Their revision suggestions greatly improved the quality of our report.
- We would like to thank our sponsor Lauren Sinatra, for her leadership and her contributions to our deliverables. Her years of exemplary work facilitating solar development on Nantucket were a key factor in our project's success.
- We would like to thank the Town of Nantucket staff, including but not limited to Holly Backus, Molly Sprouse, George Hull, John Hedden, Florencia Rullo, and Nathan Porter, for their patience with our questions and for making us feel welcome.
- We would like to thank Kelly Aves, a senior program specialist at SolSmart, for her insights and guidance on Nantucket's path to SolSmart status.
- We would like to thank the staff at ACK Smart and Cotuit Solar for helping us understand the local permitting process.
- We would like to thank our interviewees from Pepperell, Natick, Lowell, and Melrose for taking the time out of their day to participate in our interviews.
- We would like to thank the Nantucket Yacht Club and its staff for providing us with clean, warm, and pleasant living arrangements during our stay on Nantucket.
- We would like to thank Young's Bicycle Shop for providing the bikes we rode to our workspace every day.

Executive Summary

Introduction

Nantucket's status as a National Historic Landmark District necessitates that solar photovoltaics (PV) adhere to specific visual guidelines ([“National-Historic-Landmark-Registration-Report”; Way; Lang and Scout](#)). These visual guidelines and the complex installation process have dissuaded people from starting the process of installing solar PV on Nantucket buildings (personal communications). As a result, the town of Nantucket continues to look for ways to both increase the installations of solar PV systems and further streamline the solar installation process.

In 2016, the U.S. Department of Energy established [SolSmart](#), a national program that recognizes communities with an affordable and efficient path for consumers to install solar panels on their residential and commercial property ([“SolSmart Funding Program”](#)). When SolSmart designates a community, the community is awarded one of four tiers: Bronze, Silver, Gold, or Platinum ([“Introducing SolSmart”](#)).

To earn a SolSmart designation, a community must verify with SolSmart that they have completed a certain number of prerequisites as well as a selection of other discretionary criteria, which serve to improve the community's solar policies and initiatives. Completing criteria requires a community to streamline their process for permitting solar PV, improve their public solar informational resources, or complete other solar-related projects ([“Standard Pathway Program Guide”](#)). In 2023, Nantucket sought to earn a SolSmart Silver designation in recognition of their efforts to improve the town's solar installation process and promote the town's position as a solar energy leader. The town was also motivated to pursue the designation to receive direct benefits from the free technical assistance offered by SolSmart, which, for example, may include guidance on how to receive direct pay funding through the Inflation Reduction Act (Lauren Sinatra, personal communication; [“Direct Pay Through the Inflation Reduction Act”](#)).

Background

The SolSmart Program

In 2016, after the U.S. Department of Energy (DOE) granted funds to their Solar Energy Office's “Solar Powering America by Recognizing Communities” ([SPARC](#)) program, the Solar Energy Office formed the SolSmart program ([“SolSmart Funding Program”](#)). The program's objective is to “distinguish communities for being solar-friendly and consequently boost local solar markets while building consistency in solar practices nationwide” (ibid).

A SolSmart designation demonstrates that a community has clarified their solar zoning bylaws, simplified their solar permitting process, and communicated information about the solar PV installation process in ways that residents can understand ([“Introducing SolSmart”](#)).

Most benefits of a SolSmart designation are direct outcomes of any work the community does during the process. For example, a community that streamlines their solar permitting process may find that consumers are less hesitant to start the process than before ([“Standard Program Guide”](#)).

SolSmart Designation Tiers

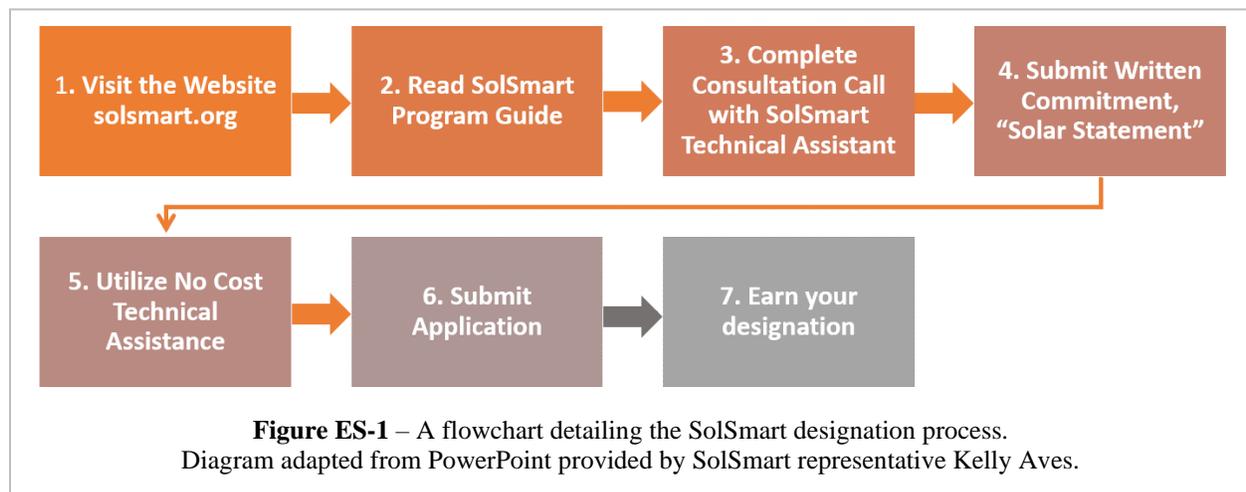
SolSmart designations come in one of four tiers: Bronze, Silver, Gold, and Platinum, with each tier being more difficult to achieve than the last (“Standard Program Guide”). As of 2023, no community had achieved Platinum tier and the over 500 designated communities have approximately an equal distribution between the other three tiers ([“Our Communities”](#)).

Criteria are specific tasks a community can complete to earn points (“Standard Program Guide”). Of all the criteria that earn points, some are prerequisites for certain tiers of designation, while the rest are discretionary criteria (ibid).

A community reaches a designation tier by earning a certain number of points and completing all the prerequisite criteria for that tier and every tier below it (“Standard Program Guide”). To obtain a Bronze designation, a community needs at least 60 points and must complete three prerequisite criteria (ibid). These three Bronze prerequisites and one of the Silver prerequisites are the only criteria that award 0 points (ibid). To obtain a Silver designation, not only must a community be eligible for Bronze status, but also it must have at least 100 points and must complete four Silver prerequisites (ibid).

SolSmart Designation Process

A community begins the SolSmart designation process by visiting the SolSmart [website](#) to learn about the program. Communities can bring any questions before a SolSmart technical assistant for consultation before committing. The next step a community must take for SolSmart designation is to submit a [Solar Statement](#) in compliance with Bronze prerequisite [PR-1](#), where PR is the abbreviation for a prerequisite that does not fit into any of the six categories (Aves). Once the Solar Statement is submitted, SolSmart offers [free technical assistance](#) to the community to help them reach their target tier (ibid).



The technical assistance begins with the Zoning Review: a technical assistant from SolSmart examines all public-facing documents and bylaws from the community and reports back to the community documenting which prerequisites they have achieved, how many points they have accumulated, and how many points they have the potential to accumulate (Aves). Following this,

the technical assistant suggests steps the community could take to complete the remaining prerequisites and earn the points required for their desired tier based on national best practices for solar (“Introducing SolSmart”).

Once SolSmart verifies that the community has completed all prerequisites and earned enough points for their desired tier, SolSmart will award them a designation.

Goal and Objectives

The goal of this project was to assist the Town of Nantucket Energy Office in achieving the criteria and prerequisites necessary to earn a SolSmart Silver designation or higher. To achieve this goal, the following objectives were identified:

1. Determine the requirements for SolSmart Silver status that the Town of Nantucket needs to complete.
2. Develop and execute a plan to fulfill the requirements for Silver.
3. Review and document the Town of Nantucket's process for permitting solar installations and identify ways it can be streamlined.
4. Update and enhance the Town of Nantucket's publicly accessible information related to solar permitting by creating and revising online resources.
5. Identify a path for Nantucket to achieve SolSmart Gold status in the future.

Methodology

Nantucket's Zoning Review

After drafting and submitting a Solar Statement signed by Nantucket's town manager, we received a Zoning Review from SolSmart. We also created our own review by comparing. With these documents we created a combined Zoning Review spreadsheet that allowed us to track the completion status of each SolSmart prerequisite and criterion.

Execute a Plan to Fulfill Silver Requirements

Using the Zoning Review spreadsheet, we developed a list of all criteria that Nantucket would need to complete to achieve Silver. We worked toward completing and verifying these criteria for Nantucket with our sponsor.

Review Nantucket's Permitting Process

We spoke with the staff at Nantucket's Planning and Land Use (PLUS) Department. They walked us through their portion of the solar permitting process, which included the Certificate of Appropriateness (reviewed by the Historic District Commission (HDC)), the building permit, and the electrical permit. Through these discussions, we successfully familiarized ourselves with Nantucket's solar permitting process and used this knowledge to recommend ways in which the process could be streamlined.

Update Online Solar Information

A proper Solar Landing Page – SolSmart's term for a municipality-specific website of information about solar permitting and installation – is a prerequisite for Silver designation ([“Standard Program Guide”](#)). Nantucket's current informational website is missing information concerning

the solar PV installation process, and therefore does not meet the requirements of a Solar Landing Page (“(2023) CE-1 Solar Landing Page Template”; “Solar Map & Resources”). To address this issue, we updated the website to become a Solar Landing Page based on SolSmart’s requirements, our sponsor’s wishes, and an informal analysis of the Solar Landing Pages of other municipalities with SolSmart designations.

Solar Map

Our sponsor expressed the need for both an updated solar map and a streamlined system for automatic updates. In response, we developed software to fulfill these requirements. Our sponsor additionally indicated her interest in a bar graph displaying solar installations on Nantucket by year, which we created from the data in the solar map. We included both the map and the graph on the Solar Landing Page.

Identify a Path to SolSmart Gold

After submitting our work towards Silver status to Nantucket’s SolSmart representative for verification, we examined the [SolSmart Program Guide](#) to glean the prerequisites and points necessary for Gold status and compare them to Nantucket’s status at the end of 2023. We wrote recommendations for the Nantucket Energy Office to complete should they desire to pursue Gold in the future, including a list of all specific bylaws or codified regulations that would need to be restructured before pursuing higher SolSmart designations.

Results

Initial Zoning Review Findings

The Zoning Review ([PZ-1](#)) is the second step of the SolSmart designation process after submitting a Solar Statement. The Zoning Review Baseline Assessment determined that the Town of Nantucket qualified for 85 points of the 100 required for the Silver tier. The SolSmart technical assistant clarified that Nantucket had not yet qualified for the 20 points in both Permitting & Inspection (PI) and Planning & Zoning (PZ) required for the Bronze tier. However, the technical assistant recommended completing certain criteria, then totaled the points of the recommended criteria in the Technical Assistance (TA) Plan column. Including those would bring Nantucket’s total to 115 points and ensure the town would have the required 20 points in PI for Bronze, though it would still be missing 15 points from the PZ category. At the time the Zoning Review was completed, every contributing criterion still needed to be officially submitted for verification by SolSmart’s technical assistants. This left zero points in the verified column.

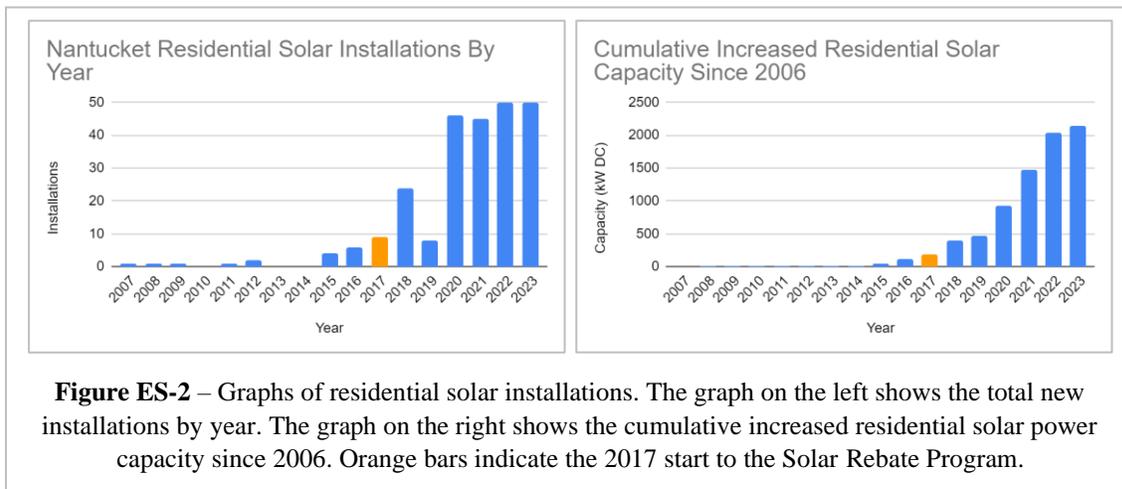
Referencing these findings, we constructed our own spreadsheet to track Nantucket’s progress. Beginning with SolSmart’s assessment, we found many potentially completed criteria that SolSmart did not identify. Based on our analysis the town had 145 potentially completed points, 60 more than the Zoning Review found. The spreadsheet also identified 70 points that Nantucket planned to earn, 30 more than SolSmart’s plan. In total, Nantucket’s goal was to earn 215 points. Following these results, we worked to verify all potentially completed criteria with SolSmart.

Solar Landing Page

To improve the Solar Landing Page and satisfy the associated silver prerequisite [CE-1](#), we created resources to include on the page based on the recommendations from the Zoning Review. The first resource was a permitting checklist, which can be seen in Appendix C. The Permitting Checklist outlines all permits necessary to install solar PV along with the required materials for the permit applications.

Additionally, the frequently asked questions (FAQ) page was updated to reduce the time Nantucket employees spend answering repetitive questions. The updated FAQ page was developed from previous FAQs, as well as questions from solar installers on the island and from town staff. The page now links to other resources and are categorized.

Finally, we produced a bar graph for the Solar Landing Page of residential solar installations by year. Due to many gaps in information among data sheets, multiple sources were used, and the data was aggregated with no more than one sheet contributing data for each year. These graphs show a general increase in residential installations on Nantucket, with the plurality occurring between 2020 and 2022. As of 2023, there are over 200 residential solar installations on Nantucket, with a collective capacity of over 2 megawatts.



Solar Map

To update Nantucket’s solar map and facilitate the process of future updates, we created a Java program which utilizes the Google Sheets API to automatically update a Google Sheet with information that can be fed into various mapping software.

When we completed the code, we delivered it as a Java application alongside relevant instructions to the Nantucket Energy Office. The resulting Google Sheet can be uploaded directly to Google My maps. Additionally, a downloaded .xlsx version of the Google Sheet can be sent to Nantucket’s GIS coordinator to create or update an internal GIS solar layer. With this up-to-date solar map, more people on Nantucket may feel incentivized to install solar PV on their property.

Recommendations and Conclusion

We created four recommendations to further develop the work of this project as well as conclusions reached based on the analysis of the data found in the results section.

1. Achieve SolSmart Silver Designation
2. Complete the Prerequisites for SolSmart Gold Designation
3. Maintain the Solar Map and Solar Landing Page
4. Continuously Identify Improvement to the Solar Permitting Process

Nantucket is constantly working on becoming a more solar-friendly community. Earning the Silver SolSmart designation is a way for Nantucket to promote and recognize the town's work as a solar energy leader.

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1.0 Introduction

According to a 2022 survey, 85% of respondents who were year-round homeowners on Nantucket (n = 118) believed there should be more solar installations on the island ([Miller et al](#)). Despite this apparent high interest in solar, there is a lack of sufficient informational resources to guide consumers through the complex permitting and installation process. Additionally, Nantucket's status as a National Historic Landmark District necessitates that solar photovoltaics (PV)¹ adhere to specific visual guidelines ([“National-Historic-Landmark-Registration-Report”](#); [Way](#); [Lang and Scout](#)). These perceived barriers have discouraged people from considering installing solar PV on their Nantucket properties (personal communications).

To minimize the barriers, Nantucket has implemented programs such as a local Solar Rebate for residential solar PV installed by year-round residents ([“Local Solar Rebate Program”](#)). By the end of 2023, the rebate has given over \$500,000 back to the community since the program started in 2017 (Lauren Sinatra, personal communication). Additionally in 2023, to demonstrate Nantucket's commitment to embracing renewable energy production, as Figure 1 shows, the town installed its [first municipal solar project](#) at the Surfside Wastewater Treatment Plant ([Nantucket Current](#)). This 104.4-kilowatt system is expected to offset over one hundred metric tons of greenhouse gas emissions yearly.



Figure 1 – An overhead photo of the solar panels on the Surfside Wastewater Treatment Plant.

(<https://nantucketcurrent.com/news/town-flips-switch-on-new-solar-array-at-sewer-plant>)

¹The term solar photovoltaics (PV) will be used in this paper to describe solar arrays, solar panels, solar energy systems, solar installations, or any other system that converts sunlight into electrical power.

In 2016, the U.S. Department of Energy established [SolSmart](#), a national program that recognizes communities with an affordable and efficient path for consumers to install solar panels on their residential and commercial property ([“SolSmart Funding Program”](#)). When SolSmart designates a community, the community is awarded one of four tiers: Bronze, Silver, Gold, or Platinum ([“Introducing SolSmart”](#)).

To earn a SolSmart designation, a community must verify with SolSmart that they have completed a certain number of prerequisites as well as a selection of other discretionary criteria, which serve to improve the community’s solar policies and initiatives. Completing criteria requires a community to streamline their process for permitting solar PV, improve their public solar informational resources, or complete other solar-related projects ([“Standard Pathway Program Guide”](#)). In 2023, Nantucket sought to earn a SolSmart Silver designation in recognition of their efforts to improve the town’s solar installation process. The town was also motivated to pursue the designation to receive direct benefits from the free technical assistance offered by SolSmart which, for example, may include guidance on how to receive direct pay funding through the Inflation Reduction Act (Lauren Sinatra, personal communication; [“Direct Pay Through the Inflation Reduction Act”](#)).

The goal of this project was to assist the Town of Nantucket Energy Office in achieving the criteria and prerequisites necessary to earn a SolSmart Silver designation or higher. To achieve this goal, the following objectives were identified:

1. Determine the requirements for SolSmart Silver status that the Town of Nantucket needs to complete.
2. Develop and execute a plan to fulfill the requirements for Silver.
3. Review and document the Town of Nantucket's process for permitting solar installations and identify ways it can be streamlined.
4. Update and enhance the Town of Nantucket's publicly accessible information related to solar permitting by creating and revising online resources.
5. Identify a path for Nantucket to achieve SolSmart Gold status in the future.

In the remainder of this report, we will discuss the background on SolSmart, Nantucket’s goals, and our methodology, results, and future recommendations to the Town of Nantucket.

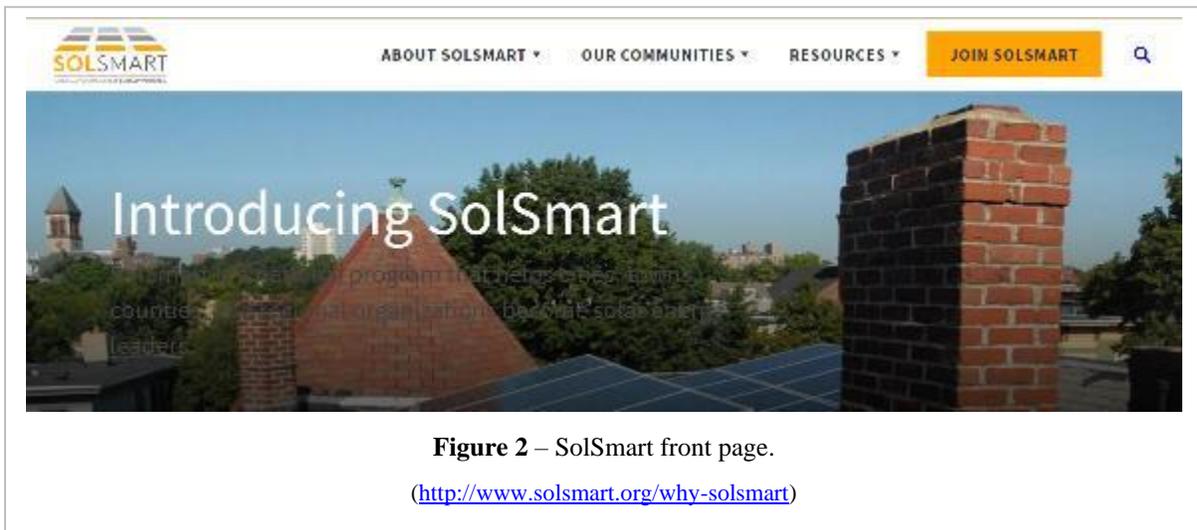
2.0 Background

This section outlines [the SolSmart program](#), the attitudes of Nantucket residents toward solar energy, and the current permitting and zoning laws relating to the solar installation process on the island.

2.1 The SolSmart Program

In 2016, after the U.S. Department of Energy (DOE) granted funds to their Solar Energy Office’s “Solar Powering America by Recognizing Communities” ([SPARC](#)) program, the Solar Energy Office formed the SolSmart program ([“SolSmart Funding Program”](#), Figure 2). The program’s objective is to “distinguish communities for being solar-friendly and consequently boost local solar markets while building consistency in solar practices nationwide” (ibid). As of 2023, SolSmart has assisted over 500 communities nationwide to achieve SolSmart designation ([“Our Communities”](#)).

A SolSmart designation demonstrates that a community has clarified their solar zoning bylaws, simplified their solar permitting process, and communicated information about the solar PV installation process in ways that residents can understand ([“Introducing SolSmart”](#)).



Most benefits of a SolSmart designation are direct outcomes of any work the community does during the process. For example, a community that streamlines their solar permitting process may find that consumers are less hesitant to start the process than before ([“Standard Program Guide”](#)). Additionally, SolSmart publicizes its designated communities; each SolSmart designated community is recognized with a physical plaque and has their designation displayed on SolSmart’s website and social media ([“FAQs”](#)). In-person celebrations and media publicity also commonly accompany designation ([“Our Communities”](#)). This publicity shows solar companies that the community is accepting of solar business (ibid).

SolSmart Designation Tiers

SolSmart designations come in one of four tiers: Bronze, Silver, Gold, and Platinum, with each tier being more difficult to achieve than the last (“Standard Program Guide”). As of 2023, no community had achieved Platinum tier and the over 500 designated communities have approximately an equal distribution between the other three tiers. (“Our Communities”).

Criteria are specific tasks a community can complete to earn points (“Standard Program Guide”). A certain number of points are required for any given designation tier, and one criterion can give 0, 5, 10, or 20 points (ibid). Some criteria are prerequisites for certain tiers of designation, while others are discretionary criteria (ibid). Criteria are placed into one of the following six categories (ibid):

- Permitting & Inspection (PI)
- Planning & Zoning (PZ)
- Government Operations (GO)
- Community Engagement (CE)
- Market Development (MD)
- Innovative Action (IA)

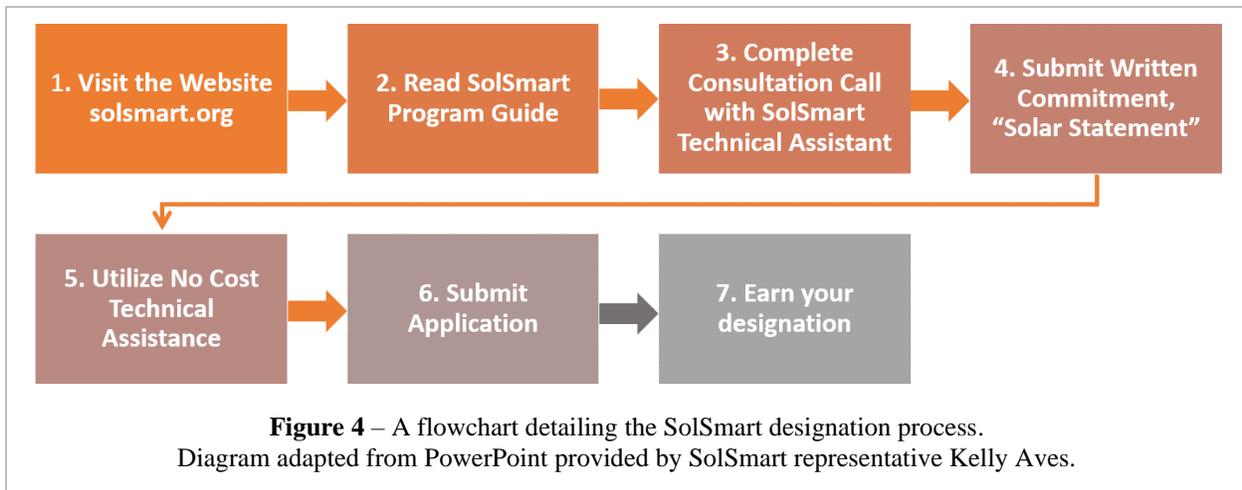
As seen in Figure 3 (next page), a community reaches a designation tier by earning a certain number of points and completing all the prerequisite criteria for that tier and every tier below it (“Standard Program Guide”). To obtain a Bronze designation, a community needs at least 60 points and must complete three prerequisite criteria (ibid). These three Bronze prerequisites and one of the Silver prerequisites are the only criteria that award 0 points (ibid). To obtain a Silver designation, not only must a community be eligible for Bronze status, but also it must have at least 100 points and must complete four additional Silver prerequisites (ibid).

Bronze	60 Total Points	3 Prerequisite Criteria
	<input type="checkbox"/> 20 Points in Permitting & Inspection <input type="checkbox"/> 20 Points in Planning & Zoning <input type="checkbox"/> 20 Points from any other category	<input type="checkbox"/> Solar Statement (PR-1) <input type="checkbox"/> Solar permitting checklist (PI-1) <input type="checkbox"/> Zoning review (PZ-1)
Silver	100 Total Points	4 Prerequisite Criteria
	<input type="checkbox"/> Complete bronze designation requirements	<input type="checkbox"/> Permit staff training (PI-2) <input type="checkbox"/> Inspection staff training (PI-3) <input type="checkbox"/> Zoning clarification (PZ-4) <input type="checkbox"/> Solar landing page (CE-1)
Gold	200 Total Points	3 Prerequisite Criteria
	<input type="checkbox"/> Complete silver designation requirements	<input type="checkbox"/> Permit turnaround time (PI-4) <input type="checkbox"/> Zoning accessory use (PZ-5) <input type="checkbox"/> Zoning barrier removal (PZ-6)
Platinum	350 Total Points	4 Prerequisite Criteria
	<input type="checkbox"/> Complete gold designation requirements	<input type="checkbox"/> Instant permitting (PI-5) <input type="checkbox"/> Post metrics (PI-6) <input type="checkbox"/> Install solar (GO-1) <input type="checkbox"/> Community partnerships (CE-2)

Figure 3 – Chart of requirements for each SolSmart tier. A criterion’s category and number are stylized as (Category Abbreviation-Criterion Number). The PR (Prerequisite) category only contains PR-1 (the Solar Statement), a 0-point Bronze prerequisite.

SolSmart Designation Process

As shown in Figure 4 (next page), a community begins the SolSmart designation process by visiting the SolSmart [website](#) to learn about the program. Communities can bring any questions before a SolSmart technical assistant for consultation before committing. The next step a community must take for SolSmart designation is to submit a [Solar Statement](#) in compliance with Bronze prerequisite [PR-1](#), where PR is the abbreviation for a prerequisite that does not fit into any of the six categories (Aves). Once the Solar Statement is submitted, SolSmart offers [free technical assistance](#) to the community to help them reach their target tier (ibid).



The technical assistance begins with the Zoning Review: a technical assistant from SolSmart examines all public-facing documents and bylaws from the community and reports back to the community documenting which prerequisites they have achieved, how many points they have accumulated, and how many points they have the potential to accumulate (Aves). Following this, the technical assistant suggests steps the community could take to complete the remaining prerequisites and earn the points required for their desired tier based on national best practices for solar (“Introducing SolSmart”).

Once SolSmart verifies that the community has completed all prerequisites and earned enough points for their desired tier, SolSmart will award them a designation.

2.2 The Nantucket Community’s Attitude Toward Solar

The number of solar installations per year on Nantucket, shown in Figure 5 (next page), has risen over recent years for both commercial and residential properties ([“Solar Map & Resources”](#)).

Figure 6 (page 8) displays two profiles from Nantucket residents that installed solar on their residential properties (ibid). The profiles emphasize that residents who have installed solar want to see more residential solar PV on the island. The residents in the profiles felt that the solar PV installation process was less complicated than the general population perceived (ibid). This is a strong indicator that the public facing solar installation resources were not sufficiently informing prospective consumers about the process.

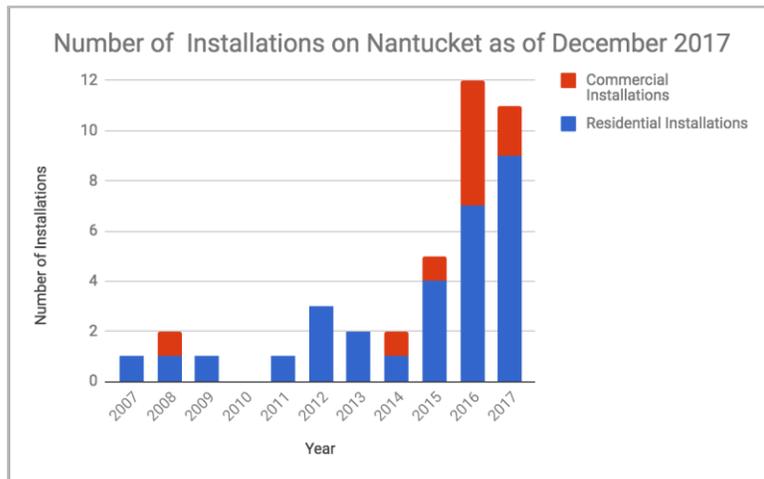


Figure 5 – 2007-2017 number of solar installations per year on Nantucket.

(<https://web.archive.org/web/20231208144413/https://www.nantucket-ma.gov/1156/Solar-Map-Resources>)

A survey conducted in 2021 found that many Nantucket residents have concerns about the [Historic District Commission’s \(HDC\) guidelines](#) on solar PV ([Salvalzo, Alicia, et al](#)). On the survey, residents indicated a desire for additional solar PV systems and a lack of concern about visual impacts based on guidelines from the Nantucket HDC (*ibid*). The researchers’ analysis of the survey reported “more than 80% of full-time residents and 40% of seasonal residents disagreed with the statement that solar panels should not be visible outside of the Old Historic Districts” (*ibid*).

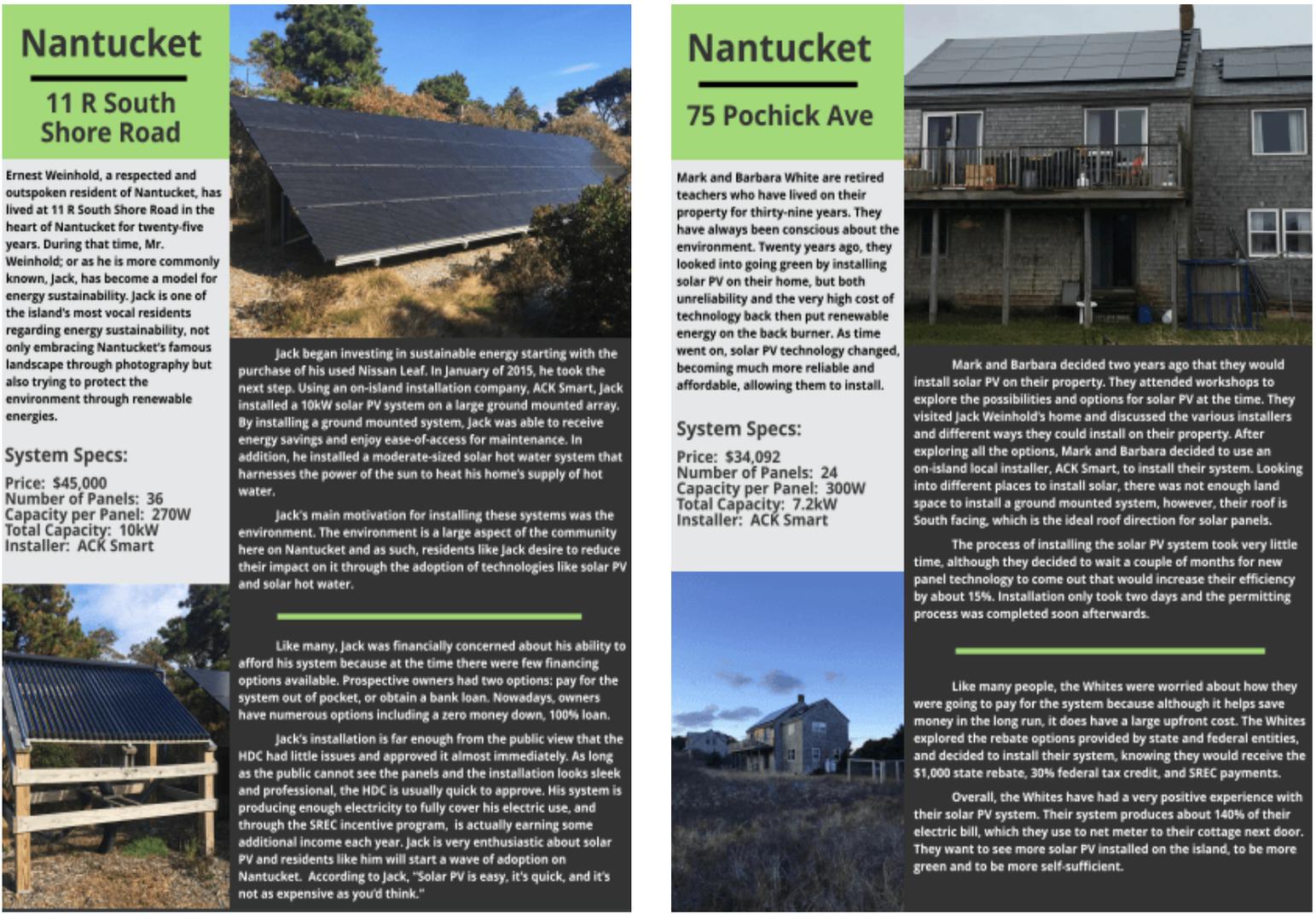


Figure 6 – Profiles of homeowners who have installed solar on their homes

(<https://www.nantucket-ma.gov/1156/Solar-Map-Resources>)

Another survey, conducted in 2022 by the undergraduate research project [Integrating Solar into Nantucket's Historic Fabric](#), analyzed the community's attitude towards solar energy. The survey showed that residents were in favor of preserving the historic atmosphere of Nantucket yet were also in favor of more solar installations (Miller et al. 33-39).

The survey had 202 respondents.

- 79% of the participants agreed or strongly agreed that more solar was needed (ibid).

Regarding the preservation of the historic atmosphere of the island and the Historic District Commission's solar guidelines,

- 93% of the respondents agreed or strongly agreed that preservation is important.
- 63% of respondents felt the HDC guidelines referencing visibility from public ways were not solar-friendly enough (ibid).

Additionally,

- 19% of resident respondents had applied for solar previously.
- 70% of respondents believed more resources about the solar installation process would be beneficial to the community (ibid).

Nantucket residents have mixed opinions on the HDC's solar guidelines but ultimately want to see more solar on the island. While residents who have installed solar believe the process is understandable, many residents have not attempted the process, potentially because of a lack of clear information posted online by the town.

2.3 Nantucket Bylaws, Codes, and Complications to Achieving SolSmart

Historic District Commission

All prospective solar owners on Nantucket must apply for a Certificate of Appropriateness (COA) from the Nantucket HDC before solar PV can be installed on their property ([Way 5](#)). The HDC has compiled a set of guidelines for solar PV with an emphasis on minimizing the visual impact on the historic character of the island (Way). Buildings within the historic districts on the island of Nantucket are subject to more strict application of the guidelines (Way 14).

According to the Nantucket Code, the HDC has jurisdiction over all building features visible from public areas (["An Act Establishing..."](#)). Thus, any solar array installed on roofing not visible from public ways such as roads complies with the HDC's guidelines. However, since solar PV installations would ideally face toward the sun, many buildings may need to install a less-than-optimal system to conform to the guidelines.

Nantucket Code and Bylaws

According to the Nantucket Code, the Solar Energy Overlay District (SEOD), seen in Figure 7 (next page), permits solar energy facilities by-right (["Town of Nantucket, MA: Town Overlay..."](#)). However, this district does not contain a significant number of buildings, and any installations still require approval by Nantucket's Planning Board (["As-of-Right Siting"](#) 2, 10).

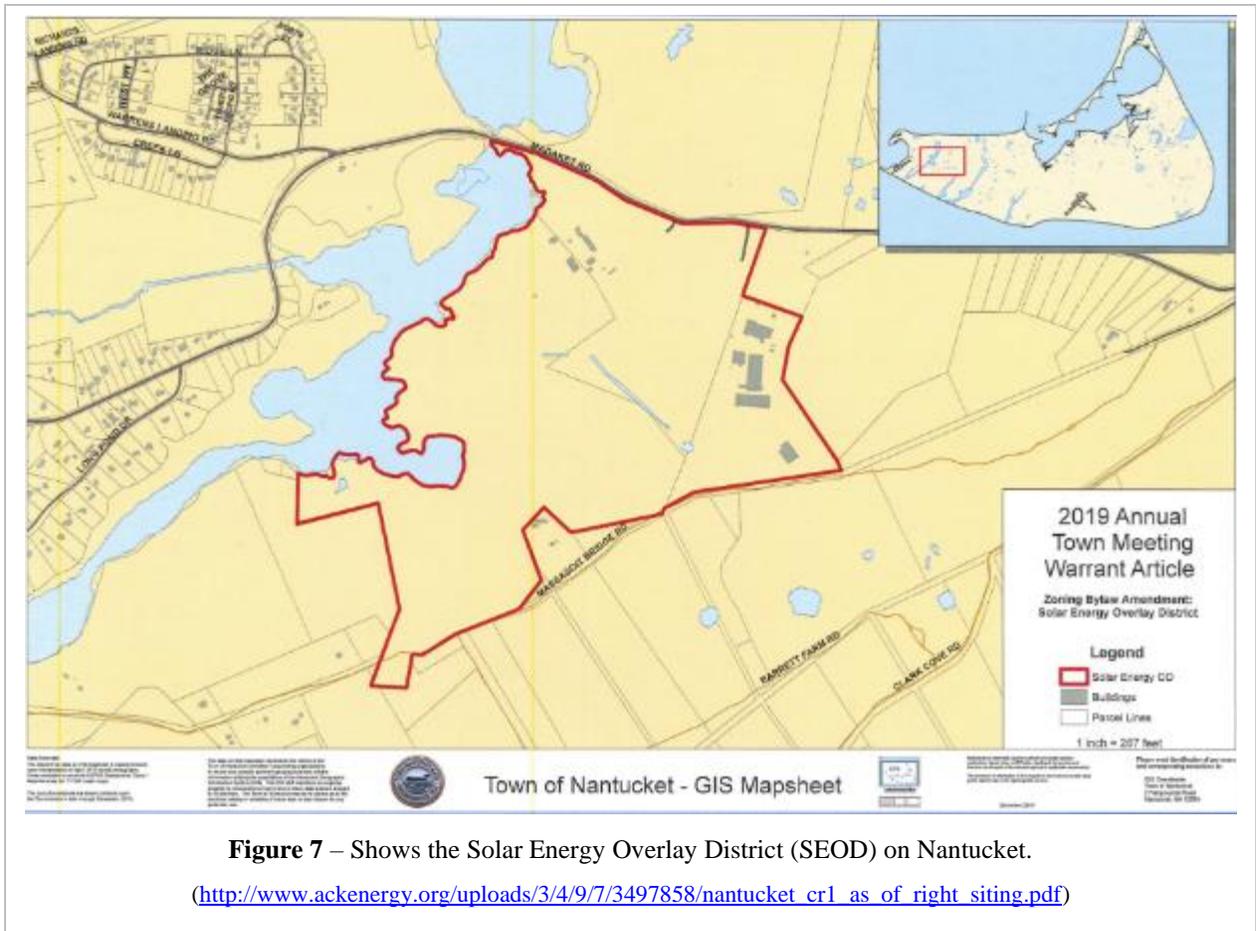


Figure 7 – Shows the Solar Energy Overlay District (SEOD) on Nantucket.

(http://www.ackenergy.org/uploads/3/4/9/7/3497858/nantucket_cr1_as_of_right_siting.pdf)

Many SolSmart criteria, especially those in the Planning & Zoning section, require conditions protecting solar to be codified in the local bylaws. The Town of Nantucket, which runs on an open town meeting/town manager government, holds meetings once a year in which the residents and elected officials of Nantucket discuss and vote on new legislation ([“Town of Nantucket, MA: Legislative Powers...”](#); [“2017 MMA Directory-full”](#); [“Forms of Local Government”](#)). Thus, any changes to Nantucket’s bylaws regarding solar energy would need to be approved during one of these meetings.

3.0 Methods

The goal of this project was to assist the Town of Nantucket in achieving the criteria and prerequisites necessary to earn SolSmart Silver status. To achieve this goal, the following five objectives were identified.

1. Determine the requirements for SolSmart Silver status that the Town of Nantucket needs to complete.
2. Develop and execute a plan to fulfill the requirements for Silver.
3. Review and document the Town of Nantucket's process for permitting solar installations and identify ways it can be streamlined.
4. Update and enhance the Town of Nantucket's publicly accessible information related to solar permitting by creating and revising online resources.
5. Identify a path for Nantucket to achieve SolSmart Gold status in the future.

3.1 Determine Incomplete Silver Requirements

Understanding SolSmart

Before we could determine the requirements for Silver status, we needed to learn about the SolSmart designation process and outcomes. To achieve this, we interviewed government officials from Massachusetts communities with a SolSmart designation. Each interview followed an interview script that we developed (Appendix A). We asked each community about key information regarding their experience with the SolSmart process. A few of these questions were about their approximate timeline for designation; how much time staff put into the process; and how they focused their efforts to achieve the required points and criteria.

The interviews were also designed to understand the challenges faced when obtaining SolSmart status. Specifically, we asked about the operational, legal, political, and social challenges. We concluded by inquiring about the results after earning SolSmart; this focused on the number of solar PV installations and the effectiveness of their current solar PV installation process.

Nantucket's Zoning Review

After drafting and submitting a Solar Statement signed by Nantucket's town manager, we received a Zoning Review from SolSmart. We also created our own review by comparing. With these documents we created a combined Zoning Review spreadsheet that allowed us to track the completion status of each SolSmart prerequisite and criterion.

3.2 Execute a Plan to Fulfill Silver Requirements

Using the Zoning Review spreadsheet, we developed a list of all criteria that Nantucket would need to complete to achieve Silver. We worked toward completing and verifying these criteria for Nantucket with our sponsor.

3.3 Review Nantucket's Permitting Process

We spoke with the staff at Nantucket's Planning and Land Use (PLUS) Department. They walked us through their portion of the solar permitting process, which included the Certificate of Appropriateness (reviewed by the Historic District Commission (HDC)), the building permit, and the electrical permit. Additionally, we met with a liaison to the HDC, representatives of solar installation companies that work on the island, and a Health Officer from Nantucket Health and Human Services. Through these discussions, we successfully familiarized ourselves with Nantucket's solar permitting process and used this knowledge to recommend ways in which the process could be streamlined.

3.4 Update Online Solar Information

A proper Solar Landing Page – SolSmart's term for a municipality-specific website of information about solar permitting and installation – is a prerequisite for Silver designation ([“Standard Program Guide”](#)). Nantucket's current informational website is missing information concerning the solar PV installation process, and therefore does not meet the requirements of a Solar Landing Page ([“\(2023\) CE-1 Solar Landing Page Template”](#); [“Solar Map & Resources”](#)). To address this issue, we updated the website to become a Solar Landing Page based on SolSmart's requirements, our sponsor's wishes, and an informal analysis of the Solar Landing Pages of other municipalities with SolSmart designations.

We wrote a permitting checklist in line with [PI-1](#) and posted it, alongside application forms for solar permits. Both blank and filled versions of the application forms were posted to make it clear what parts of each application were relevant to prospective solar installers.

To reduce the time Town of Nantucket employees spend answering repeated questions regarding solar PV, our sponsor requested a webpage of frequently asked questions (FAQs). We amended a list of frequently asked questions (FAQs) on the current solar informational website. Based on input from solar installers and permitting staff, we added more questions, rewrote answers, and sorted the questions by category. Additionally, we linked the FAQ answers to other relevant webpages that third parties update, so the FAQs will remain up to date. We included this FAQ page on the Solar Landing Page.

Solar Map

According to multiple studies, one of the most effective ways to encourage a person to choose sustainable behaviors is to show their peers embracing sustainable choices (Ayres et al). To incentivize more people on Nantucket to install solar PV, undergraduate students working on a research project on the island created a map of existing solar installations (Boyer et al). However, this map was created in 2017. Although the students working in 2017 left instructions on how to update the map, and students working in 2022 wrote a program to facilitate updates, both processes were abandoned soon after creation (Boyer et al, Miller et al). Consequently, the map remained in its 2017 state until 2023.

Our sponsor expressed the need for both an updated map and a streamlined system for automatic updates. In response, we developed software to fulfill these requirements. Our sponsor additionally

indicated her interest in a bar graph displaying solar installations on Nantucket by year, which we created from the data in the solar map. We included both the map and the graph on the Solar Landing Page.

3.5 Identify a Path to SolSmart Gold

After submitting our work towards Silver status to Nantucket’s SolSmart representative for verification, we examined the [SolSmart Program Guide](#) to glean the prerequisites and points necessary for Gold status and compare them to Nantucket’s status at the end of 2023. We wrote recommendations for the Nantucket Energy Office to complete should they desire to pursue Gold in the future, including a list of all specific bylaws or codified regulations that would need to be restructured before pursuing higher SolSmart designations.

3.6 United Nations Sustainable Development Goals

The Global Program at Worcester Polytechnic Institute (WPI) aligns itself with the goals of the United Nations as part of WPI’s own Sustainability Plan (“[Sustainability Plan](#)”). Our project is focused on improving access to information on the solar PV installation process in Nantucket and helping facilitate the increased installation of solar PV, a sustainable energy source. Thus, our project supports United Nations Sustainable Development [Goals 7](#) and [13](#). For goal 7, “Ensure access to affordable, reliable, sustainable and modern energy for all,” the project contributes toward target 7.2, “By 2030, increase substantially the share of renewable energy in the global energy mix” (“[Transforming Our World...](#)”). For goal 13, “Take urgent action to combat climate change and its impacts”, the project helps the world meet target 13.3, “Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning” (ibid).

4.0 Results

This section presents the results gathered from our methods. The findings from this section serve as supporting evidence for the recommendations and conclusions made in the next section.

4.1 Interview Results

To learn how difficult a SolSmart designation is to obtain and what effects a SolSmart designation has on a community, we conducted interviews with four Massachusetts communities that had previously obtained a SolSmart status: Pepperell, Natick, Lowell, and Melrose. During the interviews, we followed the script presented in Appendix A. Despite reaching out to communities with Bronze, Silver, and Gold designations, we did not receive responses from any Silver communities. Three communities with Gold and one with Bronze agreed to be interviewed.

Table 1 displays information regarding the communities' SolSmart designations. Each community pursued a SolSmart designation as a method of furthering their commitment to being solar-friendly and earning recognition for their solar installation processes.

Table 1. Information of SolSmart communities interviewed.

Community	Melrose	Natick	Pepperell	Lowell
SolSmart Designation	Bronze	Gold	Gold	Gold
Year Achieved	2017	2017	2021	2018

We designed the interviews to help us understand each community's experience while undergoing SolSmart's designation process. Seen in Table 2, communities repeatedly implied one of their reasons for striving for SolSmart status was to receive recognition for work the town had completed previously. This is supported by the fact that most communities recognized they had already completed many criteria required by SolSmart before beginning the application process.

Table 2. Community status at beginning of the designation process.

Community	Melrose	Natick	Pepperell	Lowell
Desired Level	Bronze	Gold	Gold	Gold
Criteria categories prioritized	Community Engagement	Permitting & Inspection	All four besides Market Development	Permitting & Inspection
How many prerequisites and criteria were completed before the process?	Nearly all	solar PV on school properties (GO-1) and at least 1 Solarize campaign (MD-2)	Zoning and solar by-law met SolSmart's standards	Multiple

The interviews also inquired about the challenges these four communities faced on the path to their SolSmart designations. Seen in Table 3, the towns considered changes to their zoning code to be the most difficult to achieve due to town meeting schedules. Many towns only held town meetings once or twice a year, and such town meetings were the only mechanism for changing town codes.

The communities that did not change the zoning code found completing the SolSmart prerequisites straightforward and manageable. Natick and Pepperell were the only two towns to experience legal or political complications when drafting bylaw documents regarding solar PV accessibility. In both cases, the complications were considered trivial, and the motions moved forward. The interviewees all faced operational challenges, mainly in the availability of staff to work on earning the designation and the inevitable disagreement from community members.

Table 3. Community challenges to obtaining SolSmart status.

Community	Melrose	Natick	Pepperell	Lowell
Which prerequisite criteria was the most difficult to achieve?	For Bronze, all prerequisites were straight-forward	PZ-5 and PZ-6, which called for changes to the zoning bylaws, required a town meeting to achieve	PZ-5 and PZ-6, which called for changes to the zoning bylaws, required a town meeting to achieve	Nothing significant to note
What legal or political challenges did your office encounter on your path to SolSmart?	None	One planning board member was concerned with bylaw restrictions; bylaws still passed with high margins	Some issues producing a properly constructed bylaw document ready for town approval.	None
What operational challenges did your office encounter?	Biggest issue was switching to online permitting	Shuttling the papers to the correct people was time-consuming	Several community members disagreed with SolSmart's goals	Staff workload was high at points

Seen in Table 4, the concluding section of the interview script inquired about what communities noticed following their SolSmart designation – particularly any economic, social, and solar permitting changes. All communities agreed that no economic changes could be causally linked to their SolSmart designation. Socially, three communities commented that residents’ opinions had shifted to be more in favor of installing solar PV since designation, although Melrose stated this change to be a function of the market and not the SolSmart designation. Since beginning their SolSmart designation processes, half of the communities streamlined their permitting processes while the other half left them as they were.

Table 4. Results of the SolSmart designation.

Community	Melrose	Natick	Pepperell	Lowell
What has changed economically since SolSmart designation?	Unrelated to SolSmart, solar PV prices have changed, and SMART incentives have changed	Nothing changed as a byproduct of SolSmart status	Electricity rates went up, not a result of SolSmart	Significant increase in installed solar, cannot give credit to SolSmart
Has popular opinion shifted on solar, and if so, how?	More rooftop solar PV has been installed, a function of the market rather than the designation	People no longer consider it odd to install solar	Community attitude shifted toward there being no reason not to install solar	No comment
What has changed regarding the solar installation process since SolSmart designation?	No notable changes	Changed permitting to all digital, no other major changes	Working on adopting a new code that states all new construction must be solar ready	No notable changes

Throughout our interviews, we learned that many communities seek SolSmart status as an affirmation of their past efforts toward solar promotion and that SolSmart offers no direct benefits outside of recognition. Our previous research led us to believe the post-designation impact was the main motivator for applying for SolSmart. The data from the interviews showed us it was instead a reward for the work put in by the community.

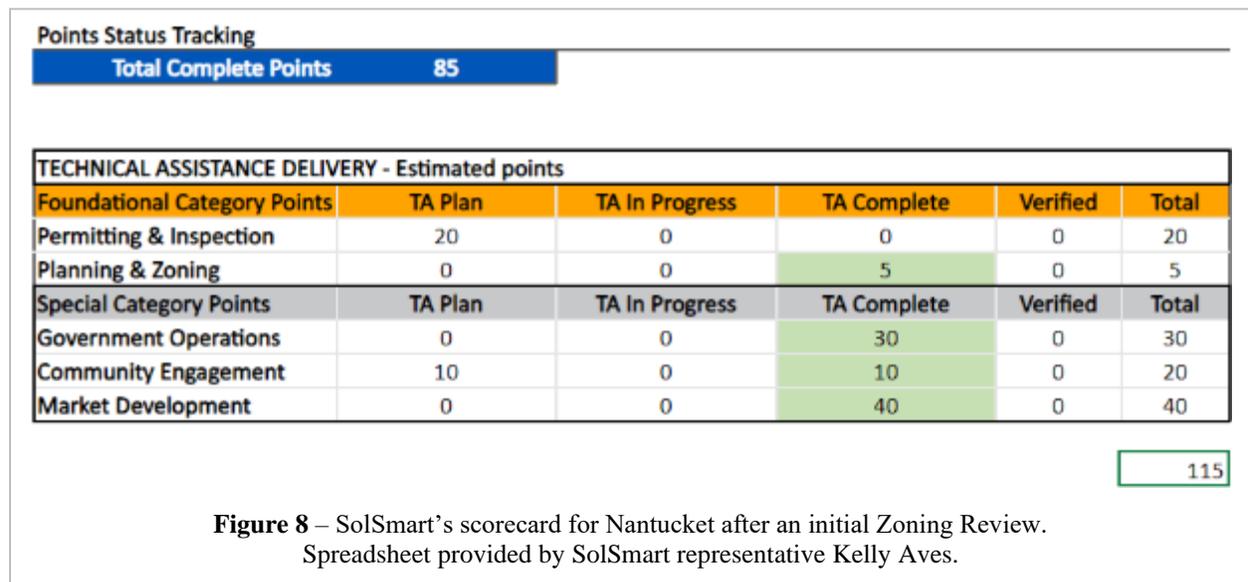
4.2 Initial Zoning Review Findings

Completing a Solar Statement ([PR-1](#)), a Bronze prerequisite, initiated the process of earning a SolSmart designation for Nantucket. As seen in Figure 2 in [Section 2.1](#), the Silver designation requires a community to earn 100 points along with the prerequisites for both Bronze and Silver tiers (ibid). Out of the 100-point total, a community must complete 20 points in Permitting &

Inspection, 20 in Planning & Zoning, and 20 points in any of the other categories (ibid). The list of requirements for Silver designation, including all requirements for Bronze, follows:

- Solar Statement ([PR-1](#)) 0 points
- Solar permitting checklist ([PI-1](#)) 0 points
- Zoning Review ([PZ-1](#)) 0 points
- Permit staff training ([PI-2](#)) 10 points in Permitting & Inspection
- Inspection staff training ([PI-3](#)) 10 points in Permitting & Inspection
- Zoning clarification statement ([PZ-4](#)), 0 points
- Solar landing page ([CE-1](#)), 10 points in Community Engagement
- 100 points in total
 - Minimum 20 points in Permitting & Inspection (fulfilled by PI-2 and PI-3)
 - Minimum 20 points in Planning & Zoning
 - Minimum 20 points in at least one other category

The Zoning Review ([PZ-1](#)) is the second step of the SolSmart designation process after submitting a Solar Statement. As shown in Figure 8, the Zoning Review Baseline Assessment determined that the Town of Nantucket qualified for 85 points of the 100 required for the Silver tier. The SolSmart technical assistant clarified that Nantucket had not yet qualified for the 20 points in both PI and PZ required for the Bronze (and therefore also the Silver) tier. However, the technical assistant recommended completing certain criteria, then totaled the points of the recommended criteria in the Technical Assistance (TA) Plan column. Including those would bring Nantucket’s total to 115 points and ensure the town would have the required 20 points in PI for Bronze, though it would still be missing 15 points from the PZ category. At the time the Zoning Review was completed, every contributing criterion still needed to be officially submitted for verification by SolSmart’s technical assistants. This left zero points in the verified column.



Referencing these findings, we constructed our own spreadsheet to track Nantucket’s progress. The chart shown in Figure 9 displays a simplified representation of our findings. Beginning with SolSmart’s assessment, we found many potentially completed criteria that SolSmart did not identify. Based on our analysis, the town had 145 potentially completed points, 60 more than the Zoning Review found. For instance, we identified that the town had completed the work to satisfy the criteria [PZ-13](#) and [PZ-17](#). The documents to verify these criteria were sent to Nantucket’s technical assistant and gave the town additional points. The spreadsheet also identified 70 points that Nantucket planned to earn, 30 more than SolSmart’s plan. In total, Nantucket’s goal was to earn 215 points. Following these results, we worked to verify all potentially completed criteria with SolSmart.

<i>Status</i>	<i>Total Points</i>
<i>Attempting</i>	70
<i>Complete</i>	145
<i>Total</i>	215

Figure 9 – Our assessment of the Town’s points toward SolSmart status.

4.3 Solar Landing Page

Nantucket’s webpage “[Solar Map & Resources](#)” was created in 2017 by undergraduate research students (Boyer et al). This page did not contain enough information to be verified for the Silver prerequisite requiring a Solar Landing Page (“[Standard Pathway Program Guide](#)”). Some of the information we implemented into the updated page included a permitting checklist, required permits, and zoning regulations as they pertain to solar PV.

To improve the Solar Landing Page and satisfy the associated silver prerequisite [CE-1](#), we created resources to include on the page based on the recommendations from the Zoning Review. The first resource was a permitting checklist, an excerpt of which is shown in Figure 10 (next page), and can be seen in full in Appendix C. The Permitting Checklist outlines all permits necessary to install solar PV along with the required materials for the permit applications.



Nantucket Energy Office | 2 Fairgrounds Rd | [Energy Office | Nantucket, MA - Official Website](#)

Solar Photovoltaic (PV) System Permitting Checklist

The pre-submittal checklist below contains the minimum information and project plan details required to be submitted to The Town of Nantucket when applying for a permit to install a solar photovoltaic (PV) system. The intent of using the checklist is to provide transparent and well-defined information to minimize the number of required revisions, improve permit application quality, and accelerate the application and review process.

Figure 10 – An excerpt of the Permitting Checklist including the description of the resource.

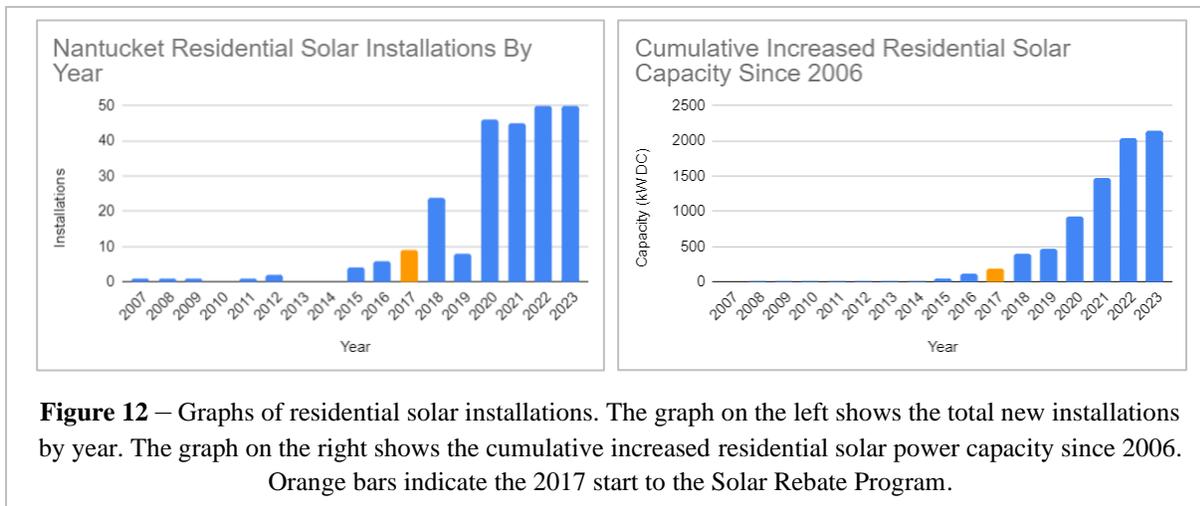
Additionally, the frequently asked questions (FAQ) page was updated to reduce the time Nantucket employees spend answering repetitive questions. An example FAQ is shown in Figure 11, and can be seen in full in Appendix D.

How do I apply for the Local SOLAR Rebate?

Fill out [this form](#) and send it to the [Nantucket Energy Office](#), either in person at 2 Fairgrounds Rd or by email. You will need proof of a completed [Massachusetts Home Energy Assessment](#) within the last 3 years to qualify for the rebate. For additional questions about the SOLAR Rebate, please contact the energy office.

Figure 11 – An example from among the frequently asked questions and its answer.

Finally, as shown in Figure 12 (next page), we produced a bar graph for the Solar Landing Page of residential solar installations by year. Due to many gaps in information among data sheets, multiple sources were used, and the data was aggregated with no more than one sheet contributing data for each year. These graphs show a general increase in residential installations on Nantucket, with the plurality occurring between 2020 and 2022. As of 2023, there are over 200 residential solar installations on Nantucket, with a collective capacity of over 2 megawatts.



4.4 Solar Map

To update Nantucket’s solar map and facilitate the process of future updates, we created a Java program which utilizes the Google Sheets API to automatically update a Google Sheet with information that can be fed into various mapping software.

This program can easily be used to update the Google Map displayed on the Solar Landing Page and the town’s geographic information system (GIS) maps through [MapGeo](#). We chose to focus on Google Maps since it is used by over 1 billion people every month, likely providing a better public experience than the GIS map (“[9 Things to Know...](#)”). However, MapGeo’s GIS allows municipalities to create toggleable layers of information over a map, which is still useful to the town staff (“[GIS Software for Cities and Counties](#)”). Google My Maps, a program that allows markers to be placed on top of Google Maps using uploaded spreadsheets, was used for the Solar Landing Page map. Using the Google Sheet created by our program to create a GIS layer is possible, although not as simple as using the Google Sheet to create a Google My Map.

The code was developed to run the following processes:

1. Intake three or four .csv files from [EnerGov](#) advanced searches for Certificates of Appropriateness (COA), electrical permits, and building permits and, optionally, the SOLAR rebate program spreadsheet the Nantucket Energy Office maintains.
2. Compare the files and check for entries that have a matching GIS parcel number across all three EnerGov searches or included at least once in the SOLAR rebate program sheet.
3. Compile a new list using the parcel numbers that occur three times in the EnerGov searches or once in the SOLAR rebate sheet. Pull relevant information from each .csv.
 - a. If a parcel number is included in a Google Sheet for manual data entry, pull data about the parcel number from that Sheet and ignore all data from the .csvs.
4. Update the Google Sheet with the new list.
 - a. A copy of the current sheet is made for archival purposes before the Google Sheet is updated with the latest information.

When we completed the code, we delivered it as a Java application alongside relevant instructions to the Nantucket Energy Office. The resulting Google Sheet can be uploaded directly to Google My Maps. Additionally, a downloaded .xlsx version of the Google Sheet can be sent to Nantucket’s GIS coordinator to create or update an internal GIS solar layer. With this up-to-date solar map, shown in Figure 13, more people on Nantucket may feel incentivized to install solar PV on their property.

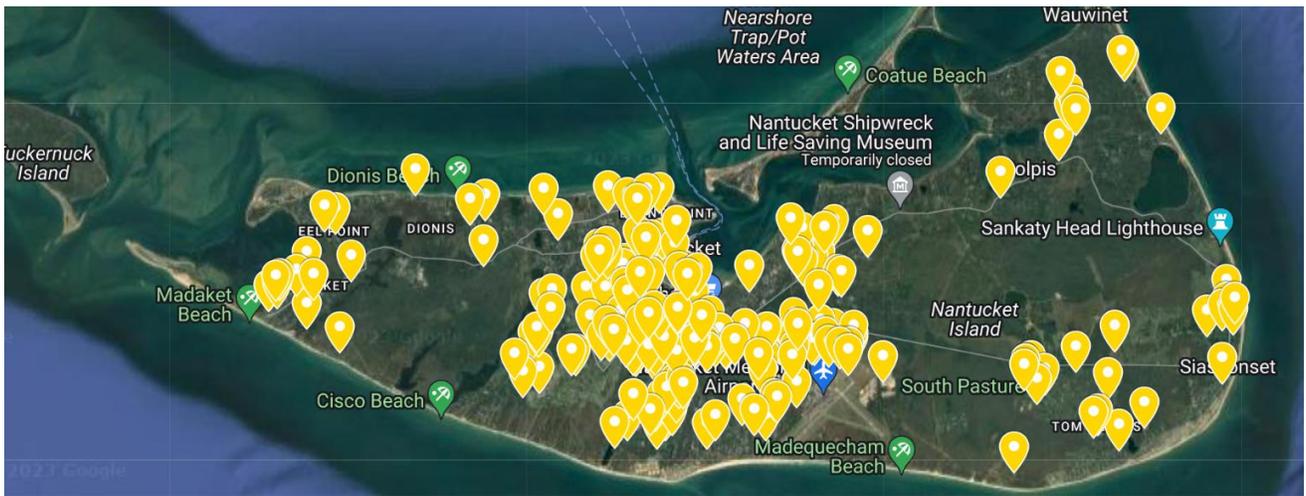


Figure 13 – The updated Nantucket Solar Map.

<https://www.google.com/maps/d/viewer?mid=1QPC0CkD1Mr7IVLUhXSsCZF-OnEzyBw&ll=41.301546720132116%2C-70.09520194520087&z=12>

5.0 Recommendations and Conclusions

This section outlines four recommendations to further develop the work of this project as well as conclusions reached based on the analysis of the data found in the results section.

5.1 Recommendation 1 – Achieve SolSmart Silver Designation

We recommend that the Town of Nantucket completes the remaining prerequisites to achieve SolSmart Silver designation. The town, at the time of this report, has completed 145 points exceeding the 100-point requirement of Silver status. Out of the seven prerequisites for Silver status, Nantucket has completed four. The three remaining prerequisites to complete are

1. Solar Landing Page,
2. permit staff training, and
3. inspection staff training¹.

These three remaining prerequisites have been started and demand minimal work and time to send out to SolSmart to be verified. Additionally, there is no cost associated with finishing the solar resources or staff training modules.

- The training sessions can be completed by Town of Nantucket staff in the Energy Office and Planning and Land Use (PLUS) Department to satisfy the latter two prerequisites.
- The Solar Landing Page can be completed by the resources we provided to our sponsor being finalized and sent to the Communications Manager to upload on the town’s website. This includes the FAQs page, the permitting checklist, bar graphs showing solar installation metrics on the island over time, and an updated solar map.

Finalizing Nantucket’s work towards SolSmart status and receiving an official designation should be achievable by January of 2024.

5.2 Recommendation 2 – Complete the Prerequisites for SolSmart Gold Designation

The Town of Nantucket should continuously seek to enhance and streamline the solar permitting process and the solar installation process as a whole. We recommend the method for accomplishing this task is to further build on the work of this project and achieve SolSmart Gold status. Gold status would further promote and recognize Nantucket’s effort as a solar energy leader.

Following the fulfillment of SolSmart Silver designation, the Town of Nantucket will have made a considerable step to achieve SolSmart Gold status. Nantucket’s existing work will have earned the town 215 points, and Gold only requires a community to earn 200 points. The additional work required for the town to earn Gold status is to complete the Gold prerequisites. The three prerequisites for Gold are to:

1. Post an online statement confirming a three-business day turnaround time for residential rooftop solar PV. ([PI-4](#)) [20 points]
2. Amend the zoning ordinance to ensure accessory use rooftop solar PV is explicitly allowed by-right in all major zones. ([PZ-5](#)) [10 points]

¹ Reference SolSmart’s [Program Guide](#) for additional information regarding Silver prerequisites

3. Ensure that the language of the zoning ordinance does not include intentional or unintentional barriers to accessory use rooftop solar PV. ([PZ-6](#)) [10 points]

The prerequisites mentioned above for Gold Status were unattainable during the timeframe of this project given the status of Nantucket’s solar policies. Town staff would have to improve the permitting timeline to guarantee the 3-day turnaround time for PI-4. To achieve the zoning ordinance prerequisite PZ-5, the town must update the ordinance to explicitly allow solar by-right in all major zones at a town meeting that occurs outside the scope of this project. Nantucket’s code does not contain language regarding any barriers to accessory use rooftop solar. The town can achieve the third Gold prerequisite, PZ-6, by not adding any barrier such as visibility screening into the town’s code.

The Gold prerequisites involve the introduction of new language into Nantucket’s zoning ordinance. They also require the solar permitting process to be more efficient to meet the required turnaround time. As a result of these factors, should the Town of Nantucket plan to acquire a Gold designation, a reasonable timeframe would be by December of 2025.

5.3 Recommendation 3 – Maintain the Solar Map and Solar Landing Page

We recommend that the Nantucket Energy Office run the application entitled the Solar Map Updater to update the solar map quarterly and update the graph of solar installations on the Solar Landing Page at the end of every year. Although SolSmart will not revoke a designation once it is given, it is important to maintain the ease of solar permitting and installation in years to come.

Instructions on how to run the application, from downloading the files the application requires to run, through updating the Google My Maps with the new data, can be found in the program’s User Manual on the Google Drive of a solar map updater Google account.

In addition to running the application, we recommend that the Nantucket Energy Office append the photographs from the SOLAR Rebate applications it has received and any it receives going forward to the solar map. To add a photo, open the Google My Map, click on the marker associated with the address of the photo, click on the camera button that says, “add image or video”, and upload a photo from a Google Drive or hard drive. Repeat for each desired photo.

5.4 Recommendation 4 – Long-Term Amendments to the Permitting Process

We recommend that the Nantucket Energy Office and PLUS Department continue to identify potential improvements and streamline the solar permitting process. We also recommend that the town digitizes the permitting process as much as possible. This includes, but is not limited to, creating a functional online portal for residents to complete the required permits for solar.

We recommend that the town offer modified versions of the required permits for solar PV which solely request information regarding the proposed solar project. The Certificate of Appropriateness, the building permit, and the electrical permit all contain information that does not pertain to solar installations. Removing this information would make it easier for homeowners to understand the core information involved in the solar permitting process. For example, seen in Figure 14 (next page), the Certificate of Appropriateness application can be halved in length into a new application specific to solar PV without losing any of the relevant fields.

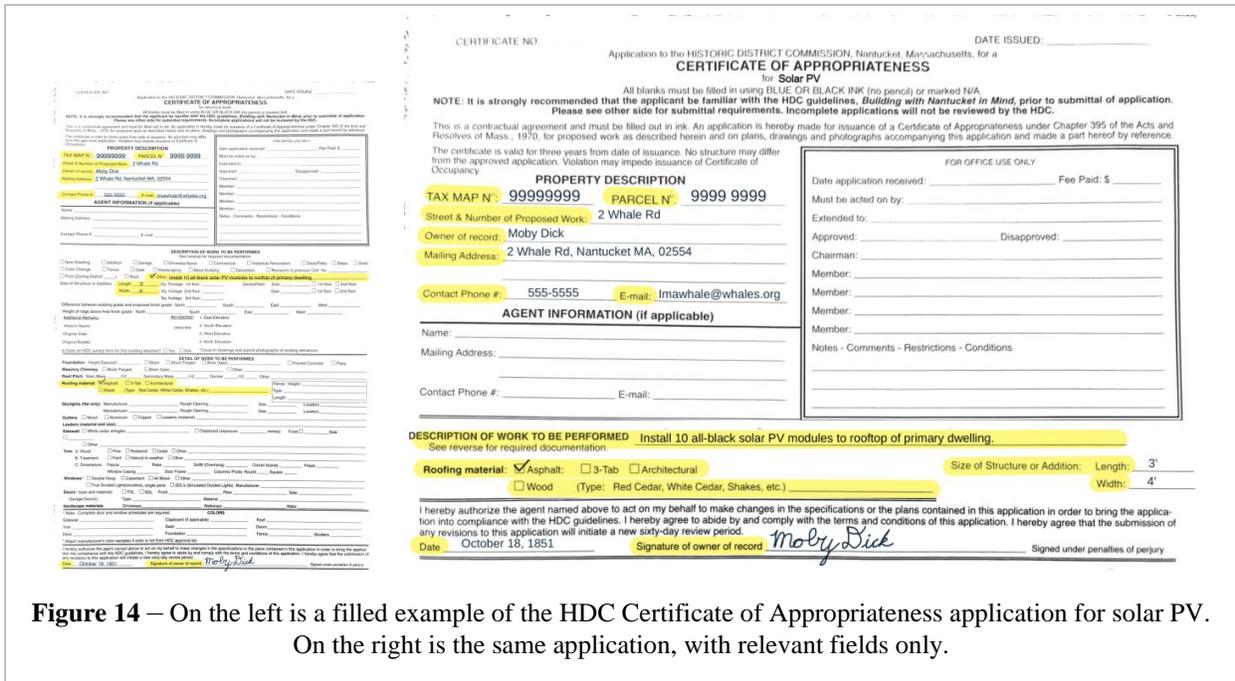


Figure 14 – On the left is a filled example of the HDC Certificate of Appropriateness application for solar PV. On the right is the same application, with relevant fields only.

We recommend that staff who enter data into [EnerGov](https://www.energov.com) standardize the way data is input into the system. In constructing the Solar Map Updater, we discovered numerous inconsistencies in the text fields in data collected from EnerGov. For instance, in Figure 15, there is a discrepancy between the formatting of the addresses on lines 175 and 176. Additionally, some of the listed names in the Installer field are: “ACK Smart”, “ACKSmart”, “ACK SMART ENERGY”, or “ACK Smart Energy”, which all refer to the same company. Adherence to enumerated standards would improve the effectiveness of our program and any future work done with EnerGov.

	A	B	C	D	E	
1	GIS-ID	Address	Capacity (kW)	Year of Installation	Installer	Tot
152	56 169.4	61 Meadow View Dr., Nantucket MA	10	2023	ACK Smart and ACKSmart	
163	67 72	8 Bayberry Lane, Nantucket MA	7.6	2023	ACK Smart and ACK SMART ENERGY and ACKSmart	
164	57 20	11 Deer Run Road, Nantucket MA	9.28	2023	COTUIT SOLAR and Cotuit Solar	
165	60.2.1 7.2	10 F Street, Nantucket MA	14.5	2023	COTUIT SOLAR and Cotuit Solar	
166	80 50	18 Pond View Dr., Nantucket MA	9.89	2023	COTUIT SOLAR and Cotuit Solar	
167	67 15	38 Surfside Rd., Nantucket MA	8.125	2023	Sun Wind LLC	
168	68 145	28 Lovers Ln., Nantucket MA	7.6	2023	ACK Smart and ACK Smart Energy	
169	71 3.3	24 Marion St., Nantucket MA	5.8	2023	Cotuit Solar	
170	67 115.5	8B Thirty Acres Ln., Nantucket MA	5	2023	ACK Smart and ACK Smart Energy	
171	67 772	8 Gray Ave, Nantucket MA	16.24	2023	COTUIT SOLAR and Cotuit Solar	
172	56 264	13 Hawthorn Ln., Nantucket MA	12.215	2023	SUNWIND LLC and Sun Wind LLC	
173	67 571	15 Wappossett Cir, Nantucket MA	7.6	2023	ACK SMART ENERGY and ACK Smart Energy	
174	54 21	49 Polpis Rd., Nantucket MA	7.6	2023	ACK Smart and ACK Smart Energy	
175	54 276	9 Sheeps Common Ln., Nantucket MA	9.28	2023	SUNWIND LLC and Sun Wind LLC	
176	66 409	83 BARTLETT RD, Nantucket, MA 02554		2022	SUNWIND LLC	

Figure 15 – An excerpt from the Google Sheet that the Solar Map Updater compiled.

5.5 Conclusion - The Town of Nantucket is a Solar Energy Leader

The Town of Nantucket's Energy Office has developed resources and programs in recent years to demonstrate the community is a solar energy leader despite the unique challenges the island experiences. The Energy Office created the Nantucket PowerChoice Program, which offers residents and businesses stable energy prices ([Nantucket PowerChoice](#)). The program provides partial funding for the [Nantucket Local SOLAR Rebate](#) which lowers the total cost to install solar PV for year-round residents. Since 2017, the local rebate has given over \$500,000 back to residents, with qualifying installations producing over a megawatt of power. The number of solar installations continues to grow, with over 200 residential solar installations on the island since 2007, as a byproduct of the work the Town has accomplished. The Zoning Review found that the town had achieved 60 points in Market Development, which was considered by Nantucket's SolSmart technical assistant one of the highest observed tallies in the program.

Nantucket is constantly identifying ways to become a more solar-friendly community. For instance, the Town Manager additionally mandated that town permitting and zoning staff take SolSmart's provided training modules in effort to align the town with best practices (Lauren Sinatra, personal communication). The pursuit of the SolSmart designation allows the town to receive guidance on how to receive direct pay funding through the [Inflation Reduction Act](#). Finally, earning the Silver SolSmart designation is a way for Nantucket to promote and recognize the town's work as a solar energy leader.

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Appendix A - Expert Interview Questions

The team contacted multiple communities with a SolSmart designation requesting interviews about the designation process. Upon commencing a Zoom call with a SolSmart community leader, the lead interviewer read from this script to conduct the interview. Some questions were removed or slightly altered depending on the community our interviewee represented.

Before the interview begins, we would like to ask you if the audio of this interview can be recorded. Your responses will be analyzed for purposes in line with our project's goal statement, which is as follows – "Assist the Nantucket Energy Office in achieving the criteria and prerequisites necessary to earn SolSmart Silver Status." You may stop the interview at any time, at which point we will ask if the data collected from the interview may be used, or if you would like it deleted. You may refuse to answer any question or questions for any reason. Do you have any questions? [Wait for response. If negative, continue.] Are you willing to continue? [Wait for response. If positive, continue.]

1. Timeline to SolSmart
 - a. What was your role in getting [community name] SolSmart [community status] status?
 - b. How long did the process take from start to finish?
 - c. What was the timeline for completing the process?
 - d. Please estimate how many hours [community name] staff in total committed to achieving SolSmart.
2. SolSmart Tiers
 - a. What SolSmart designation levels were [community name] aiming to achieve and by when?
 - b. What, if anything, was the largest cause of discrepancy between your office's plan and your office's actual achievements in the process of applying for a SolSmart designation?
3. Points
 - a. Which criteria categories did your office prioritize?
 - b. Which criteria categories would you suggest your office prioritize if you could go back to when the process began?
 - c. How many of the prerequisites and criteria were already completed before [community name] started actively working toward achieving a SolSmart designation?
 - d. Which prerequisite criteria was the most difficult to achieve?
 - e. Which criteria was the most difficult to achieve?
4. Obstacles to SolSmart
 - a. What legal challenges did your office encounter on your path to SolSmart?
 - b. What political and social challenges did your office encounter?
 - c. What operational challenges did your office encounter?
 - i. Did your office have enough staff and understand the process?
5. Special Recognitions in Planning & Zoning, Community Engagement, etc. (if applicable)

- a. Did you plan to achieve special recognition at the outset?
 - b. Why did you choose to strive for the special recognition that you did?
6. Results of SolSmart
- a. What has changed economically since you were officially SolSmart designated?
 - i. Has the population of solar companies changed since your designation?
 - ii. Have solar photovoltaic system prices changed?
 - iii. Do you have any data you can share with us about your solar economy before and after SolSmart?
 - b. What has changed socially since you were officially SolSmart designated?
 - i. Has the frequency of solar installations changed since your designation?
 - ii. Have you seen a change in the demographic of citizens installing solar?
 - iii. Do you think citizens have better access to information regarding solar?
 - iv. In your opinion, has popular opinion shifted on solar, and if so, how?
 - c. What has changed with regard to the solar installation process since beginning the path to a SolSmart designation?
 - i. How has the length of the process changed?
 - ii. Has the process seemingly become more or less intuitive?
 - d. Were there any unforeseen positive or negative consequences of the SolSmart designation?
7. Are there any questions you have for us or anything else you would like to say?

Appendix B - Informed Consent Agreements for Participation in a Research Study

These forms detail the nature of our research to our participants and inform them of the steps we took to ensure we used ethical research practices when collecting and handling their data. These forms were presented digitally to the interviewees before the commencement of each interview. The research only continued upon the signature of the form(s) by each participant.

Interviews

Investigator - Brendan Fainer, tel. 860 733-5632, email: bpfainer@wpi.edu

Investigator - Daniel Brower, tel. 207 991-0478, email: dwbrower@wpi.edu

Investigator - Alana Reid, tel. 717 678-1882, email: aereid@wpi.edu

Investigator - Grace Phillips, tel. 713 542-3690, email: gephillips@wpi.edu

Title of Research Study: Achieving SolSmart Status on Nantucket

Sponsor: Lauren Sinatra, Energy Coordinator: Town of Nantucket

Introduction:

You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: The purpose of this study is to collect information about implementations of SolSmart in Massachusetts municipalities. This information will help the investigators to assist the Nantucket Energy Office in achieving the criteria and prerequisites necessary to earn SolSmart Silver Status.

Procedures to be followed: Investigators will interview each participant over a Zoom meeting with recorded audio and ask the participant a series of questions about the implementation and effects of the SolSmart program in the participant's city.

Risks to study participants: This study carries minimal to no risk to participants.

Should a participant wish to withdraw from the study after it has begun, the following procedures should be followed:

The lead interviewer should ask if the participant would like their partial data to be deleted or if the participant would prefer for the investigators to keep the data already collected from the interview and incorporate it into the research.

There are no consequences for the subject for early withdrawal.

Benefits to research participants and others: There are no expected benefits for the research participants.

Record keeping and confidentiality: Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Compensation or treatment in the event of injury: This study does not involve more than minimal risk of injury or harm. You do not give up any of your legal rights by signing this statement.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:

Investigator - Brendan Fainer, tel. 860-733-5632 , email: bpfainer@wpi.edu

Investigator - Daniel Brower, tel. 207-991-0478 , email: dwbrower@wpi.edu

Investigator - Alana Reid, tel. 717-678-1882 , email: aereid@wpi.edu

Investigator - Grace Phillips, tel. 713 542-3690, email: gephillips@wpi.edu

IRB Manager - Ruth McKeogh, tel. 508 831- 6699, email: irb@wpi.edu

Human Protection Administrator - Gabriel Johnson, tel. 508 831-4989, email: gjohnson@wpi.edu

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

Study Participant Signature: _____ Date: _____

Study Participant Name (please print): _____

Signature of person who explained this study: _____

Date: _____

Appendix C – Permitting Checklist

Solar Photovoltaic (PV) System Permitting Checklist

The pre-submittal checklist below contains the minimum information and project plan details required to be submitted to The Town of Nantucket when applying for a permit to install a solar photovoltaic (PV) system. The intent of using the checklist is to provide transparent and well-defined information to minimize the number of required revisions, improve permit application quality, and accelerate the application and review process.

Both residential and commercial solar PV installations follow the same process on Nantucket.

The following local design guidelines should be used when planning a solar PV installation:

- [Building With Nantucket in Mind](#)
- [Nantucket Historic District Commission \(HDC\) Solar Guidelines](#)
- [Nantucket Fire Department Solar PV Plan Review Checklist](#)

A permit must be obtained prior to the start of any work. Complete the following permit application forms and submit any additional required documents. Permit application forms can be picked up from 2 Fairgrounds Rd (open from 7:30 AM to 4:30 PM on weekdays).

Required Permits:

- HDC Certificate of Appropriateness (COA) [**Link to watermarked application**]
- Electrical Permit [**Link to watermarked application**]
- Building Permit² [**Link to watermarked application**]
- Environmental (Only for ground-mount systems)
 - MESA Review³
 - Conservation Commission⁴

Additional Required Documents:

- HDC COA submission:
 - All applicable items listed on the required documents [Checklist](#)
 - [10 Day Waiver](#) for HDC hearing
- Electrical Permit:
 - Fee - check (made out to the Town of Nantucket)/cash
 - Schematic and specifications of solar PV system

² Ground mounted arrays are required to receive a Health Department review of the Building Permit

³ Required for ground array systems installed on land that is designated as having state-listed species habitat.

⁴ Required for ground array system installed on designated wetlands and within the 100' Buffer Zone

- Building Permit:
 - Fee - check (made out to the Town of Nantucket)/cash
 - HDC Certificate of Appropriateness Yellow copy of approval
 - Approved elevation and site plans stapled to structural pass [2 copies]
 - Site plan (physical full sized)
 - Registered plot plan
 - Workers comp. certificate of affidavit and exemption
 - Contractors license or homeowner exemption form
 - recorded copy of the Conservation Commission approval
 - Structural plans [2 copies]

Contractor Requirements

- *Building* - Massachusetts Construction Supervisor License
- *Electrical* - Solar photovoltaic (PV) components must be installed by Massachusetts-licensed electricians per the ratio requirements specified in [M.G.L. C. 141 § 1](#).

Permit Fees

Permit	Fee
HDC Certificate of Appropriateness	\$100
Electrical Permit	\$75
Building Permit	\$75
Health Department Fee (For Ground Arrays)	\$20
Total	\$250 (\$270 For Ground Arrays)

Complete fee information can be found on the Town of Nantucket website on the [fee schedule](#).

Submit Permit Applications

All documents must be dropped off in-person at 2 Fairgrounds Rd (open from 7:30 AM to 4:30 PM on weekdays).

Review Process Timeline

The Planning & Land Use Services (PLUS) Department is committed to providing a review of solar PV permit applications in a timely manner. The Town of Nantucket has a staff of dedicated individuals, but workloads, vacations, and sick leave can cause unforeseen delays that may impact turnaround time.

Certain circumstances can prolong the permit turnaround time including:

- Applicant does not submit all required information
- Contractor applying for permit is not a licensed contractor
- Equipment is not listed

Permit Status

To check your building or electric permit status please contact the PLUS Department at their website (<https://www.nantucket-ma.gov/230/Planning-Land-Use-Services-PLUS>), by phone (508-325-7587) or by email (plus@nantucket-ma.gov).

Permit Expiration

- HDC COAs expire three (3) years after the date of issue.
- Building permits never expire once installation begins, but if the installation is not started within six (6) months after the date of issue then you must reapply.
- Electrical permits expire three (3) years after the date of issue.

Scheduling Inspections and the Inspection Process

Solar PV systems require 3 inspections:

- HDC inspection
- Building inspection
- Electrical inspection

Inspections are scheduled at the PLUS Department office at 2 Fairgrounds Road during business hours. Inspection times may vary.

Contact Information

If you have any solar permitting questions, please contact the PLUS Department at:

- Office Email: plus@nantucket-ma.gov
- Office Phone Number: 508-325-7587

For general solar questions, please contact the energy office at:

- Online: <https://www.nantucket-ma.gov/136/Energy-Office>

Address:

2 Fairgrounds Rd, Nantucket, MA 02554

Hours of Operation

Office: M-F 7:30 AM - 4:30 PM

Appendix D - Frequently Asked Questions Page

Frequently Asked Questions

Is solar allowed on Nantucket?

Yes, solar installations are allowed on Nantucket. Data on completed solar installations on the island are visible [here](#).

How do I get started with solar?

Refer to this permitting checklist [[link to permitting checklist](#)] to review the process of installing solar on Nantucket.

Should I talk to my local Homeowners Association when considering installing solar PV?

If your home is a part of one, it is recommended that you talk to your Homeowners Association and ensure that solar panel installations are allowed on your property before contacting an installer.

What solar installer companies are available?

The solar map located [here](#) (update with correct link) provides information about residential and commercial solar installations around the island, including the installer who worked on each.

Disclaimer: This map is used as an informational tool only, in no way should it be considered to be an endorsement for any specific installer.

The MassCEC has provided a listing of solar installers. On the linked [webpage](#), you can find a list of installers filtered by your location. When searching for a solar installer, you should do some research on your options and ask for references before deciding to do business with them. Friends, family and neighbors may also be able to give you feedback on installers.

How do I choose an installer?

It is recommended that you talk to multiple installers to get a system and company that works best for your project. Consider the overall cost of the system, system and labor warranties, and how well the installer communicates.

When getting quotes, installers should visit the site and analyze all site features that would be missed from a preliminary overview. Similarly to other home-improvement projects, you should get multiple quotes with written descriptions of all costs and work that needs to be done to completely install the solar energy system.

Can I apply for my permits online?

As of December 2023, there is no way to apply for a Certificate of Appropriateness, Building Permit, or Electrical Permit online. All applications should be picked up and dropped off at the PLUS Department at 2 Fairgrounds Rd. (open weekdays from 7:30am to 4:30pm).

How do solar panels work?

Check out this [webpage](#) from MassCEC for answers to this question and more!

Does Nantucket get enough sun for solar panels to work?

Although Nantucket may sometimes get less sun than mainland areas, these systems do generate enough electricity for owners to greatly reduce their electric bills.

Do solar panels need to be cleaned?

Cleaning solar panels is not regularly needed. Rainfall should clean them off with no problem. If they do get dirty enough to affect their efficiency (for example, from bird droppings), they can be cleaned with a non-abrasive wash - a soft brush, warm water, and mild detergent - just like you would clean your windows. However, this is rarely necessary.

Do solar panels require snow removal?

With the amount of snowfall on Nantucket, as long as panels are on a roof or high enough off the ground for ground-mounted systems, snow should not need to be removed. Solar panels are usually warm enough to melt any snow that doesn't slide off of them.

Will a roof mounted system cause leaks?

If installed properly, roof mounted systems should not cause roof damage that could cause leaks. Depending on the age of your roof, it may need to be replaced before installing a roof mounted system to ensure structural stability.

How can I monitor my system's electrical generation?

Many installers use smart apps that communicate to your solar energy system through WiFi or ethernet, allowing you to manage and track your system output in real time.

Historic District Commission Guidelines

Where should I put rooftop solar panels?

Because Nantucket is in the northern hemisphere, [the optimal place to locate solar panels is on a south-facing roof](#). If your building has no or minimal south-facing roofs, or if the south-facing roofs are often shaded by nearby trees, it may be more energy-efficient to place solar panels on east or west, or perhaps even north-facing roofs. Regardless of which direction the panels face, they *must* comply with [Historic District Commission guidelines](#).

Can I install solar on the front of my home?

The Historic District Commission does not recommend installing solar on the front of the home if it is visible from the street so as to preserve the island's historic character. However, if there is enough screening (e.g. plants, trees) to make the solar panels not visible from the street or other public lands, the installation may be approved.

Can I install solar panels on my property in the Historic Core Districts, the town of Nantucket and the village of Siasconset?

Solar is allowed in Nantucket's Old Historic District and in Siasconset's Old Historic District, but it may be subject to stricter application of the Historic District Commission's solar guidelines to preserve the historic character. **Systems cannot be visible from any public view**, and can't impact the historical integrity of the building. Any installations must be reversible, meaning they should be able to be removed without residual damage to the structure.

Do I need to get Historic District Commission approval even if I don't live in a Historic Core Districts?

Yes, you do need approval from the Historic District Commission before installing solar panels outside of a Historic Core District, but the application of the guidelines may be less strict depending on where your home is and where on your property the planned installation would be.

Do I need to be present when the Historic District Commission reviews my Certificate of Appropriateness application?

Yes, you or an agent you have authorized to act on your behalf must be present at the HDC meeting during which your application is reviewed. If you or your agent are not present, your application

will not be reviewed and will be put on the agenda for the next meeting. Information regarding HDC meeting schedules and agendas can be found [here](#).

Pricing and Financial Resources

How much will a solar installation cost me and how long will it take to pay for itself?

Depending on your installer, your roof design, and the size of your planned installation, the total cost of installation will vary.

There are various tools available online that allow you to evaluate your site for solar energy installations and determine what the economics might be for a prospective solar energy system installation. These include [SolarReviews' solar calculator](#), [the National Renewable Energy Laboratory's PVWatts calculator](#), and [Energy Sage's solar calculator](#). These calculators can also provide an estimate for the period of time the installation will take to pay for itself. While your evaluation will give you a better idea of what you can expect, quotes from local solar installers will be more accurate than the calculators' estimates.

Additionally, see the Solar Permitting Checklist [[link to permitting checklist](#)] for current permit fee information.

How much money does it cost to maintain my system?

As long as your solar energy system is under warranty, replacement parts should be of no cost to you. Modern solar energy systems rarely have issues with components, so maintenance will likely be uncommon.

How long do warranties last?

The solar panels typically have a manufacturer warranty of around 20-25 years, while installers typically have a labor warranty of around 5 years. Both of these warranties are dependent on your manufacturer and your installer.

Is it more expensive to install solar panels on the island of Nantucket than the mainland?

Like many other things on Nantucket, it is more expensive to install solar panels on Nantucket due to the cost of transportation of materials and additional labor costs. The [Local SOLAR Rebate](#) was

created to help alleviate these extra costs. Even though the system is more expensive, it is still an economically viable option to save money on your energy bill.

What solar energy incentives are available?

As of December 2023, incentives include:

- [Federal tax credit](#) of 30% of your system cost.
- [State tax credit](#) of 15% of your system cost, up to \$1000.
- [Nantucket Local SOLAR Rebate](#) for year-round residents.

How do I apply for the Local SOLAR Rebate?

Fill out [this form](#) and send it to the [Nantucket Energy Office](#), either in person at 2 Fairgrounds Rd or by email. You will need proof of a completed [Massachusetts Home Energy Assessment](#) within the last 3 years to qualify for the rebate. For additional questions about the SOLAR Rebate, please contact the energy office.

What does “as funds are available” mean regarding the Local SOLAR Rebate program?

As long as the Town’s municipal electric aggregation program ([Nantucket PowerChoice](#)) is in operation, there will be a constant source of revenue to fund the [Local SOLAR Rebate](#). A small surcharge is included in the electric bills of participating customers every month, which funds the Local SOLAR Rebate program. Participation in the PowerChoice program is a requirement for being eligible for applying for a Local SOLAR Rebate.

Will taking out a loan to pay for solar panels qualify as "out of pocket system payment" for the Local SOLAR Rebate program?

Out-of-pocket payments against the loan would be sufficient to qualify, but not the loan itself.

What is net metering?

When your solar energy system produces more energy than your home uses, your excess energy goes into the grid. At the end of your energy billing cycle, if you produced more energy than you used, you get credits from the utility that you can use against future bills.

At the end of a billing cycle, if you used *more* energy than your solar energy system produced, you pay your energy bill as normal, but are only billed for the energy you pull from the grid.

You will typically get net metering credits in the spring and autumn and spend them in the summer and winter. These credits are worth 100% the value of the exchanged energy so long as your system capacity is **at most 10kW**. Any system above this capacity receives credits at a reduced rate.

What does it mean to get “100%” or “1:1” net metering credit?

At the end of your billing cycle, any excess energy you produced but did not use is returned to you as credits. These credits are worth 100% the value of the exchanged energy so long as your system capacity (kW) does not exceed the Massachusetts net metering cap, which can be found [here](#). Any system above this capacity receives credits at a rate of approximately 60% of the value. These credits can be spent to reduce your energy bill at a later date so you receive the full value of your solar panel production.

Contacts

I have another question. Who do I talk to?

For questions regarding the Nantucket SOLAR Rebate Program or other solar incentives, contact the [Nantucket Energy Office](#) by email or phone.

For questions regarding HDC’s involvement in the solar installation process, contact the HDC Compliance Coordinator, whose contact information is located [here](#).

For questions regarding the electrical permit and inspection process, contact Nantucket’s Electrical Inspector (wiring@nantucket-ma.gov, 508-325-7587 ext. 7018).

For other questions regarding the solar permitting and installation process, contact the Nantucket PLUS Department (plus@nantucket-ma.gov, 508-325-7587).