This action recognizes townships that install a photovoltaic (PV) solar system and/or a solar thermal heating system on municipal facilities.

Sunlight is a 100% clean and renewable source of energy, and it is one of the fastest-growing renewable energy alternatives in the country. A range of solar technologies capture energy from the sun for electricity or heating. Solar photovoltaic (PV) panels, in particular, transform solar radiation directly into electricity and are appropriate for many types of public facilities. Solar thermal collectors capture the sun’s energy as heat, and may be used either to heat water or (less frequently) for space heating.

This action awards a variable number of points depending on the scope of work completed, based on a combination of: 1) a fraction of the traditional energy displaced; and 2) whether optional resiliency features are included with the project. The project can be solar PV only (providing electricity), solar thermal (providing heat), or both. In all three cases, the displacement fraction is measured against the matching relevant baseline (electricity only, heat only, or both.) Detailed instructions on calculating traditional energy displaced is provided below in the "What to Submit" section of this action.

10 points: Level 1 - On-site solar system that displaces less than 20% of electric purchases or the municipality is unable to document the historical load and therefore cannot calculate the displacement percentage, OR

20 points: Level 2 - On-site solar system that displaces between 20% and 30% of electric purchases, OR

30 points: Level 3 - On-site solar system that displaces greater than 30% of electric purchases,

AND, optionally

An additional 10 points: If the solar electricity system is upgraded to include islanding/grid-interactive operation and energy storage to enable on-site support of critical loads during a grid outage.

Submissions that do not contain data on energy purchases displacement will only be approved for the basic level of 10 points.

Why is it important?

Using solar energy is one of the most impactful strategies available for reducing greenhouse gas emissions and making the municipality's energy supply more sustainable. All solar energy generated on-site directly displaces the purchase of less sustainable energy supplies from traditional sources. Solar is considered one of the purest forms of renewable energy and is demonstrably “cleaner” than virtually any other alternative. Beyond environmental value, however, solar energy brings numerous economic, social, and political benefits, as well as the creation of local jobs. The State of NJ has been a national leader in recognizing and encouraging the use of solar energy, and it is considered an “inherently beneficial use” for most properties.

In addition to these strategic benefits, municipal leaders also appreciate the price stability and predictability that comes with on-site solar generation. Increasingly, investment in solar energy is seen as a “price hedge” against likely future
energy cost increases. And in a post-Sandy world, on-site solar can improve the resiliency for strategic facilities when augmented by battery back-up and specialized switchgear. In addition, solar applications are also typically highly visible, and can help stimulate consumer interest and support overall market development.

New Jersey has one of the strongest solar markets in the country for solar PV, second only to California by many measures. As of the end of 2014, approximately 32,000 solar installations had been completed in New Jersey, on residential, commercial, and public properties. These systems collectively represent over 1.4 billion watts of capacity, and at peak times, solar generates more power than NJ’s largest nuclear plant! This peak-generation benefit is particularly important, since peak times are when electricity is most expensive. Solar power is more economically viable than ever before and most solar projects result in electricity costs that are lower than those from traditional suppliers.

By making use of solar electricity and/or solar heating, the municipality will 1) reduce its carbon footprint and realize all the other benefits that come from clean renewable energy; 2) gain control of its energy costs long term, and potentially become more resilient, 3) demonstrate commitment to clean energy solutions to the public in a tangible and visible way.

Who should lead and be involved with this action?

The active support of municipal leadership is usually required for a large project like a solar energy installation. The green team will typically help initiate and advocate for the project. The most successful projects will cultivate members of the local government as “solar champions,” and will actively engage with the community to show public support.

Some municipalities may hire an energy consultant to scope the opportunity and identify purchase/hosting/leasing options. Municipal staff and other professionals (especially legal counsel, procurement, and engineering) are also often involved, as is typical with any large capital investment project. Many municipalities choose to minimize the strain on capital resources through the use of commercially provided project financing and use of an experienced solar project development consultant.

Please see the “What to Do” section for more details on who is involved in a typical solar energy project.

Timeframe

A typical solar project takes about a year to get through the township approval and procurement process, but can be shorter or longer depending on local conditions. The rules of procurement under New Jersey’s public contracting law add time to the process, but this is balanced against the need to ensure a fair and transparent process. Once the procurement and permitting processes are complete, actual physical installation can usually be completed within days or weeks (depending on the project’s size), and is then followed by an interval for inspections and final interconnection approval from the NJ BPU and utility. Typical municipal solar projects can be implemented within a range of 6 to 18 months.

Project costs and resource needs

The actual cost of a solar system can vary widely, from several tens of thousands for a very small system to multiple millions of dollars. While these costs represent a large “up front” investment, they offer a solid economic return based on the value of the electricity they generate over a 30-40 year life. More importantly, almost all municipal solar installations are financed so that there is little to no up-front cost (i.e. out of pocket) or capital expense. See the “What to Do” section for more details on costs and project financing.

The primary resources needed for this action are people: the involvement of municipal leadership, active advocacy by green team champions, and support from the public. Municipal staff and supporting professionals will typically be involved in the engagement of an energy consultant and the associated system procurement.

What to do, and how to do it (“How to”)

The outcome of this action is the installation of a working solar PV or solar thermal system on a municipally controlled property. As a result of this installation, municipal purchase of traditional energy (typically through a utility) will be reduced, and displaced by the cleaner, renewable, and more sustainable solar energy system. These guidelines tend to focus on solar PV systems (for electricity) since they are the more common solutions implemented by NJ municipalities, but similar guidance applies to solar thermal systems as well.
Below we have listed the requirements for earning points for this action. We have provided guidance and recommendations for implementing the action. You do not need to follow this guidance exactly as long as your final product meets the requirements.

**Project Steps:**

In general, if an energy consultant is engaged to manage the project planning and implementation, most of the work will be performed by that consultant. In that case, the primary work of the municipality is to organize initial support for the effort and gain necessary approvals, engage the consultant, and support the procurement and construction process as required (decision making, access to buildings, etc.). Whether or not a consultant is engaged, the project will require the following basic steps.

1) **Project Start-up**: Organize support for the project, usually as initiated within the green team, but also including municipal leadership and key staff and/or professionals. The critical first decision is whether to engage a consultant to plan and manage project implementation, which is the approach most municipalities take. An energy consultant is NOT REQUIRED to implement a solar energy project, but many municipalities find that approach to be beneficial. In that case, implement a competitive process to select a consultant, solicit project bids, and award the consulting contract. Note that in many cases the cost of the consultant can be covered within the final project costs (which are frequently financed), so there may be little to no direct consultant costs for the project.

2) **Site Identification**: Identifying appropriate hosting sites for the project is a key early step. The consultant can help with this assessment, and green team members can help identify potential sites as well. There are opportunities for creativity in hosting scenarios, and often multiple sites can be aggregated together into a single project. Solar PV can be mounted on a roof (flat or tilted), on a suitable open space (a ground-mounted array), or on a parking lot shade structure. Optimal locations receive direct sunlight with little-to-no shading, have a southern exposure, and are close to the point of interconnection (where the utility meter is). Particular attention should be paid to strategic facilities (emergency management, refuge locations, etc.), since the solar array (if augmented with storage and appropriate switchgear) can provide resiliency benefits during an extended grid outage.

3) **Soliciting Bids and Selecting A Vendor**: In most cases, an RFP (or similar) process will issue project specifications and collect bids from several contractors, each of whom will submit detailed project design information, solar energy production estimates, and cost and/or project financing options. New Jersey’s Clean Energy Program website (See “Resources” section) provides a directory of manufacturers, distributors, and installers of solar equipment. The municipality, typically with the assistance of the energy consultant and municipal staff and/or professional, will select a winning bidder and award the project. Formal contracting must conform with public contracting requirements. It frequently takes 3-12 months to get through the RFP and contracting phase of the project.

3) **Construction**: Once the contract is awarded, the contractor will complete a detailed design, obtain permits and other needed approvals (including the utility and the BPU), procure the equipment, and install the system. Actual construction time is usually relatively short (days to weeks), depending on the size of the system. After construction is complete, there are several inspections and approvals required before the system can be formally commissioned. Most of these steps will be done by the contractor with minimal involvement from the municipality itself. Direct access to the site will be needed for construction, and there may be a brief period of service interruption for interconnection in some cases.

4) **Solar Energy Outreach and Education**: A municipal solar installation is often highly visible within the community and serves to create awareness and consumer confidence. Towns are encouraged to leverage the municipal solar array with outreach and educational activities, including:

   - Posting educational signage about solar technology in the building
   - Including a visible interactive display that shows generation from the solar system in real time. This has become a fairly standard feature offered by most solar solution providers.
   - Organizing tours, lectures, or training workshops about solar power. • Posting project profile and solar resources on the municipal website. • Developing and distributing brochures about solar energy to staff.
   - Profiling solar project(s) in municipal newsletter(s) for the community.

5) **This action includes the option to earn 10 additional points if resiliency features are included in the system**
This applies only when resiliency features are added to an electricity generation system (not solar thermal). In most cases, this means a specialized inverter that allows the system to disconnect from the grid in the event of an extended outage, and some storage (usually using batteries) that allow the solar system to power critical loads. In this way, the solar system provides clean power all year, but also serves as a sustainable “backup up generator” for the municipal facility. Since the solar array doesn’t depend on a fuel supply like a normal generator would, it is a preferable option for powering strategic facilities in the event of an extended outage like that experienced after Superstorm Sandy. This value is enhanced if any municipal buildings serve as a refuge or similar function as part of the town’s emergency management plan. Resiliency factors in the solar system design should typically be coordinated with the emergency management organization, and the energy consultant guiding the project (if engaged) can help specify these features as part of the project RFP. In many cases, these additional resiliency features can be provided for little to no incremental cost if designed into the project from the outset.

These steps are a general guide and actual project details may vary. The energy consultant, if employed for the project, will typically manage each step of the project on the municipality’s behalf. You do not need to follow this guidance exactly as long as your final product meets the requirements.

**Project Costs:**

Project costs vary widely depending on the system size and the approach taken to project financing. There is great flexibility on system size, ranging from small systems with primarily educational value, to very large systems that eliminate almost all utility power purchases. Cost effectiveness typically scales with project size – the larger the better.

The municipality can either own the solar system outright, or finance it based on a lease, a power purchase agreement, or similar mechanism. If owned outright, solar represents a capital improvement project that typically costs hundreds of thousands of dollars, up to several million dollars for a very large system. If financed, there is typically minimal to zero cash outlay. For a variety of reasons, as covered in more detail below, Sustainable Jersey strongly recommends the use of a commercial financing product (like a PPA or lease) for most municipal projects.

When considering solar project costs and financing options, it is important that the municipality set realistic expectations based on current market conditions. Historically, NJ solar systems were able to take advantage of particularly high state incentives, and as a result, solar prices (in cents per kWhr) were very low, or other project adders (such as a roof replacement) could be rolled into the project. Those conditions no longer exist, but nonetheless, most solar PV projects today can still deliver an equivalent cost of electricity that is lower than utility supply costs.

Solar systems are priced in terms of dollars per watt ($/w), where a watt represents the common unit of generation capacity (similar to horsepower in a car). Depending on what type of space is available (roof, ground or parking lot for solar canopy), and how much electricity the facility uses, system sizes and pricing will vary widely. In New Jersey, for a fixed tilt array, each kilowatt of capacity can produce approximately 1,000 - 1,200 kilowatt hours of energy per year.

As of summer 2014, prices ranged from $2.25-$3.75/watt. As of summer 2014, prices ranged from $2.25-$3.75/watt. As a rule of thumb, pricing for solar canopies, which support the solar panels on a shade structure erected in a parking lot or similar space, is typically higher than pricing for ground or roof mounted solar arrays. For systems ranging in size from 50 kilowatts to 1,000 kilowatts, (1,000 watts = 1 kilowatt), prices will range from $112,500 for a small, roof mounted array to upwards of $3,750,000 for a large car canopy.

**Municipally-Owned Solar-PV Systems:** A municipality may purchase the solar equipment outright, in which case installing a solar system is no different than any other larger capital improvement project. While this approach, in some cases, offers the strongest return on investment, it requires that the municipality come up with the investment capital necessary. In addition, the municipality will be responsible for the costs of procurement, permitting, and operation and maintenance of the system over time. The municipality will also be responsible for capturing all available revenue from the project, which includes displaced utility purchase value, tax value (which is frequently difficult for a municipality to capture), and revenue from the sale of the Solar Renewable Energy Certificates (SRECs). One SREC is earned for every 1,000 kilowatt hours produced by a solar PV system interconnected to the distribution system in New Jersey.

In New Jersey, electricity suppliers are required by law to purchase a specific amount of solar electricity. This requirement is typically accomplished through the purchase of an SREC, creating a compliance market - the SREC.
market, where the value of the SREC will vary depending on market conditions. SREC pricing long term is a significant economic risk in the project, but it can be mitigated (or in most cases eliminated) through the use of commercially provided project financing. In this case, the project financier assumes long term SREC price risk so the municipality does not need to do so.

Direct ownership allocates all the benefits, costs, and risks directly to the municipality. However, the federal tax benefits, which are considerable, are lost when ownership resides with a public sector entity. Since tax-based incentives are a large part of solar project financing, and municipalities typically cannot capture that value easily, most municipal projects make use of financing programs where those issues can be addressed most efficiently.

**Financed Solar PV Systems:** Over the last decade, commercial financing products have emerged to help the municipality avoid the up-front, or out-of-pocket cost of a solar generation system. Third party ownership models, in the form of leases or power purchase agreements (PPAs) take advantage of the federal tax incentives efficiently, passing those incentives on in the form of savings to the municipality. The third party owner also owns the SRECs, absorbing the pricing risk in the SREC market.

In leasing arrangements, the municipality will pay a monthly leasing fee (usually reflecting the value of the electricity produced and used) over a specific term. In PPAs, the municipality will contract to purchase all the electricity being produced by the system at a known price for a fixed term. In both arrangements, there is typically an end of term buy out option. These arrangements also typically include a robust maintenance agreement over the term, which is another good reason most municipalities prefer commercially financed solutions.

With regard to pursuing either of these options, the municipality should hire energy consultants that have experience in solar PV and project financing to scope the opportunities (with regard to size, type and location). Energy consultants may structure their fees to be absorbed by the winning solar bidder in the required RFP process run by the consultant. In this way, the municipality will not incur upfront costs to pursue the opportunity, and will be able to make use of expert advice from those most familiar with the market.

While financing options are plentiful for solar PV (electricity), the options are more limited for solar thermal systems. Those systems tend to be purchased, as is typical with other onsite equipment, out of the municipal capital budget.

**What to submit to earn points for this action**

In order to be eligible for points under this action the on-site solar solution (either solar PV for electricity, or a solar thermal collector) must be in use and the municipal government must have been significantly involved in the implementation of the project. The installation must be on properties or buildings owned or controlled by the municipality. Projects on school properties are not eligible for points under the municipal certification program, unless a school and municipal project are pursued jointly. As long as the solar system, (either solar PV for electricity or a solar thermal collector) is in use at the time the municipality applies for certification, the installation may have been completed at any time to be eligible for points.

The following documentation must be provided to verify that the action was completed to the specified standards. The documentation can be submitted by logging in to the municipality’s online certification application and clicking on this action name to access the Action Submission page. At the top of the Action Submission page in the **Requested Points** section, please indicate the number of points the documentation will support.

1. **Description of Implementation** – In the text box provided on the submission page for this action provide a short description (300 words or less) of the on-site solar system including the location, size, and how long it has been in operation. The narrative description MUST include the percentage of the municipal building(s) energy use that is offset by the solar system. See example regarding calculation of energy use displacement below.

2. **Upload a Letter of Certification signed by the Mayor or Town Council member certifying the following:**
   a. System Type (solar PV for electricity, or solar thermal for water or space heating)
   b. System size, including both nameplate power rating (in kilowatts or similar units), and estimated annual energy generation (in kWhrs for electricity, or BTUs for thermal)
   c. Mounting type (roof, ground or canopy), and an inventory of the buildings served by the installation
d. Utility displacement expressed as a percentage. (See example calculation below)
e. Ownership Basis and Financing: Whether the system is owned outright by the municipality (and how those funds were raised), or whether a third party ownership model was used (lease, power purchase agreement, etc.) If a third party agreement is in place, identify terms (cents per kWhr, contract term, annual escalators, etc.)
f. Date system was placed in use (usually taken as interconnection date for electrical systems, or final inspection approval and commissioning for thermal)
g. Energy consultant (if applicable), and installation contractor
h. A summary of any public outreach done for the project, if applicable (strongly encouraged).
i. If submitting for the additional 10 points related to resiliency, provide information about the storage system (both power and energy storage rating), and that a grid-interactive (or "islanding") inverter with appropriate grid-separation switchgear is integrated into the system design. Document the number of hours the building can operate at night (i.e. no solar input), serving critical loads, when operating independent of the grid.

All of this information can be provided by the energy consultant involved with the project if used.

3. UPLOADED documentation MUST include:
a. Utility data for a consecutive 12 month period, indicating the actual electricity (in kWh) purchased for the building(s) served by the solar system; this data must be from within 2.5 years of the application.
b. Output data for the solar system (in kWh) for the same consecutive 12 month period.
c. Calculation of the percentage of purchased electricity offset (or displaced) by the electricity produced by the solar system relative to overall electricity used by the building(s) served by the solar system.
d. Electricity displacement is calculated as follows: the actual amount of solar generated electricity for a consecutive 12 month period divided by the total amount of electricity used by the building (i.e. purchased electricity plus electricity produced by the solar PV system) for the same consecutive 12 month period.

EXAMPLE OF HOW TO CALCULATE ENERGY DISPLACEMENT: “Building A” utilized purchased electricity in the amount of 100,000 kWh over the last 12 months as documented in their utility billing data. The onsite solar PV system for “Building A” generated 30,000 kWh over the same 12 month period. The total electricity use for “Building A” is 130,000 kWh for the 12 month period (100,000 kWh + 30,000 kWh). To calculate the amount of purchased electricity displaced by the solar system, the equation would be 30,000 divided by (100,000 + 30,000) = .23, or 23% displacement.

Submissions that do not contain data on displacement of energy purchases will only be approved for the basic level of 10 points.

RESUBMISSION REQUIREMENTS: When resubmitting for this action, the municipality will need to document that the solar system for which the original points were awarded is still in operation. The resubmission will also need to include recent data within 2.5 years of the June submission deadline regarding the utility displacement percentage to support the number of points being requested.

APPROVED ACTION EXPIRATION DATE: Points for this action expire 5 years from the date of the most recent data submitted.

IMPORTANT NOTES: There is a limit of six uploaded documents per action and individual files must not exceed 20 MB. Excerpts of relevant information from large documents are recommended.

All action documentation is available for public viewing after an action is approved. Action submissions should not include any information or documents that are not intended to be viewed by the public.

Spotlight: What NJ municipalities are doing

Bradley Beach Boro (Monmouth)
Bradley Beach installed solar panels on their recreation center in 2008. An additional system was put on the old DPW building in 2009. A third system was installed on the new DPW building in 2014. Bradley Beach has been harnessing energy from the sun for eight years now and has expanded their solar capacity. These systems can be easily seen from popular places in town, thereby spreading awareness of the feasibility of solar energy. The town is also enjoying the
financial benefits of the SREC’s they are earning.

- Bradley Beach On-Site Solar System (Formerly Solar) Documentation
- Bradley Beach On-Site Solar System Documentation

Franklin Township (Somerset)

Solar Cells were put in service on the roof of the Franklin Township Municipal building in July 2011. In 2015, they provided 21.3% of the electricity used by the municipal building (from a low of 7.3% in January to a high of 34.1% in May). The owner is Somerset Solar I (a subsidiary of the Somerset County Improvement Authority, which financed the project) and the installer and biller is Vanguard Energy Partners. The payment rate is $0.05245/kWh. For technical data concerning the system see the NJ Clean Energy Program technical worksheet (original signed by Craig Novick, township manager at the time).

Somerset County has embarked on a program, whereby the Somerset County Improvement Authority will sell bonds to construct solar cells on municipal roofs, a company [eventually Vanguard] will erect them and sell Franklin Township the electricity, at 10.6c/kWhr vs 15-16c/kWhr on the market. All Franklin Township has to do is allow access to their roofs and agree to buy the electricity. This works because of all the subsidies: while the county will actually own the cells, it will lease them to the constructor/operator, who will get the federal tax credit for them; will get accelerated depreciation benefits, and will be able to sell certificates of renewable energy production (SRECs) through the ten-state renewable energy program, as well as selling the electricity to the township.

- Municipal building solar system bills - usage
- NJ Clean Energy Program technical worksheet

Resources

The following resources may be helpful in completing this action.

Resource Type: Background New Jersey


New Jersey’s SREC Registration Program
http://www.njcleanenergy.com/srec

PSE&G Solar Loan Program https://www.pseg.com/business/go_solar/index.jsp

Resource Type: Background Solar

FAQ about Solar PV and Solar Thermal
http://www.gosolarcalifornia.ca.gov/solar_basics/faqs.php


Resource Type: Local Government & Procurement Tools

Solar Photovoltaic Financing: Deployment on Public Property by State and Local Governments
http://www.nrel.gov/docs/fy08osti/43115.pdf