

Solar Photovoltaic Systems Policy Manual Addendum

Solar photovoltaic (PV) systems are considered an eligible measure for WAP-eligible households. The cost of the solar measure must be covered by braiding funds from federal and/or non-federal sources. Funding to cover installation costs can be sourced from:

US DOE Funding

- Any solar installation utilizing any amount of USDOE funding must follow all USDOE funding rules, with exceptions to the rules for the portion funded by EAPWX (if also used) as stipulated below.
- PV systems may be considered as a potential Energy Conservation Measure on site-built single-family homes owned by the occupant and rental buildings with one to four units.
 - Manufactured homes are currently not eligible for rooftop PV.
- To ensure that WAP PV installation projects qualify for a categorical exclusion from National Environmental Policy Act (NEPA) environmental review requirements, PV systems must be installed on the household roof (includes an attached garage roof). Installation on detached garages or other detached outbuildings is not permitted. **NOTE:** PV installations on detached garages, outbuildings, or as ground-mounted or pole-mounted systems **can** be submitted to USDOE for approval, on a case-by-case basis. These types of projects are currently not included in the existing USDOE WAP NEPA Categorical Exclusion for solar.
- The US DOE average solar cost per unit is for PY24 is \$4,169.
- The measure SIR minimum achieved by running a WA Itemized Cost input must be at least 1.0, using a 20-year measure lifetime. US DOE allows for the use of a greater measure lifetime, in WA, if the warranty period of the shortest warrantied component is greater than 20 years.
 - The job SIR must also meet a minimum of 1.0 and the solar measure must be the last measure to clear SIR on the overall Job SIR list of measures.
- See page 4 *Braiding EAPWX funds on USDOE funded projects* for more information regarding Cost Effectiveness and solar Average Cost per Unit.

EAPWX Funding

- EAPWX funding can be used for PV installations only when in combination with USDOE funding.
 - PV measures using only EAPWX funding are not authorized at this time.
- USDOE funding rules given above apply to the use of EAPWX funding, with the following exceptions:
 - Measure timeline specified in the SIR calculation (via an itemized cost entry) for the amount funded by EAPWX will be 25 years.
 - The measure cost funded by EAPWX must make a .75 SIR.
The EAPWX measure is not required to be, nor should it be, displayed on the full job SIR list.
 - After running the audit with the EAPWX PV solar measure for SIR, run the audit again, unselecting the "Include in SIR" box to decouple this item's SIR from the audit for the final audit run.
 - There is no solar Average Cost per Unit stipulation for the portion of the measure funded by EAPWX.
- See page 4 *Braiding EAPWX funds on USDOE funded projects* for more information regarding Cost Effectiveness and solar Average Cost per Unit.

Utility or other Leveraged Funding

- If available, utility, or other non-federal leveraged funding should be braided with Federal funding.
 - Installations must adhere to and comply with all program requirements of any leveraged funds programs supplying installation funds.
 - For example, if a utility solar PV rebate such as Xcel Energy's Income-Qualified Solar*Rewards Program is utilized, all program requirements must be met, including submission and approval of Rooftop Solar PV Application, and successful completion of required permitting, net metering and interconnectivity agreements.
 - Any front-end incentives from a utility program, such as Xcel Energy's Income-Qualified Solar*Rewards, or other leveraged fund source, will be assigned by the client to the solar installer to be applied to the front-end installation cost.

POLICY

□ **System size:**

- a. Each installed system for single family homes shall be no smaller than 1.8 kW and no larger than 5.0 kW. System size of slightly greater than 5.0 kW may be allowed on a case-by-case basis if the preferred layout exceeds 5.0 kW with the inclusion of the desired number of modules. For example, if a roof surface would accommodate a four-by-four layout of 16 325-watt modules, for a total system of size of 5.2 kW, this should be submitted as a special case, rather than requiring that only 15 modules be installed to keep the system size under 5.0 kW.
- b. Each installed system on multi-family homes of two to four dwelling units may be up to a maximum size of 15 kW. Solar PV is not an eligible WAP measure for multi-family buildings with five or more dwelling units.
- c. PV systems must be sized to generate no more than 100 percent of the electricity used by the WAP customer during a typical year.

□ **Warranties and Other Requirements:**

- a. Battery storage is not permitted as part of a WAP PV project.
- b. No tree removal would occur.
- c. All equipment must be new and UL CERTIFIED and listed on the California Energy Commission website at [Solar Equipment Lists Program | California Energy Commission](#).
- d. All installed solar PV systems will include theft deterrent devices, such as break away nuts and bolts, that will not void the PV panel/module manufacturer's product warranty or production warranty.
- e. PV modules must carry at least a ten (10) year manufacturer's product warranty, and at least a twenty (20) year manufacturer's performance/output warranty that modules will generate no less than 80% of rated output under Standard Testing Conditions (STC).
- f. Inverters shall be UL 1741 Certified, and shall be, at a minimum, string inverters with DC optimizers or micro-inverters having a minimum twenty (20)-year warranty. Twenty-five (25) year warranties on inverters are preferred.
- g. Warranties shall start on the date of weatherization agency's final inspection.
- h. All rooftop solar PV systems must carry at least a one-year workmanship warranty from

the subcontractor(s) with a minimum five-year installation workmanship warranty preferred.

- Exception: If a utility rebate is used on the installation, and the rebate includes a back-end performance-based incentive (PBI) payment, the workmanship warranty must be extended to cover the term of the back-end incentive payment term.
 - In exchange, the PBI will be assigned to the contracted solar installer. For example, installations on which Xcel Energy's Income-Qualified Solar*Rewards funds a portion of installation costs receive a PBI for 10 years. Workmanship warranties for these projects must cover the entire term of the PBI for the back end PBI to be assigned by the client to the solar installer of record.
- The workmanship warranty is intended to cover any unexpected operations and maintenance (O&M) costs not covered by the manufacturer's warranty, including the cost of associated labor or material costs of the needed O&M. Installers must provide written documentation to the WAP Service Provider and to the client stipulating the term of the workmanship warranty and what is covered by the warranty.
- i. All rooftop PV installations must receive a final inspection by a certified Quality Control Inspector (QCI). The QCI final inspection must verify that all permits are acquired and signed off by all required parties. The QCI inspector must also confirm the following have been completed or conducted:
- j. Confirmation of warranty information provided to the building owner/ household resident.
 - client education provided by PV installation contractor, including any Operations and Maintenance required for system.
 - quality of install, and acquisition of all required paperwork, including required state electrical inspector sign-off.
 - client interview for satisfaction.
 - review of the project recap sheet and Solar Book to ensure file completeness.
- k. For rental properties with two to four units, a property owner contribution may be required based on individual Service Provider policy. Service Providers may find a property owner contribution to be necessary to allow the project to meet the required SIR thresholds.

3. Braiding EAPWX funds onto USDOE funded project:

When braiding EAPWX funding with DOE funding, the following policies are variable depending on the source of the funds. In general, Solar into WAP projects follow all policy requirement as filed with the USDOE, with the following exceptions:

4. Cost-effectiveness:

- a. Per USDOE requirements, the portion of the project costs covered by USDOE funds must achieve a savings-to-investment ratio (SIR) of 1.0 or greater, as determined via SIR calculation in Weatherization Assistance (WA).
- b. When project braids together USDOE funds with leveraged utility or other funds, **but no EAPWX funds**, the full expected annual system production should be assigned to the USDOE-funded itemized cost measure.
 - The portion of project cost provided by USDOE must make a measure and job SIR of

- 1.0, and the solar PV measure must be the last measure in the list of job measures clearing 1.0 SIR. If the measure is not the last on the list, the project requires pre-approval from Commerce.
- No SIR calculation is required to be run, nor should it be, for the funds covered by leveraged utility or other funds.
 - SIR calculations done on the funds supplied by USDOE must use a 20-year lifetime or use the warranty period of the shortest warrantied component.
- c. When USDOE and EAPWX funds are combined on a PV project (with or without leveraged non-federal funding), the percentage of the expected annual system production assigned to each Federal fund is variable depending on how many kWh each fund needs to make the associated SIR requirement.

The expected kWh production TOTAL must be fully assigned between the two Federal funds; WA SIR calculations are not required on the portion of project cost covered by any leveraged funding (non-federal) also used applied to the project.

When braiding USDOE and EAPWX funding on a solar measure, two SIR calculations must be run, with each portion of funding meeting the SIR requirements as stipulated for the specific fund.

- SIR calculations run on the EAPWX portion of solar project funding must make a SIR of .75, utilizing a 25-year lifetime. EAPWX funding does not need to be, nor should it be, included in the job SIR list of measures.
- After running the audit with the EAPWX PV solar measure for SIR, run the audit again, unselecting the "Include in SIR" box to decouple this item's SIR from the audit for the final audit run.
- SIR calculations run on the USDOE portion of solar project funding must make a measure SIR of 1.0, utilizing a 20-year timeline, the job SIR must be at least 1.0, and the solar measure **must** be the last measure to make 1.0 on the overall job measures list.

PROCEDURES

1. **Site Evaluations:** The service provider auditor should inspect the home during the initial energy audit to determine if the home is a good candidate for rooftop PV. The auditor should use the solar suitability pre-assessment checklist, noting the items below. Further detail on these items is provided below this list.
 - a. age and condition of the roof,
 - b. the roof covering type,
 - c. roof orientation (azimuth) of between 120 and 240 degrees (southeast to southwest);
 - Solar array installations with azimuth of 90-119 degrees, or 241-270 degrees may be eligible but require Commerce review and assessment before seeking Installer bid,
 - d. open square footage available for panel installation, and an estimate of the number of modules that can fit on the roof,
 - e. any potential shading obstructions,

- f. the roof where will be installed should be free of shade from 10am to 2 pm,
 - g. the status and size of the home's main electrical panel,
 - h. available locations and space for mounting electrical components, and
 - i. an evaluation of electricity usage. Initial evaluation may be based off estimated electrical load, but solar installers will need actual monthly electrical bills for final system design.

- 2. Roof Condition:** If roof is in poor condition, it must be repaired prior to installation of rooftop PV. Repairs must be able to qualify as an incidental repair measure (IRM), or funded by funds other than USDOE funds, or the solar PV measure must be deferred until roof repairs are completed. See Policy Manual 4.2.2 for requirements to handle roof repairs as an IRM.
 - a. In assessing roof condition, auditors should consider:
 - b. The age or suspected age of the roof. The remaining estimated roof life should be at least 15 years:
 - c. Whether roof framing and sheathing are in good condition, if there are any roof leaks, if there are missing or deteriorating shingle. Are the shingles themselves no older than 10- 12 years?
 - d. What is the tilt angle of the roof? Best for solar is between 20 and 45 degrees (4/12 to 12/12), with 38 degrees tilt the most ideal for rooftop solar in MN (to maximize production year- round)
 - e. Is the roof structure sound? (2' on-center trusses, no soft spots in the roof, no broken or sagging trusses, etc.)
 - f. A [Standardized Load Table](#) for residential solar has been developed by Commerce and MN Dept of Labor and Industry

- 3. Electrical Service:** A thorough inspection of the existing electrical system must be performed prior to considering the household for PV. Consideration must be given to whether enough physical space exists near the electrical service to install the solar electrical components, as well as if space exists in the electrical panel to add the PV service. 200 Amp Service with open circuit breaker slots would be ideal, though upgrades to the electrical system will be allowed if the upgrades can be handled under the IRM policy. (See Policy Manual 4.2.2 and the Allowable Measures Chart.)

- 4. Preliminary Qualification work:** In addition to onsite assessment of the household's potential to be suitable for PV, WAP personnel should also perform an assessment of the solar suitability of the household by reviewing and assessing the items below.

- 5. Household electrical bills:** Gather household electrical bills, or use EAP application numbers, to get an estimated annual kWh usage number and cost.
 - Initial energy usage estimates may come from the EAP application, but solar installers will need at least 12 months of actual electric bills or a 12-month summary (both \$ and kWh used each month} once the installer is involved.
 - Most electric utilities will supply a 12-month summary of electrical usage in kWh and total charges in dollars upon request.
 - An analysis document of the full year electrical usage must be included in household client files as part of the final Solar Book.

- 6. Solar Suitability Analysis application:** A solar lidar tool such as the Solar Suitability online analysis application should be accessed to determine initial solar resource. (Note: this tool is very sensitive to the exact placement of the locator on a rooftop. You will want to try several specific roof spots to determine the best solar lidar results}. Print a copy of the REPORT for inclusion in the Solar Book for the household file. The solar resource tool results should be cross-checked with the auditor's evaluation of the site and other recent online imagery such as Google Earth and/or Google Maps Street View to check for shading from trees that may have grown significantly since the Solar Suitability app lidar data was collected (between 2006 and 2012).
- 7. PV Watts:** utilize [PV Watts](#) to run an initial system size production estimate for the household location. If more than one roof surface is expected to be used for the PV installation, a PV Watts run should be done for each solar-potential roof surface using an estimated size of the installed system for each separate roof surface (for example, 3.0 kW on a SE-facing roof surface and 2.0 kW on a SW-facing roof surface).
- 8. SIR calculation:** Utilizing either USDOE or EAPWX funding on a solar project will require WA SIR calculations run on the portion of the installation cost to be funded by each fund, respectively. The SIR calculations will be done in WA using the itemized cost functionality. Any IRM costs to support the solar installation must be considered as well and handled as per standard IRM requirements. (See Policy Manual 4.2.1. and 4.2.2.) SIR calculations must be run as part of the initial "solar suitability" assessment (using estimated price, size, and generation) and then once the job is contracted, using the new numbers as supplied by the contracted solar installer. Results of both the preliminary assessment and the post- contracting SIR calculations must be documented in the Solar Book.

 - Using the itemized costs tab in WA, create an itemized cost measure for each federal funding source to be used.
 - If using only USDOE funding on the job, along with leveraged utility or other non- federal funding, enter the proposed system size, the total expected annual kWh production of that system, and the cost to be covered by DOE funding. Specify life of system as 20 years.
 - The measure and job SIR must both be at least 1.0, and the solar measure must be the last measure to make SIR in the full "job measures" chart.
 - If the measure is not the last on the list, the project requires pre-approval from Commerce.
 - If braiding USDOE and EAPWX funding (with or without leveraged non-federal funding), two WA SIR calculations must be done. The total estimated annual kW generation number must be divided between the two funds, as appropriate, in a manner that facilitates each fund meeting the required SIR stipulations.
 - For the EAPWX-funded portion of the cost, the measure life should be specified as 25 years, and a measure SIR of .75 must be met. The EAPWX funding is NOT required to be shown on the full, ranked job-measures list, nor should it be.
 - After running the audit with the EAPWX PV solar measure run for SIR, run the audit again, unselecting the "Include in SIR" box to decouple this items SIR from the audit for the final audit run.

- The requirements for the SIR calculation for DOE-funded portion are the same as outlined in the bullet above, except for using only a portion of the total estimated annual kWh generation in the calculation, rather than assigning 100% of the kWh production to the USDOE funds.
- Solar project audits may need to be run two or more times, with adjustments made each time in the percentages of estimated kWh generation assigned to each fund, to achieve the desired SIR results.

9. Solar Professional Site Assessment: After the agency auditor determines that the home is potentially a candidate for rooftop PV, a rooftop PV site assessment must be performed by an experienced solar site assessor or solar installer; a North American Board of Certified Energy Practitioners (NABCEP) certified professional is preferred but not required. Solar installers are responsible for performing on-site solar site assessment and making the final decision as to whether the household is appropriate for the installation of solar.

10. Procurement of Services: Service Providers must follow all standard WAP procurement requirements for acquiring the services of a contractor. The solar installer contracted to do the job will design and appropriately size the proposed solar PV system (within the stipulations of the WAP program rules) and provide an estimated annual kWh production number.

Solar Installation and Site Assessment professionals must be eligible solar contractors who meet all Federal and State requirements.

Project Approval Process:

Commerce review and approval is needed on the initial PV installations done by each individual service provider. Commerce review will be required for at least the first five installations done by each service provider, or until Commerce staff determines that the Service Provider has demonstrated the ability to consistently complete PV projects in accordance with policy and determined Commerce review is no longer required.

Review and approval occur as a three-phase process as delineated below. For each phase, documentation should be sent to the Solar Technical Assistance Liaison (STAL), as a single PDF file, for initial STAL review and Commerce review and approval.

Phase I approval submission package:

1. Preliminary site in-house solar suitability work: WAP auditor's site assessment checklist, PV Watts results, LIDAR/ Solar Suitability report, WA SIR estimated results (from the auditor's estimated costs and PV Watts-estimated energy production), site pictures (aerial and ground-based);
2. Solicitation and Procurement documentation, including an installation agreement form, full professional solar site assessment, and resulting bid for installation cost with estimated system size and generation estimate (estimated kWh production and percentage of HH usage offset);
3. Updated WA SIR using the installer's bid numbers for system size and estimated kWh generation. The measure cost for the SIR calculations(s) should be the portion of the installation costs funded by

USDOE, EAPWX, or both.

4. Updated PV Watts results, or results from similar software used by the installer (with system size, azimuth, de-rate factor, shading percentage, snow load and other details from solar installer's bid).
5. An analysis of one year of household energy usage, with both monthly kWh-used and monthly billed-cost information.
6. Proof of SHPO review and approval, including both the "review receipt" from using the SHPO submission tool and a separate email (from the designated State of MN SHPO-reviewer) showing "Solar SHPO review completed and HH approved for Solar," or notation regarding the household's exemption from solar review due to the age of building.

Phase II approval submission package:

1. Commerce Phase I packet approval email (until Commerce review no longer required).
2. Final contract and supporting documentation from solar installer receiving bid.
3. Completed system design from installer.
4. Full application package submitted for utility rebate, permit(s), interconnection agreement, and net metering agreements. Include any supporting documentation submitted, such as a one-line electrical diagram, lay-out design, wiring design, etc.
5. Final approvals and supporting correspondence related to utility rebate (or other leveraged funds), permit(s), interconnection agreement. net metering agreement.
6. Planned Installation timeline (given in days or weeks, not date specific).
7. Signed household owner or property owner agreement allowing installation of Solar PV and acknowledging that the building owner does not intend to remove the system prior to the end of the system's useful life, as well as building owner agreement that Commerce can receive post-installation production information.
 - a. For rental properties with two to four units: property owner agreement must include agreement to provide any required contribution as per Policy Manual section 3.3.6.

Phase III (completion) approval submission package:

1. Commerce Phase II packet approval email (until Commerce review no longer required).
2. Client utility incentive-assignment documents (front-end and/or back-end)
3. Copy of inspector's sign-off for all required permits and inspections.
4. Copy of QCI sign-off.
5. Details on when interconnection was completed, or when interconnection is scheduled to occur.
6. All other post-work contractor documents as normally required of any WAP contractor (lien waivers, invoices, customer completion certificates, etc.).
7. Copies of warranties, operating manuals, system operation documents provided to household, and
8. Household signed acknowledgement of receipt.

The Phase III approval process must be completed, including required state electrical inspector sign-off, prior to payment of the solar installer's invoice for service.

Household Client File Inclusions:

In addition to items listed in Policy Manual section 4.3, the following must be included in the household file

as part of the "Solar Book":

- All documents and emails related to acquiring Commerce project approval, including complete Phase I, II and III packets.
- Specification sheets, warranty information, and operating/owner's manuals for all major components of solar PV system.
- Client signature forms related to client education; client satisfaction; building owner/property owner agreement; and client confirmation of receipt of warranty information; release of client contact information; at least 12 months of electric usage history to the solar installer; and access to real-time and cumulative data on solar PV system performance for at least 10 years to the installing solar company, the Weatherization Assistance Program (WAP) service provider, and the Minnesota Department of Commerce.

Rooftop PV Solar Installer Requirements

Solar installer will ensure that personnel are prepared to and capable of instructing WAP customers on system operations and provide all warranty information and operating manuals to the WAP customer, Service Providers and, upon request, Commerce.

Installer will ensure that installed system is commissioned and operating properly.

- Installer will provide Manufacturer's Specification Sheets the component materials used on the installation:
 - PV panel/module utilized, including warranty information.
 - Inverter/Microinverters/Optimizers utilized, including warranty information.
 - Racking, mounting frames, brackets, or other mounting system utilized, including warranty information.
- Installer will provide all labor, materials, permits, supplies, equipment, and supervision required to design, furnish, construct, and commission the rooftop solar PV system, including all necessary devices and connections between inverter and main electrical service. **MATERIALS EXCEPTION:** If Service Provider has participated in and negotiated a Bulk-Buy master agreement to acquire the major solar PV components, those bulk-buy materials may be utilized if they meet all the other requirements and stipulations of this policy.
- Installer will provide Installation drawings and field wiring diagrams.
- Installer will provide in electronic format preliminary and as-built versions of the submittals and drawings, including shade analyses.
- Installer will provide lien waivers for payments at time of bill payment.
- Confidentiality of all eligible WAP client information is required in accordance with the Privacy Act of 1974. Solar installers shall be responsible for the privacy of all data disclosed to them as necessitated to participate in this project.
- Installer shall agree to attend any pertinent meetings/conference calls as deemed necessary by any WAP Service Provider, Commerce, and/or utility. Invoices submitted by solar installer will be authorized for payment only after all required forms and documents have been submitted, and the weatherization agency verifies that all work is completed and conforms to the project

standards and requirements as well as the appropriate WAP Field Work Standards.

- Callbacks required solely due to solar installer error and/or deficiencies in installer work will be performed promptly, and installer will be responsible for all associated expenses.
- Installer is solely responsible for determining the techniques, means, methods, and materials of installation to meet the requirements of this solicitation and subsequent contract(s). All work must comply with the following standards, regulations, policies, and procedures:
 - OSHA Worker Safety Regulations (29 CFR 1910 & 1926)
 - WAP Policies and Procedures
 - DOE Federal Regulations:
 - [Weatherization Program Notices and Memorandums | Department of Energy](#)
 - Xcel Energy's Solar*Rewards Program Requirements (or similar utility solar incentive):
 - [Solar*Rewards | Xcel Energy](#)
 - EPA Lead-Safe Renovation Requirements:
 - [Lead Renovation, Repair and Painting Program Rules | US EPA](#) All DOE requirements for lead-based paint safe work
 - NESC (National Electrical Safety Code), ANSI (American and Electronic Engineers), NEC (National Electrical Code) requirements.