sunnova

Commissioning

version 3/17/2014

Sunnova requires that we see the following features for EACH ARRAY This is not a list of prescribed photographs, but of the subject matter that needs to be present via photographs. Please provide a comprehensive review of the installed system. Separate arrays should be treated individually.		
Array		
1	**Array (s)**	Please provide a view of the array in context; show all modules and surroundings, please provide as many images as necessary to capture every module installed, no pv conductors exposed to Sunlight.
2	**Module attachment**	Please provide an example of the end clamp and mid clamp used to secure the modules to the racking. This should be properly sized and fastened, appropriately spaced along the module edge. Anti-seize measures and appropriate weather and corrosion resistant metals should be employed.
3	**Array tilt**	Provide an image showing array tilt. This measurement must be taken on site directly on the installed array. Please provide one measurement per each unique tilt applicable to the system
4	**Underneath Array**	MUST clearly demonstrate all of the following, - Roof clearance of at least 3" from the roof surface - Inter-module wire managament showing how the wires are secured to the structure - No loose wires unsecured or hanging free - No wires touching the roof surface or sharp edges
5	**Structural**	MUST clearly demonstrate all of the following, without exception: - An example of the full racking assembly - Show stanchion attachment to rail - Show attachment to underlying structure
6	**Flashing**	MUST clearly demonstrate all of the following, without exception: - Roof penetration at underlayment properly sealed - Contact with shingle or tile membrane flashed and sealed - Any conduit run support or penetration properly flashed and sealed
Electrical		
1	**Roof J-Box / Conduit Entrance**	Show how conductors from the assembled array are collected into the conduit and capture some of the conduit run on the roof surface to demonstrate proper conductor stress relief, weather protection and conduit stability
2	**Roof Conduit Run / Penetration**	Show a run of conduit on the roof surface, supported properly, flashed when necessary, and properly labeled per NEC. Show the conduit roof penetration properly weatherproofed and flashed.
AC /Monitor		
1	**Home run conduit**	Please show the conduit through a part of the house leading up to the inverter
2	**PV Combiner Panel**	Show open sub panel with a legible view of amperage for each of the breakers
3	**Inverter(s)**	Show 10' around area for string inverters or attachment to panels for micro-inverters
4	**Inverter Serial Number(s)**	PROVIDE IMAGES OF THE SERIAL NUMBERS - enphase serial numbers can be provided on an array map
5	**AC Disconnect/ Safety Switch(es)**	Show clear view of switches and 10 feet around the mounting area
6	**Sunnova Monitor**	Show Itron monitor properly installed and confirmed powered on with a legible view of the serial number. Provide photographic evidence of the 106xx signal code associated with the serial number.
7	**Interconnection**	Show open breaker box with clear image of OCPD amps or line-side tap and main breaker
Notice:		
*You are our eyes out on these sites, therefore failure to abide by the above procedures and requirements to Sunnova's satisfaction will result in non-payment until resolved to Sunnova's satisfaction. We need you to show us that the system has been built to NEC requirements. If you do not take the time now, the opportunity will be rejected and you will have to return to the worksite and retake the appropriate pictures. *Meter Must be Provisioned - See provisioning guidelines in Articles *Commissioning assumes that construction is complete, and all equipment is verified to be properly functioning. This includes modules, inverters, balance of system, meter provisioning, and NEC required labels.		

sunnova

24 Greenway Plaza, #1515
Houston, TX 77046

SHADING ANALYSIS and SHADING OBSTRUCTION REQUIREMENTS

Sunnova requires that a shading analysis be submitted for every system. The Solmetric Suneye is the preferred equipment to be used when obtaining this information. However, a specific shading analysis tool is not prescribed. Sunnova requires that an analysis be performed with a commercially available shading analysis tool. The tool must capture images on-site and provide verifiable data readouts of available sun exposure. Tilt, Azimuth, and solar obstructions to the array must be accurately accounted for. Manually calculated shading assessments will not be accepted.

This analysis will be the benchmark solar exposure for the array. Conditions recorded with this analysis will be expected to be preserved on-site for the duration of the lease. It is recommended to discuss this with the homeowner, along with the potential need to maintain foliage and obstructions in their current state.

- A Minimum of **four (4) readouts** per array is required at the **extremities (corners)**
- Please do not allow more **than 25 feet between readings** for a single array
- For identifiable shading obstructions, at least one reading MUST be made on the closest point of the proposed array to the obstruction
- Readings should be taken **AT THE HEIGHT** of the proposed array location, analysis taken on the ground for a roof mount array will not be accepted
- Analysis reports should be submitted in **.PDF format**
- The report should include **IMAGES** taken on site, **ANALYSIS RESULTS** and a plan indicating **READING LOCATIONS**

For instances where shading obstructions are to be removed (i.e. in the event that a tree is to be cut down or pruned) there are two courses of action. A shading analysis is still required for each instance. No assumptions will be made about work to be done to a shading obstruction.

A. OBSTRUCTION IS TO BE REMOVED
   1. Quote as if the obstruction is not present on-site
   2. Take accurate shading measurements of the obstruction. Should the obstruction not be removed for any reason, this will be applied to the corrected production estimate for the lease
   3. Provide the design with obstruction located in plan and indicated "to be removed"
   4. Perform removal prior to Substantial Completion
   5. Provide photographic evidence of obstruction removal within the substantial completion package along with a new shading analysis

B. OBSTRUCTION IS TO BE PRUNED OR CUT BACK (NOT REMOVED)
   1. Quote with expected shading after pruning
   2. Take accurate shading measurement and provide with design
   3. Perform pruning prior to Substantial Completion
   4. Take new shading measurement after pruning and submit with substantial completion package to verify the conditions quoted on the lease

24 East Greenway Plaza Ste 1515, Houston, TX 77046
T 281.985.9900 www.sunnova.com

Sunnova ITRON Meter RMA Process

This process is for Meters Delivered from CED prior to December 2013

1. Call or Email Sunnova Customer Service and Report RMA Request with Meter ID
2. Receive RMA Code from Customer Service
3. Complete Form and Return with Meter to Address Below

Partner Name: _____

Meter ID: _____

Have you power cycled the meter? (Circle One): Yes No

Description of Continuing Problem (Place an X on the correct reason):

___ Screen is blank

___ Screen shows code other than 106

___ Meter reports 0 kWh

___ Other _____

Returns Contact:

Name: _____

Phone Number: _____

Mailing address for Returned Equipment:

_____

_____

_____

RETURN EQUIPMENT WITH FORM TO:

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24 East Greenway Plaza
Suite 1515
Houston, TX 77046

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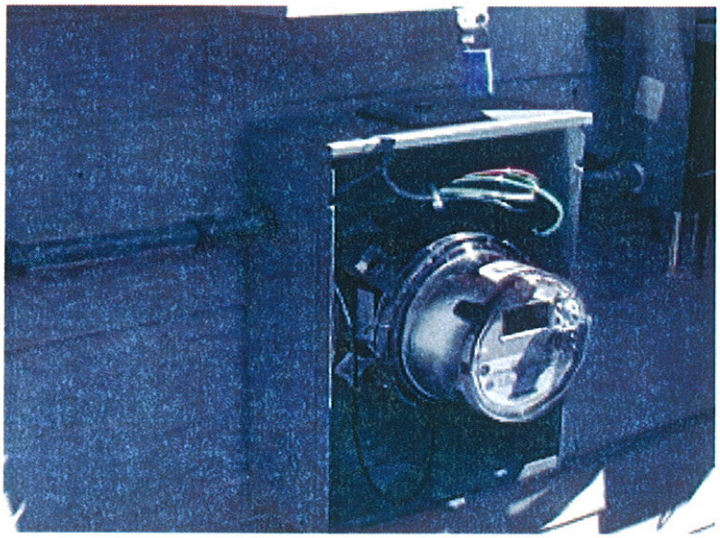
24 Greenway Plaza, Suite 1515, Houston, TX 77046
O 281.985.9900 / customerservice@sunnova.com / www.sunnova.com

PHYSICAL INSTALLATION

Installing the Sunnova meter is in many ways, similar to the installation of a basic socket mounted utility meter. Once energized, installation and provisioning should only take 30 minutes. For a sucessful install, there are two main points to consider:

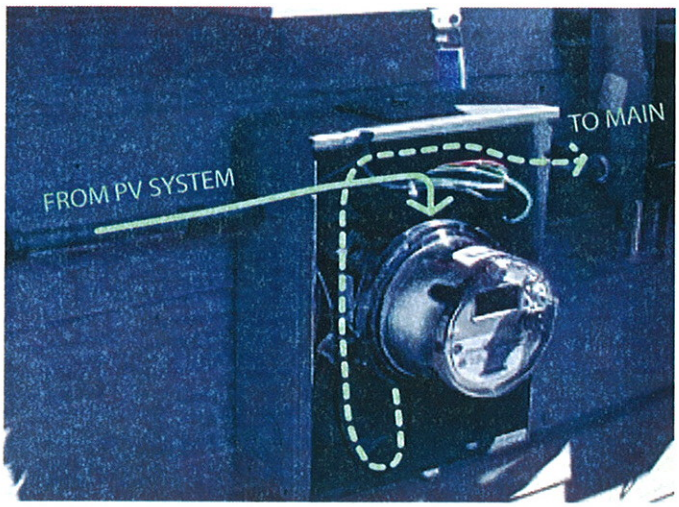
- 1. **Location** - give the meter clear access to the cell signal, access can be blocked by interior walls and clutter. Meters previously installed indoors have not connected to the internet. **Sunnova recommends mounting the meter on an exterior wall of the home whenever possible.**
- 2. **Wiring** - Please remember to wire the meter with the **PV System as the line, i.e. wire the meter base TOP-DOWN coming from the PV System.** This is often reverse for utility meter installations.

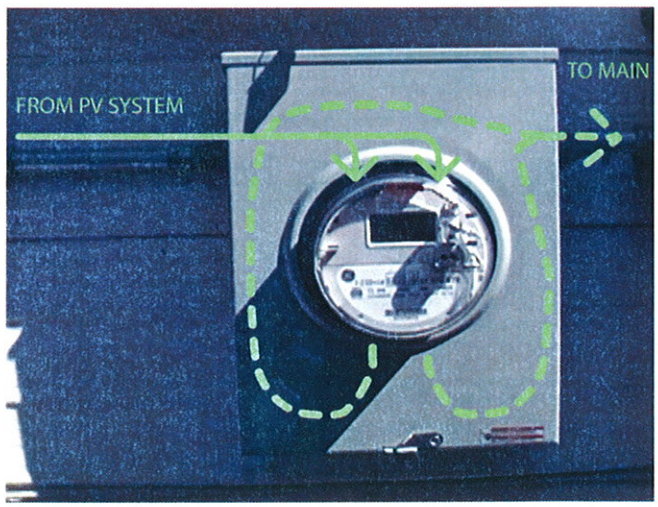


INSTALL THE METER IN A LOCATION FREE OF OBSTRUCTIONS IN ORDER TO GUARANTEE CELLULAR ACCESS TO THE INTERNET. GARAGE INSTALLATIONS HAVE BEEN KNOWN TO BLOCK CELLULAR SIGNAL

SUNNOVA RECOMMENDS INSTALLING ON AN EXTERIROR WALL WHENEVER POSSIBLE

<u>WIRE THE SOCKET BASE TOP-DOWN FROM THE PV SYSTEM.</u> ***THIS IS REVERSE OF A TYPICAL UTILTY METER INSTALLATION.





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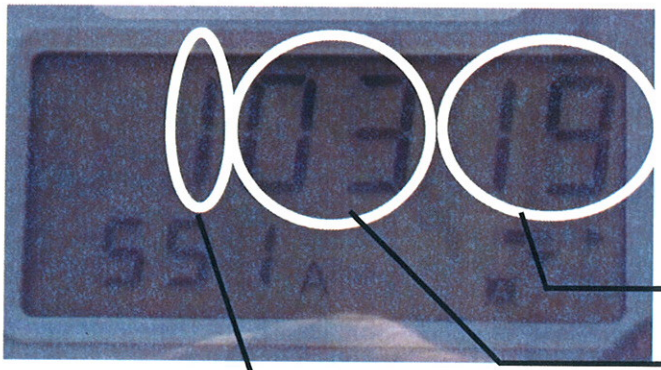
PROVISIONING PROCESS



Screen 551 will indicate connectivity. A 551 screen with a "**106xx**" indicates set up is done (xx being a 2 digit signal code). Pay attention to the sequence of numbers on this screen to get an indication of the cellular signal being recognized by the meter.

The last two digits indicate signal strength

The second two digits indicate the Meter State.

The first digit indicates cell coverage.

***Please refer to the tables below to decipher the connectivity of the meter .
***The example above is in cellular coverage ("1"), attempting to auto configure ("03") and is receiving acceptable signal strength ("19")
***poor signal strength does not mean the meter will not connect to Sunnova servers

Coverage

1	●	In Cellular Coverage
0	●	Out of Cellular Coverage
2	●	Attempting to Register with Network
3	●	Not Registered with Cellular Network

GE I210 Display Code (XX) Definitions:

27 to 31	Excellent
20 to 26	Good
12 to 19	Acceptable
8 to 11	Marginal
0 to 7	Not Acceptable to Poor

Smart Meter State

00	●	Initial state – SmartMeter not Quality Controlled yet
01	●	SmartMeter passed the Meter Integrator QC
02	●	SmartMeter passed Utility QC & is ready for deployment
03	●	SmartMeter is attempting to auto-configure with configuration server
04	●	SmartMeter is configured & is attempting to register with TMS
30	●	SmartMeter failed to automatically download configuration
05	●	SmartMeter has automatically registered with TMS
31	●	SmartMeter failed to automatically register with TMS
06	●	TMS has successfully provisioned the SmartMeter
80	●	SmartMeter failed to transmit messages in up to 24 hours
81	●	SmartMeter failed to transmit in at least 24 hours (# messages < 10)
82	●	SmartMeter failed to transmit in at least 24 hours (# messages >= 10)

***The meter shoud provision in 30 minutes (provide a 106xx code). If the meter does not provision, power cycle by unplugging the unit from the socket and letting sit for 15 minutes, then re-install the unit. If the problem persists, please install a different meter and RMA the faulty unit.