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# Solar Thermal Program Manual

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New York State Energy and Research Development Authority

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## **1.0 PROGRAM SUMMARY**

### **1.1 What Is The Solar Thermal (ST) Program?**

The New York State Energy Research and Development Authority (NYSERDA) provides incentives for the installation of new Solar Thermal (ST) systems for the production of hot water to displace electrically heated hot water. System incentives are capped at \$4,000.00 per site/meter for residential systems and \$25,000.00 per site/meter for nonresidential applicants. Funding for the Solar Electric Incentive Program (“Program”) has been allocated by the New York State Public Service Commission through the Renewable Portfolio Standard (RPS) program. The goal of the program is to install 45.54MW of Solar Thermal capacity by 12/31/2015. Incentives will be granted on a first-come, first-served basis, and applications will be accepted through December 31, 2015, or until funds are fully committed, whichever comes first. There is also a small amount of non-RPS funding available for projects which use fossil fuels to heat their domestic hot water. Please call NYSEDA for availability of non-RPS funding.

### **1.2 How Does the Solar Thermal Program Work?**

Financial incentives are available for qualified customers who wish to install Solar Thermal systems through applications submitted by an “Eligible Installer.” Eligible Installers are those who have demonstrated technical competence in the Solar Thermal field and who have signed written agreements with NYSEDA to abide by certain ST Program terms and conditions. Incentives are paid directly to the Eligible Installer, but must be passed on in full to the customers. Eligible Installers are responsible for preparing and submitting all necessary incentive paperwork to NYSEDA.

On average, incentives for a typical residential or commercial system are expected to cover approximately 15 to 20% of the installed cost of a ST Systems.

### **1.3 Eligible Installers**

Solar Thermal system installers who have received and are current in their NABCEP (North American Board of Certified Energy Practitioners) certification, Home Performance with Energy Star, Journeymen Plumbers and heating contractors with ST system installation training and experience are encouraged to submit applications to become Eligible Installers. Preference will be given to those installers that have completed 40 hours of NABCEP and or 18 hours of manufacturer certified solar thermal or its equivalent and demonstration of experience in installing systems. Installers can apply for Eligible Installer status at any time while the program is open. Once approved, Eligible Installers can apply for financial incentives for ST Systems meeting the requirements of this ST Program. Although NABCEP certification is not required at this time, all Eligible Installers must be certified by June 30, 2012.

## **2.0 GENERAL PROGRAM RULES**

### **2.1 Incentives**

Incentives are available on a first-come, first-served basis. Incentives will only be reserved for customers once an application has been approved by NYSEDA. Incentives will be available for the Solar Thermal Program beginning in November 2010 and continuing through December 2015. Individual incentives will start at a rate of \$1.50 per kWh (or mmBtu equivalent for Non-RPS funding based on estimated displaced electrical usage) and may be adjusted as necessary in order to meet the program goals, but cannot exceed the incentive cap.

Incentives are reserved for Solar Thermal Systems designed and installed by Eligible Installers. Incentives are available only for new equipment and Solar Thermal Systems that have not been installed (partially or completely) prior to NYSERDA approval of an incentive application submitted in accordance with the terms and conditions of this Incentive Program. Incentives will not be provided directly to customers purchasing or installing Solar Thermal systems.

The full amount of the approved NYSERDA incentive must appear as a credit to the customer in the customer purchase agreement.

When approved, the incentive amount will appear on the approval letter that Eligible Installers receive from NYSERDA. Eligible Installers are responsible for sending a copy of the approval letter to the customer. This amount will not change assuming the ST System is installed, as approved, and within the Terms and Conditions of NYSERDA's Solar Thermal Program.

Incentives for electrically fueled systems are available for Solar Thermal systems installed for qualified customers only. Qualified customers are those who pay the Renewable Portfolio Standard (RPS)/System Benefits Charge (SBC) as part of their electricity bills. Incentives for fossil fueled systems are available to all NY State residents, but are subject to funding availability which is determined quarterly by NYSERDA. Owners of electrically heated systems may not access both RPS and non-RPS funding for the same system.

NYSERDA reserves the right to limit the number of incentives per customer/site/meter.

Incentives are based on displaced electrical usage based upon Solar Rating and Certification Corporation (SRCC) OG-300 estimates of system production and/or standard industry software such as RETScreen, or SolarPathfinder thermal program. For solar panel manufacturers who have SRCC OG-100 panel ratings and have applied for a SRCC OG-300 system rating but have not yet received a rating, an estimate based on the panel's SRCC OG-100 rating and along with calculations from RETScreen, Solar Pathfinder Thermal or other approved method may be provided. In such cases, a meter must be installed on the system and the amount of energy produced in kilowatt hours must be measured every 3 months for the first year and reported to NYSERDA. NYSERDA will review the energy production data to determine the accuracy of the estimated production. Estimates of system production that are determined to be highly inaccurate may result in the manufacturer or installer being disqualified from participation in the Program.

NYSERDA reserves the right to make changes in the incentive levels. Any revisions in the incentive levels will be posted on NYSERDA's website, and Eligible Installers also will be informed via email. Customers' applications that are accepted by NYSERDA after an incentive change will be automatically changed to the new incentive level. Eligible Installers and Customers are prohibited from cancelling submitted applications and re-applying if incentives are increased the following months.

## **2.2 Standard Incentive Amounts**

Incentives are calculated based upon estimated displaced electrical usage. Typical Solar Thermal systems can only displace 50-80% of the thermal load. Therefore, the displaced kWh cannot exceed 80% of the total calculated existing thermal load.

Example:

The Solar family has an annual electrical usage of 12,259 kWh as detailed on their utility bill. They currently have an electric hot water heater, there are 4 persons living in the residence. A RETScreen analysis indicates that 3,309 kWh or 27% of that yearly electric bill is attributed to hot water. The ST system proposed by Eligible Installer is expected to displace 76% (76% < 80%) of their hot water load.

$3309 \text{ kWh} * 0.76 = 2515 \text{ kWh displaced @ } \$1.50 = \$3,772.50$  as the maximum incentive.

You would then apply the Incentive cap listed in 2.2 above to determine the final incentive.

### **2.3 Total Capacity Limit**

NYSERDA reserves the right to establish and enforce a per month capacity limit on Eligible Installers and Affiliated Entities. Applications received after this limit is reached will not be accepted.

### **2.4 Change Orders**

Any system modifications or equipment changes **must be approved** by NYSERDA in writing before a system is installed. Failure to get NYSERDA approval on any and all modifications may result in revocation of the incentive reservation or nonpayment of the incentive.

Change order requests shall state the reason for the change, the original equipment quantity and catalog numbers, the proposed equipment quantity and catalog numbers, changes in cost, changes in incentive amount and any changes in the collector configuration, piping, controls or insulation levels. All proposed change requests must include the customer's signed acknowledgement of the proposed changes.

### **2.5 Incentive payments**

Incentives will be paid to Eligible Installers in one final payment and will be tied to the completion of the installation and acceptance by the Authority Having Jurisdiction (AHJ). The NYSERDA incentive payment will not be paid until all documentation for all applicable utility, state, city or town permits and other inspections and approvals, as appropriate, are obtained and submitted to NYSERDA together with the "Attachment C – Incentive Payment Request Form" and approved by NYSERDA. Eligible Installers have 120 days from the date of award by NYSERDA to complete the installation.

### **2.6 Incentive structure**

Where necessary, NYSERDA reserves the right to structure incentive payments differently to accommodate unique situations as determined by NYSERDA.

### **2.7 Clipboard Audits**

Eligible Installers shall perform an electric energy efficiency clipboard audit for all Residential Customers. A clipboard audit consists of two main components: an interview of the home/building owners to ascertain energy use habits and the age of the building, and an inspection of the building to identify potential energy efficiency measures, especially low-and no-cost measures that could reduce the electricity load of the building. This includes an inspection of the hard-wired lighting systems and free-standing light fixtures, appliance ages and whether they are ENERGY STAR, the presence of advanced power strips for consumer electronics, existence of "phantom loads" related to consumer electronics and battery chargers, use of programmable thermostats or timers for air conditioners, age and condition of the doors and

windows, and inquiries to the Customer regarding any recent installation of insulation. The Eligible Installer shall conclude the audit with a homeowner debriefing. The Eligible Installer shall leave a copy of the inspection form with the owner at the end of the inspection. The form will include a description of the home, recommendations of changes to reduce electric consumption, and easy fixes the homeowner can do. The Eligible Installer shall also leave a list of Home Performance Contractors that could install more complex energy efficiency measures, informational brochures informing the owner of the details of utility or NYSERDA energy efficiency programs available to the home owner, and a brochure of low cost/no cost tips for reducing energy consumption. The inspection should typically last no more than 60 minutes. Customers will not be required to benchmark or implement energy efficiency measures as a pre-requisite to receiving a ST incentive.

### **2.8 Non Residential Energy Assessment**

Eligible Installers shall provide non-residential building owners with information on ENERGY STAR'S Portfolio Manager Benchmarking Tool, or other equivalent tool and if requested by the building owner will help them enter utility bill information into the Tool in order to produce an EUI (Energy use index) and where applicable, an ENERGY STAR score. Eligible Installers shall also provide informational brochures on NYSERDA and utility energy efficiency programs. Customers will not be required to benchmark or implement energy efficiency measures as a prerequisite to receiving a ST incentive.

### **2.9 System Losses**

Applications shall indicate all potential ST system output losses (actual thermal energy generated and equivalent kilowatt hours or kWh displaced after all equipment losses are applied) associated with shading, system orientation, tilt angle, etc. and must be analyzed and detailed by the Eligible Installer for each ST System. Systems which are shaded by trees that face east or west, or that are installed on a flat roof, will have outputs that will be less than ideal. All impacts on system output must be quantified and will be considered during the review of applications submitted by the Eligible Installer.

### **2.10 Coordination with other NYSERDA Programs**

NYSERDA reserves the right to restrict applications for the ST Program where the applicant's participation in another NYSERDA program would constitute double dipping or a conflict between programs.

### **2.11 Financing**

Residential customers may be eligible to participate in loan programs such as PACE (Property Assessed Clean Energy), On-bill financing, the NYS Energy Smart Loan Fund<sup>sm</sup>, or other financing options should they be available in the future. For customers that participate in the loan programs, the incentive will be reduced by the equivalent "buy down" cost or other cost incurred by NYSERDA to make the loan product available. The total incentive for any customer, including cash and loan product, will not exceed the system incentive cap.

### **2.12 Tax Credits**

Customers may also be eligible for State and Federal tax credits. It is recommended that ST Program participants contact a tax adviser to determine eligibility for tax credits.

## **3.0 SPECIFIC PROGRAM RULES**

### **3.1 New Components**

All components installed as part of an approved ST System must be new. With the exception of the monitoring meter(s), the use of used or refurbished equipment is not permitted under the Program.

### **3.2 Qualified Solar Collectors**

All ST Collectors must be certified as meeting all applicable standards of the Solar Rating and Certification Corporation and detailed in the eligible list found on PowerClerk. PowerClerk is a database used to track applications and installers. Once approved, you will receive log-in information and instructions.

### **3.3 Hot Water Tanks**

All ST Hot Water Tanks must be certified as meeting all applicable standards of the Solar Rating and Certification Corporation and detailed in the eligible list found on PowerClerk.

## **4.0 SYSTEM REQUIREMENTS**

### **4.1 Displaced Electrical Usage**

To be eligible for Incentives, all ST Systems must demonstrate a savings in displaced electrical usage calculated in kWh or equivalent BTUh for non-RPS funded systems. Thermal Energy generated by the ST System must offset the customer's electricity purchases.

### **4.2 Approved System Design**

ST Systems must be installed in accordance with the design and ST System components submitted in the application and approved by NYSERDA. Any change in ST System design from the approved design must be approved in writing by NYSERDA prior to installation of the ST System. Incentives will not be paid for ST Systems that are installed prior to approval from NYSERDA, or for ST Systems that are not installed according to the design submitted to and approved by NYSERDA.

### **4.3 Code-Compliant Interconnection**

The Eligible Installer is required to ensure that all approved ST Systems that are designed to be interconnected to the heating or domestic hot water systems have a code compliant interconnection.

### **4.4 Other Plumbing and Electrical Components**

All other Plumbing and electrical components of each ST System including, but not limited to, piping, fittings, insulations, tanks, vessels, valves, controls, safety devices, and associated wiring must be certified as meeting the requirements of all relevant national and New York State codes and standards.

### **4.5 Compliance with Laws and Codes**

All approved ST Systems, system components, and installations must comply with any and all manufacturers' installation requirements, applicable laws, regulations, codes, licensing and permit requirements including, but not limited to, the New York State Environmental Quality

Review (SEQR), the New York State Building Code, New York State Plumbing Code, the National Electric Code, and all applicable State, city, town, or local ordinances or permit requirements.

#### **4.6 ST System Warranty**

The Eligible Installer and the Affiliated Entity must provide the purchaser of the ST System with a full five year transferable warranty. The warranty must cover all components of the generating system against breakdown or degradation in thermal output of more than ten percent from the original rated thermal output. The warranty shall cover the full costs, including labor, of repair or replacement of defective components or systems. The Eligible Installer and the Affiliated Entity are responsible for providing warranty coverage in a timely manner regardless of the level of support from the equipment manufacturer.

#### **4.6 Annual Follow Up Visits**

The Eligible Installer or the Affiliated Entity must conduct annual follow up visits for the first two years of operation in order to verify that the system is operating properly and make any necessary adjustments to improve system performance.

#### **4.7 Maintenance Manual**

Upon final completion of the installation, the Eligible Installer shall provide the customer with a maintenance manual containing manufacturer information on all the major components along with a schedule or any regular required system maintenance to be performed.

### **5.0 APPLICATION PROCESS**

Each Application for Incentives must include a complete and accurate copy of each of the following:

#### **5.1 Incentive Application Form**

The Eligible Installer must submit all application, using PowerClerk.

#### **5.2 Site Map**

The site map must include the location of all ST System components including collectors and water tanks, roof type, system orientation and tilt angle, point of connection with existing plumbing system, customer name and address, and Eligible Installer name and Eligible Installer number.

#### **5.3 Photo**

There must be photo(s) of the collector location from both the ground and roof level. Photos from the ground must be taken looking south, north, east, and west.

#### **5.4 Schematics Drawing**

Schematics diagrams will not be required for residential applications. However, nonresidential applications will require a legible diagram using unique line characteristics and standard symbols to clearly describe the solar thermal system as installed. The one line diagram shall include, but not be limited to, the collectors, water tanks, heat exchanger(s), pumps, piping lengths and sizes, controls, insulation requirements, associated wiring.

Manufacturers' catalog numbers for the key components and other relevant equipment as applicable shall be provided.

### **5.5 System Production**

An estimate of annual system production (displaced kWh) must be submitted. For residential systems installed on one to four family homes, use of the SRCC OG-300 system rating may be used to size and estimate the annual system production in kWh if the properly sized system falls within Program guidelines for maximum displaced load of 80%. For all calculations, installers shall assume a storage tank water temperature of 120 degrees in the design. Should the installer use a higher temperature, they must provide justification of the higher value with the application.

For larger non-residential systems, non OG-300 or residential systems using OG-100 components, a more detailed estimate of system production will need to be provided in conjunction with a more detailed system design including a one-line drawing as noted above. Calculations and methods used to determine the system production in nonresidential systems must be included in the application.

### **5.6 System Loss Analysis**

Installers must calculate all potential system output losses (kilowatt hours or kWh, or equivalent BTU<sub>h</sub> for fossil fuel based systems, generated after all equipment losses are applied) associated with shading, system orientation, tilt angle, etc. Such losses must be detailed using industry accepted shading and orientation tools, verifiable assumptions, and calculations. Incentives will not be approved where losses due to system shading and orientation exceed 25% of what the ideal system for that location would be without any site losses. In cases where trees or any other obstruction must be removed or moved in order to meet the program rules, incentive payment will not be made until a new system loss analysis and photos have been submitted and reviewed by NYSERDA.

### **5.7 Domestic Hot Water Gallons Used**

When calculating the usage for residential, the number of persons in the household shall be used. For new construction or where the number is not known, use the number of bedrooms plus one.

Example: A three bedroom house would be sized for four people. In order to determine the number of gallons, use the formula  $20 + [15(\text{residents}-1)]$ .

$$\begin{aligned} 20 + [15(4-1)] &= \\ 20 + [15(3)] & \\ 20 + 45 &= 65 \text{ gallons per day} \end{aligned}$$

### **5.8 Utility Bill**

A copy of the customer's utility bill or other proof (for new construction applications) that the customer pays (or will pay, in the case of new construction) the Renewable Portfolio Standard/System Benefits Charge must be included. The site address on the utility bill must match the installation site address on the Incentive Application Form. The customer's historic usage for the past twelve (12) months will be required. For new construction, information on anticipated electric usage, including that usage to be displaced by the ST system is required. The Eligible Installer must submit detailed calculations for review. Please provide evidence of other fuel billing for fossil-fuel, non-RPS funding.

## 5.9 Permits

Copies of all necessary permits, approvals, certificates, etc. must be attached for all non-residential systems. Residential customers may submit permits with the application or with the incentive request. Incentive requests for ST Systems without permits will be rejected. All permits must clearly reference installation of the approved ST System at the customer site. If permit(s) are not needed for installation, a signed letter from the Town Code Officer or Authority Having Jurisdiction (AHJ) must be submitted stating that no building permit is required

## 5.10 Customer Purchase Agreement

Each Incentive Application must be accompanied by a Customer Purchase Agreement, signed by the Customer and the Affiliated Entity. NYSEERDA may reject an Application for Incentives if it is received by NYSEERDA more than (30) days from the date of the customer's execution of the Customer Purchase Agreement. Each Customer Purchase Agreement must include the following:

- Installation location including town, street, and number, if applicable;
- Installation schedule (a realistic installation and interconnection schedule that takes into account NYSEERDA and utility review requirements). For example, incentive applications should not have an expected installation date that does not include adequate time for NYSEERDA to receive, review, and notify an Eligible Installer and the customer regarding the status or approval of an application;
- System description, including a description of the ST System being purchased and an outline of system specifications, the make and model of major system components, identification and SRCC Certification.
- Estimate of annual energy displaced in kWh or equivalent BTUh for non-RPS funding that summarizes the results of the System Loss Analysis;
- Total system and itemized costs broken down as follows: cost of collector(s), cost of water tanks(s), balance of system (piping, fittings, insulation, controls, etc.), and labor and overhead (labor, permitting, etc.);
- Applicable incentives. The Customer Purchase Agreement must reflect the entire amount of the approved NYSEERDA Incentive;
- An explanation and estimate of any and all costs that the customer will incur associated with the development, installation, and commissioning of ST Systems that are not included in the Eligible Installer's price quote;
- Payment schedule;
- ST System Warranty. A full warranty to the purchaser of the ST generation system installed under the Agreement for a period of five years after installation. The warranty must cover all components of the ST System against breakdown or degradation in thermal output of more than ten percent from the original rated thermal output. The warranty must cover the full costs, including labor and repair or replacement of defective components or systems.
- Addendum to Customer Purchase Agreement in the form provided at Exhibit E, completed and signed by both the customer and the Eligible Installer.

## **6.0 INSTALLATION SITE VISIT/INSPECTION**

NYSERDA or its representatives may make a reasonable number of visits to the customer site before, during and/or after installation of a ST System. Such visit(s) will be at a time convenient to the customer.

### **6.1 Purpose of Site Visit**

The purpose of the site visit(s) is to provide NYSERDA with an opportunity to evaluate the site, the system design as submitted, and the Installed ST System in order to determine the actual kWh displaced for program evaluation purposes and to verify that the ST System was installed according to the approved system design and all ST Program requirements. Continued installer eligibility in the program may be contingent upon the results of NYSERDA's inspection of an installed ST System.

### **6.2 Site Visit Report**

NYSERDA may provide a written report summarizing the results of the ST System inspection to the Eligible Installer. If the site visit report indicates that there are deficiencies in the ST System or that the ST System was not installed in conformance with the approved application, the requirements of the Program and/or this Agreement, NYSERDA may provide a copy of the site visit report to the customer, all authorities having local jurisdiction, and the interconnecting utility.

**Communication with Customer:** Installer, Company and Customer agree that NYSERDA may, at NYSERDA's discretion, communicate by voice and/or written format with any Solar Thermal System Customer with respect to any matter relevant to a proposed or installed SOLAR THERMAL System. Such communications may be in reply to an inquiry from a Customer or at NYSERDA's initiation.

## 7.0 OTHER INFORMATION

### Information for Eligible Installers and Customers

Customer Step-by -Step Guide	Attachment A
Incentive Application Form*	Attachment B
Incentive Request Form*	Attachment C
Addendum to Customer Purchase Agreement*	Attachment D

**\*Needs to be completed by an Eligible Installer**

### Information to Become an Eligible Installer

Eligible Installer Instructions and Application	Attachment E
Sample Eligible Installer Agreement	Attachment F

### Specific Program Rules

NYSERDA Solar Thermal Program Manual	Attachment G
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