Solar Ready II

Stakeholder Meeting

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U.S. Department of Energy

DVRPC's Solar Ready II Objectives

The goal of Solar Ready II is to create more streamlined and standardized solar practices in the region, and to achieve measureable improvements in the region's solar market conditions.

Solar Ready II will:

- Identify existing conditions and barriers to solar adoption in Greater Philadelphia
- Develop and implement a plan to reduce soft costs of solar PV adoption (best management practices)
- Provide free "light" technical assistance to interested municipalities
- Provide training on solar PV best management practices to municipalities, and related market stakeholders

Goals of Today's Meeting

1. Recap: Solar Ready BMPs
2. Permitting and zoning interviews
3. Best Practice Development: Permitting
4. Best Practice Development: Zoning
5. Best Practice Development: Training Modules
6. Sign up for review committees

Best Management Practices

Focus on **Permit Process, Zoning, and Customer Acquisition**

- Permitting guide and technical assistance
- Incorporate solar in zoning code
- Link municipalities to First Responder Safety training opportunities
- Solar 101 Training Modules

Recap:
Permit Process Improvements

- Unclear or inconsistent requirements
- Lengthy application review process, even for small projects
- High or inconsistent fees
- Multiple inspections and long time windows
- Lack of familiarity with solar
- Regional inconsistency!

Goal: Develop guidance and training on permitting best practices

Permit Process Interviews

- **Delaware**: Radnor, Media, Chester, Edgmont
- **Montgomery**: Pottstown, Plymouth
- **Mercer**: Princeton, West Windsor

Solar Ready II

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dvrpc Delaware Valley Regional Planning Commission

Standardizing and Streamlining Solar PV Permit Processes in Greater Philadelphia

Municipal Interview Questions

1. What is the permitting process for installing a residential or commercial solar energy system?
2. How is the permit process information made available?
3. What documents and information are required to review a permit? (e.g. site plan, electrical diagram, inverter/module spec sheets for all manufactured components)
4. Are professional approvals required? (licensed electrician, wet stamps for structural integrity)
5. What factors affect the municipal review process time? (how many reviewers, how long to review, how many inspection visits, training of inspection staff)
6. What is the fee and how is that fee for a solar PV permit assessed? (is it a value based fee, or flat fee?)

What we heard from municipalities

- Municipalities have existing (working) processes for electrical and building permits
- No specific solar permit application or checklist
- Structural review of roof including wet stamp is almost always required
- Variation in completeness of applications by installers
- Installations do not match design drawings
- Most use third-party inspectors
- Value-based fees are most common

Permitting Process Improvements

- **Pre application**
  - Checklists, installation guides
- **Application submittal and review**
  - Solar-specific forms
  - Flat fees
  - Over the county/pre-qualified review of plans
  - Train staff on solar
- **Inspection**
  - Consolidate or eliminate excessive inspections
  - Create checklists for inspectors

Municipal Feedback on Permitting BMP

- Would find a checklist and application helpful if it aligned with existing process
- Streamlined permit may be appealing to some ala Philadelphia
- Structural review: some willingness to offer alternatives to wet stamp requirement
- Value-based fees are required in NJ
- Expedited permit process is not feasible due to competing permitting priorities.

Permitting Checklists

Just the Basics

Solar Permitting Checklists

Checklists are an integral part of the permitting process. They provide a simple list of required information for either the permit application or the inspection that follows. As such, they can serve as guides for solar installers as well as permit review staff and inspectors. Checklists can save staff time for the jurisdiction by reducing the number of inquiries received from installers, and can also save time and money for the solar installer by making requirements clear and transparent. They can also help to ensure that application and inspection requirements are applied consistently across the board to all installers. In some cases, jurisdictions require applicants to turn in the completed checklist as part of the application to help to verify that the application is complete. Some jurisdictions choose to provide even more information in other guidance documents, as discussed on the reverse side of this sheet.

Tips for Application Checklists

- ✓ List required forms, such as building permit application form, and where they can be located
- ✓ List and describe required diagrams or plans, including the number of copies needed
- ✓ List any other required documentation, signatures or approvals
- ✓ Describe the fee structure and options for payment
- ✓ Provide online or in-person application submittal instructions
- ✓ Provide information about office locations, hours, and appropriate staff contacts
- ✓ Include citations to relevant code or other sources as much as possible for the applicant to reference

Tips for Inspection Checklists

- ✓ List the information required in advance of the inspection
- ✓ List what the inspector will look at on-site and what requirements are expected to be met
- ✓ Consider dividing checklist into appropriate sections, such as utility service/AC power source, inverter, arrays/modules, and grounding/bonding
- ✓ Explain who needs to be there and what applicant can expect during the inspection
- ✓ Provide information about office locations, hours, and appropriate staff contacts
- ✓ Include citations to relevant code or other sources as much as possible for the applicant to reference

Examples to check out

These jurisdictions have published checklists for solar permitting:

- Boulder County, Colorado
- Miami-Dade County, Florida
- Tucson, Arizona
- San Jose, California
- Berkeley, California
- Maui County, Hawaii

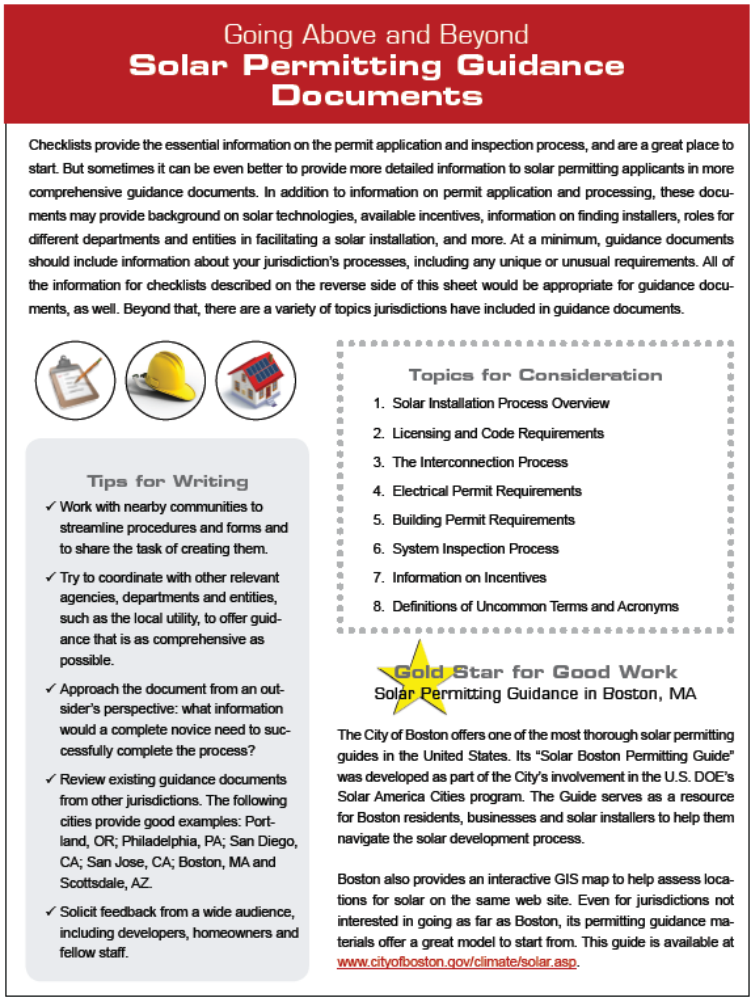
For more examples and discussion of permitting checklists and other guidance documents, see IREC's report, *Sharing Success: Emerging Approaches to Efficient Rooftop Solar Permitting*, available at: www.irecusa.org/wp-content/uploads/FINAL-Sharing-Success-w-cover-revised-final052012.pdf.

IREC Interstate Renewable Energy Council

www.irecusa.org

- List required forms, diagrams or plans and where they can be found
- List any other documentation, signatures or approvals
- Describe the fee structure and options for payment
- Provide submittal instructions
- Provide office locations, hours and appropriate staff contacts
- Include citations to relevant code or other references for technical requirements

Solar Installation Guide



Going Above and Beyond
Solar Permitting Guidance Documents

Checklists provide the essential information on the permit application and inspection process, and are a great place to start. But sometimes it can be even better to provide more detailed information to solar permitting applicants in more comprehensive guidance documents. In addition to information on permit application and processing, these documents may provide background on solar technologies, available incentives, information on finding installers, roles for different departments and entities in facilitating a solar installation, and more. At a minimum, guidance documents should include information about your jurisdiction's processes, including any unique or unusual requirements. All of the information for checklists described on the reverse side of this sheet would be appropriate for guidance documents, as well. Beyond that, there are a variety of topics jurisdictions have included in guidance documents.

Tips for Writing

- ✓ Work with nearby communities to streamline procedures and forms and to share the task of creating them.
- ✓ Try to coordinate with other relevant agencies, departments and entities, such as the local utility, to offer guidance that is as comprehensive as possible.
- ✓ Approach the document from an outsider's perspective: what information would a complete novice need to successfully complete the process?
- ✓ Review existing guidance documents from other jurisdictions. The following cities provide good examples: Portland, OR; Philadelphia, PA; San Diego, CA; San Jose, CA; Boston, MA and Scottsdale, AZ.
- ✓ Solicit feedback from a wide audience, including developers, homeowners and fellow staff.

Topics for Consideration

1. Solar Installation Process Overview
2. Licensing and Code Requirements
3. The Interconnection Process
4. Electrical Permit Requirements
5. Building Permit Requirements
6. System Inspection Process
7. Information on Incentives
8. Definitions of Uncommon Terms and Acronyms

Gold Star for Good Work
Solar Permitting Guidance in Boston, MA

The City of Boston offers one of the most thorough solar permitting guides in the United States. Its "Solar Boston Permitting Guide" was developed as part of the City's involvement in the U.S. DOE's Solar America Cities program. The Guide serves as a resource for Boston residents, businesses and solar installers to help them navigate the solar development process.

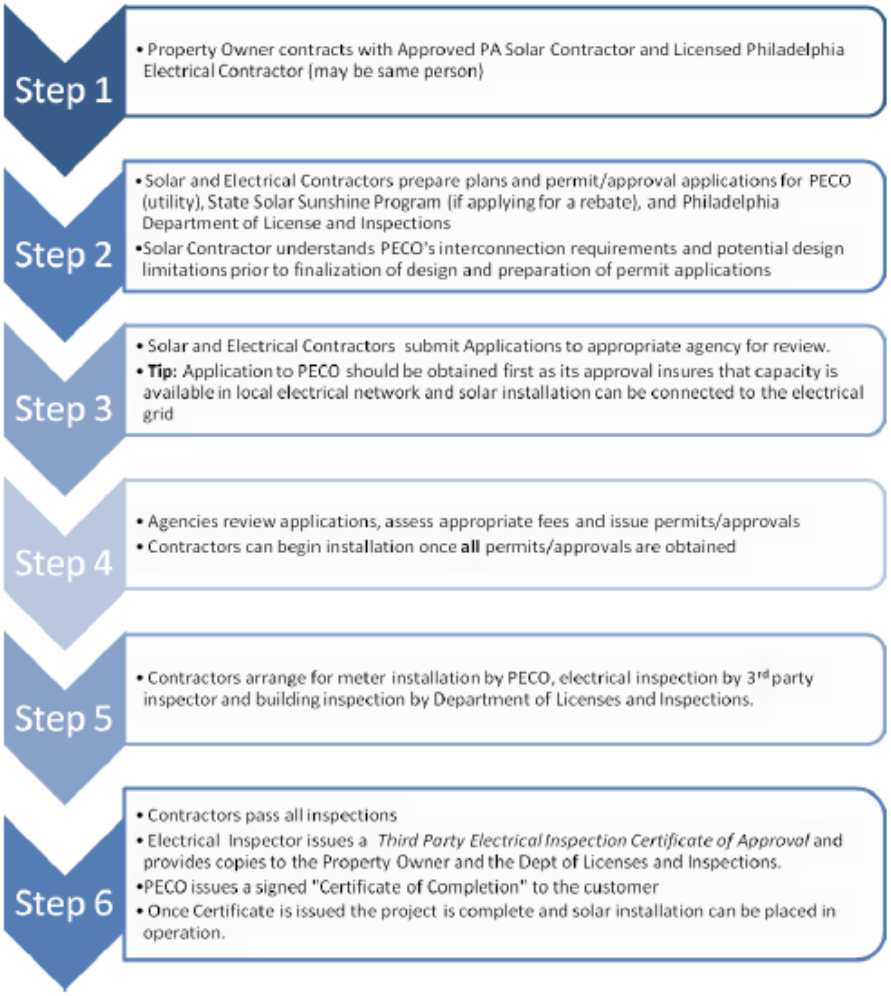
Boston also provides an interactive GIS map to help assess locations for solar on the same web site. Even for jurisdictions not interested in going as far as Boston, its permitting guidance materials offer a great model to start from. This guide is available at www.cityofboston.gov/climate/solar.asp.

- A broader look at the solar permitting process
- Installation process overview
- Licensing and code requirements
- Interconnection process
- Electrical permit requirements
- Building permit requirements
- System inspection process
- Information on incentives
- Definitions of uncommon terms and acronyms

4.0 SOLAR INSTALLATION PROCESS CODES AND REGULATIONS

4.1 Solar Installation Process Overview

Figure 4.1 presents a process diagram that identifies the six key steps for the implementation of a solar project. (Note that these are steps that will occur after a property has been thoroughly assessed by a qualified solar contractor and has been identified as a feasible site for a solar PV system. For additional details, see Sections 2 and 3 of this guidebook.) Each step is briefly described below:



Application

Application Submittal and Review

- Solar-specific forms
  - Utilize Solar ABCs, NY Unified Solar Permit, and others
- Flat fees
- Prescriptive structural review
- Streamlined permit criteria
- Over the counter review of plans
- Pre-qualified installer list
- Pre-qualified electrical diagrams
- Train staff on solar

PennFuture Model PA Permit Application

Solar Photovoltaic (PV) Permit Application

Page 1 of 3

Applicability: This Solar Photovoltaic Permit Application may be used for systems with the following qualifications:

- A total inverter capacity with a continuous AC power output of 13,440 watts (13.44kW) or less;
- A distributed weight load of less than or equal to five (5) lbs. per sq. ft.;
- A point load of less than or equal to 45 lbs. per sq. ft.;
- Installation on a roof with a single layer of lightweight roofing material;
- A mounting structure with an engineered product designed to mount PV modules with no more than an 18" gap beneath the module frames;
- The installation is overseen by a trained solar professional and a licensed Pennsylvania contractor;
- The installer assumes liability for the installation and the roof structure as it pertains to the installation.

If the System does not meet any of the above qualifications or the answer is "NO" to any of the questions in Steps 1 and 2 below, the municipality may require further information or review as it deems appropriate.

Questions regarding this Application should be directed to: _____. Definitions of terms used in this Application and sample application documents can be found in the *Solar Guide for Municipalities*.

Materials needed upon permit application submission

1. A completed copy of this Solar Photovoltaic Permit Application.
2. A site plan showing location of major components on the property. This drawing need not be to scale, but it should represent relative location of components at site (A sample site plan is included in the *Guide*.)
3. A single-line electrical diagrams showing the configuration of the photovoltaic ("PV") array, the wiring system, the overcurrent protection, the inverter, the disconnects, any required signs, and the AC connection to the building.
4. Specification sheets and installation manuals (if available) for all manufactured components including, but not limited to, PV modules, inverter(s), combiner box, disconnects, and mounting system.
5. An application fee of $ _____.

Basic Information

Brief System Description _____
(eg, number and power rating of panels; total power rating of system; panel and inverter manufacturer; inverter/microinverter output, location of system on property)

Address of Project: _____

Applicant Name: _____
Address: _____
_____
Telephone Number: _____
E-mail address: _____

Property Owner (if different from the Applicant):
Name: _____
Address: _____
_____
Telephone Number: _____
E-mail address: _____

Installation Company (The System must be installed by a contractor licensed by the Commonwealth of Pennsylvania):
Address: _____
_____
Telephone Number: _____
E-mail address: _____
HIC#: _____

Owner of Solar System (if diffent from Applicant or Property Owner):
Name: _____
Address: _____
_____
Telephone Number: _____
E-mail address: _____

tovoltaic (PV) Permit Application

Page 2 of 3

of the System will be overseen by (check one below):
ified solar equipment installer
olar equipment installer
ntractor with a license accepted by the municipality
r on the approved list for the Pennsylvania Sunshine grant program

with above qualification: _____

ay Mounting System

covering?

composition, lightweight masonry, metal, etc.)?
_____
avier roofing materials (e.g. slate, heavy masonry, tile) may not have the assumed dead hat are found with lighter weight roofing materials and may justify a further review to either in compliance or needs enhancement.

patible with the roofing material. Describe method *and* type of ons (e.g. flashing, caulk) _____

l inspection of the roof and confirmed that there is no pre-existing damage? (*If or any work necessary to repair the existing roof structure.)*

ngineered product designed to mount PV modules with no more than an ames? If YES, complete information on the mounting system below:
urer _____
_____

and Rails _____ lbs
t Points _____
t (Total Weight of Modules and Rails (from line b.) ÷ Total Number of e c.) = _____ lbs.

above , less than or equal to 45 lbs? If YES, complete the following:
Attachments Points on a Rail = _____ inches
ximum spacing allowed based on maximum design wind speed)
dules (square feet) _____ ft^2.
dule on Roof (Total Weight of PV Modules and Rails (from line b.) ÷ Total (from line f.) = _____ lbs/ft^2.

e (g) above, less than or equal to 5 lbs/ft^2?

ermit Application

cal Diagram)

er output of 13,440 Watts or less?

ner boxes are identified for use in PV systems.

per inverter.

service disconnecting means.

andard string system, micro-inverter, AC Module or tely represent the PV system? (refer to *Guide*)

ust conduct an on-site inspection of the System.
ided in Steps 1 and 2 above.
ction of the System and submit approval to

---

e Solar Installation Company

the "Company") hereby represent and warrant that:
curate and complete to the best of my knowledge;
porting the System; and
with the applicable requirements of the
tric Code and other applicable construction codes.

ation of this System, including any liability arising out
nify, defend and hold harmless
st any claims referring or relating to (1) the accuracy
ation; or (2) the representations and warranties

ation on its behalf.

_____
_____
te: _____

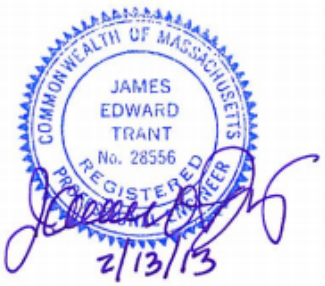
e verified to the
s accurate.
_____
_____
_____
_____

Prescriptive Process for Structural Review

Structural Review Guidance for Rooftop Residential PV (<10 kW)

Prescriptive Process for Structural Approval of Small PV Systems

Contents



1. Introduction to the Prescriptive Process

The goal of this prescriptive structural review process is to provide standard guidelines for the installation of rooftop solar PV systems on one- and two-family residences without the expense and time of utilizing a licensed structural engineer to evaluate load carrying capacity. This process is designed to be applied to all cities and towns in the Commonwealth of Massachusetts.

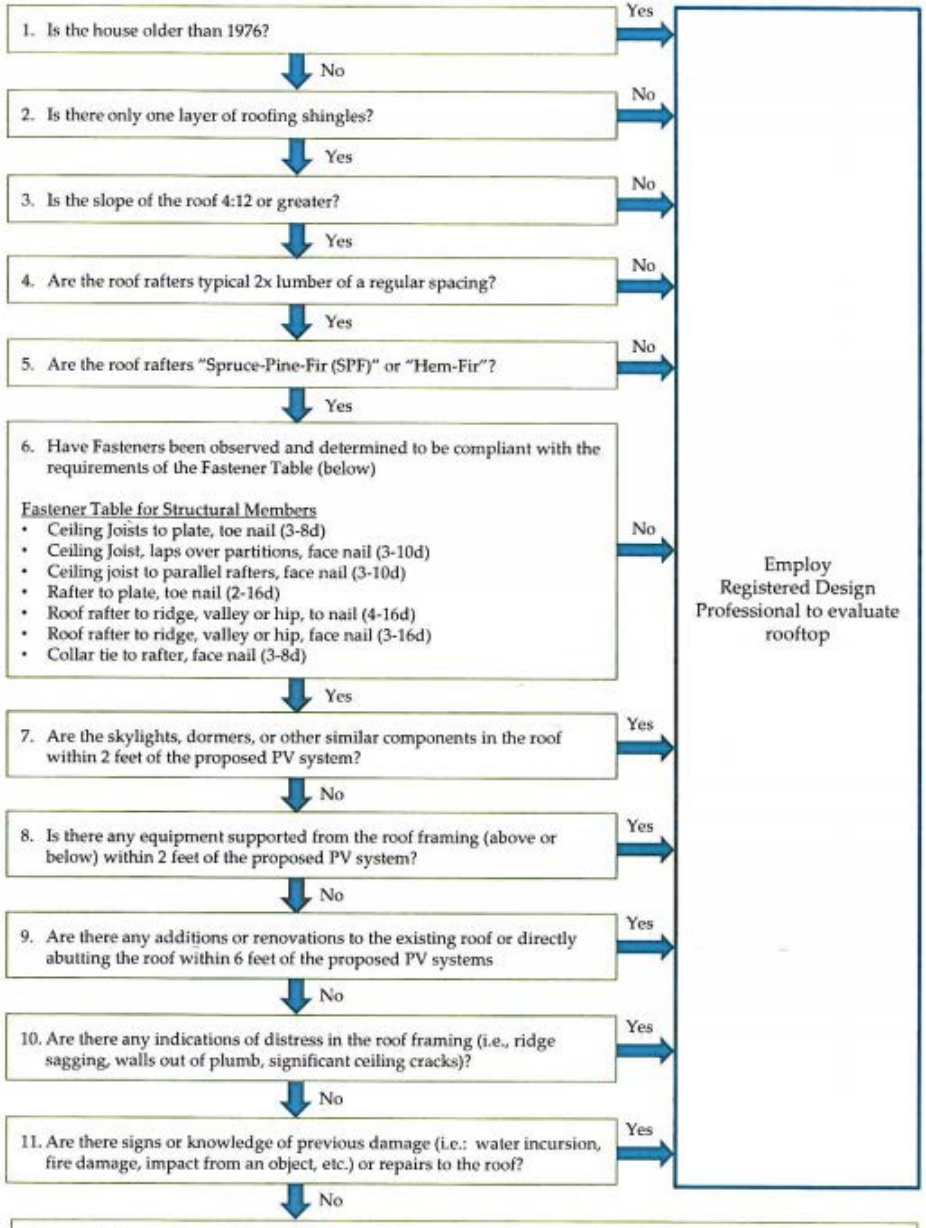
Residential PV systems, usually sized 10 kW and less, are typically very lightweight, approximately 3.0 to 3.5 pounds per square foot. Adding this amount of weight to a roof compares favorably to adding a second layer of roofing shingles, which does not require the advice of a licensed structural engineer in Massachusetts. The prescriptive method described herein is limited to flush-mounted PV systems, for which the effects of wind and snow accumulation can be better quantified using existing building code metrics.[1] PV systems are sometimes installed at a tilt to get the best exposure of the PV modules to the sun, but the tilt can cause an increase in the effect of wind and snow accumulation.

In order to qualify for the prescriptive structural review process, the building in question must be a 1-2 family dwelling built after 1975 with a light-frame wood construction and traditional rafters for the roof. Considering lightweight construction and rafter/truss data from 1997 and 2001, one could roughly estimate that approximately 10%-12% of homes in Massachusetts will qualify for the prescriptive

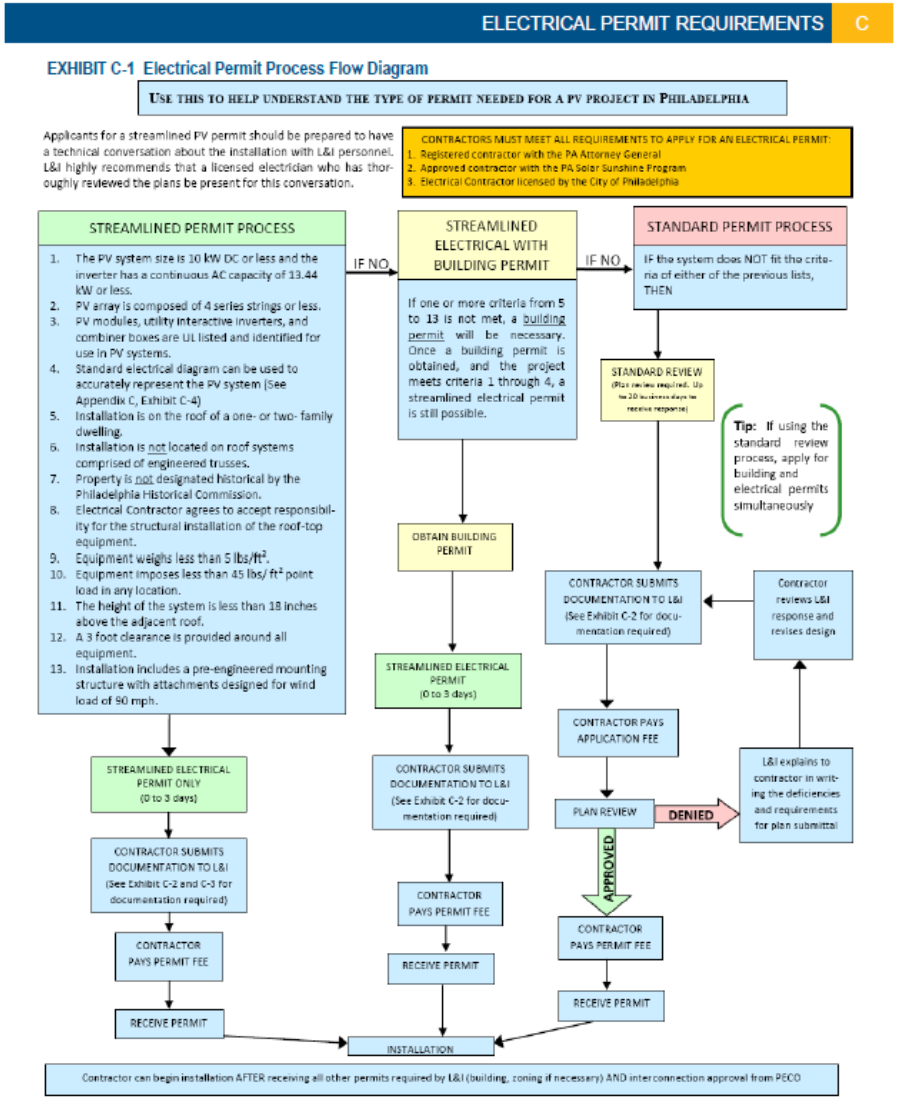
Structural Review Guidance for Rooftop Residential PV (<10 kW)

Prescriptive Process for Structural Approval of Small PV Systems

Prescriptive Process Flowchart for Residential PV <10 kW



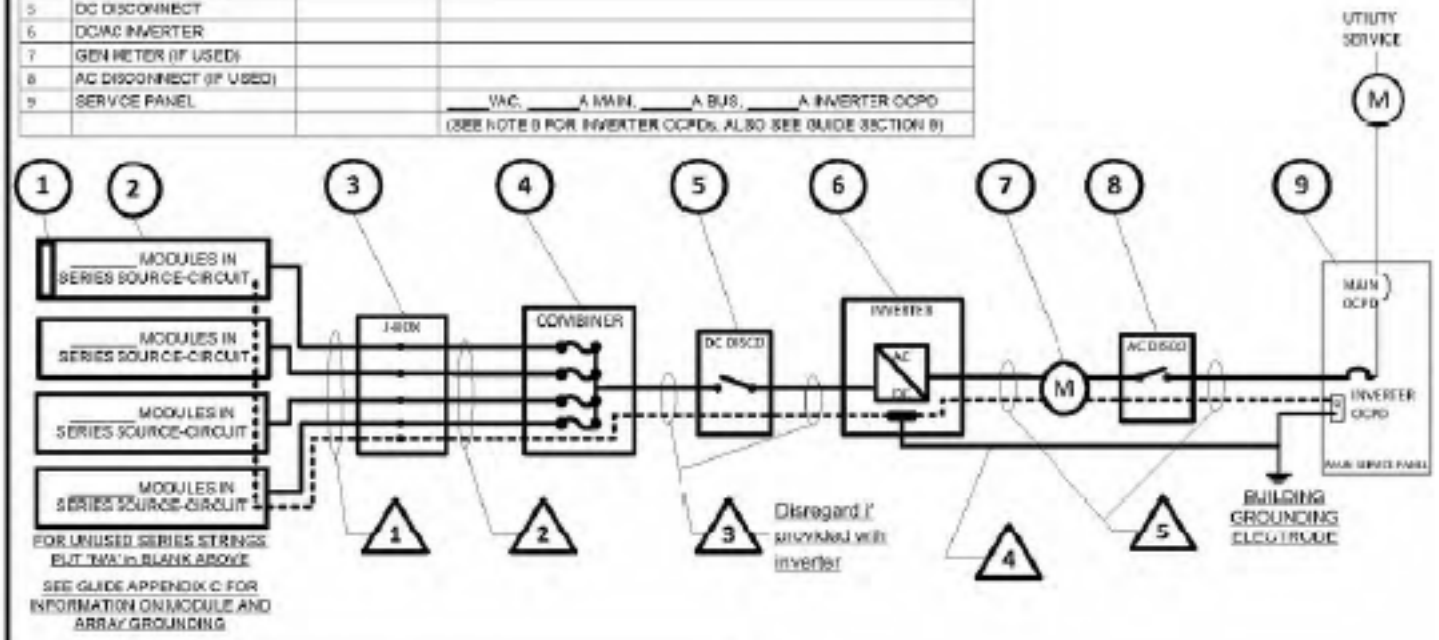
Streamlined Permit Criteria



STANDARD STRING SYSTEM SYSTEM ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE

TAG	DESCRIPTION	PART NUMBER	NOTES
1	SOLAR PV MODULE		
2	PV ARRAY		
3	J-BOX (IF USED)		
4	COMBINER (IF USED)		
5	DC DISCONNECT		
6	DC/AC INVERTER		
7	GEN METER (IF USED)		
8	AC DISCONNECT (IF USED)		
9	SERVICE PANEL		____VAC, ____A MAIN, ____A BUS, ____A INVERTER OCPD
			(SEE NOTE 9 FOR INVERTER OCPDs. ALSO SEE GUIDE SECTION 9)



CONDUIT AND CONDUCTOR SCHEDULE

TAG	DESCRIPTION OR CONDUCTOR TYPE	COND. GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE	CONDUIT SIZE
1	USE-2 ☐ or PV WIRE ☐			N/A	N/A
	BARE COPPER EQ. GRD. COND. (EGC)			N/A	N/A
2	THWN-2 ☐ or XHHW-2 ☐ or RHW-2 ☐				
3	THWN-2 ☐ or XHHW-2 ☐ or RHW-2 ☐				
	INSULATED EGC				
4	DC GROUNDING ELECTRODE COND.				
5	THWN-2 ☐ or XHHW-2 ☐ or RHW-2 ☐				
	INSULATED EGC				

Contractor Name, Address and Phone

One-Line Standard Electrical Diagram for Small-Scale, Single-Phase PV Systems

Site Name: _____

Site Address: _____

System AC Size: _____

Drawn By: | SIZE | DWG NO | REV

Checked By: | SCALE: NTS | Date: | SHEET

Zoning Code Considerations

- Height – Flat roof vs pitched
- Rooftop setbacks for first responder safety
- Ground mounted setbacks for nuisance
- Impervious coverage
- Glare
- Trees
- Historic preservation

Renewable Energy Ordinance Framework

Solar PV

DRAFT - SEPTEMBER 2014

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

Permitting and Zoning Training

- Have permitting checklists, application options available
  - Vet through municipal advisory group prior
- Coordinate CEUs
- Invite third-party installers
- Half day for permitting, half day for zoning, with note of overlap
- **Goal: January 2015**

Homeowner's Solar PV Checklist

Preliminary Questions

- ☐ Do I know how much electricity I currently consume and how much it costs?
- ☐ Do I have a south-facing roof? If not, do I have property with open space that might accommodate a ground-mounted solar PV system?
- ☐ Do I know where there is shading on my roof (or on my property) during different times of the day and at different times of year?
- ☐ Do I want to purchase and own the solar PV system, or do I want to work with a third-party company and either buy the electricity generated through a power purchase agreement or pay a monthly lease payment?

Purchasing and Contracting

- ☐ Am I comfortable with the installer's knowledge and experience?
- ☐ Does the installer have credible references?
- ☐ Is the installer adequately insured to protect me, as well as the company's employees and subcontractors?
- ☐ Does the contract include performance specifications for the system being installed, including an estimate of the power that will be produced annually or under different conditions?
- ☐ Does the installation contract clearly lay out what is included and what is not included in the price?
- ☐ Do I want or need a DAS installed to measure, track, and record power produced, or do I want to track system production manually?
- ☐ Does the proposed payment schedule protect me by allowing payment to be withheld until the system: 1) passes local code inspections, 2) receives utility interconnection approval, and 3) is shown to be operating properly?
- ☐ Are all warranties clearly stated with information on how to exercise them?

Post Installation

- ☐ Has the installer tested and activated the system?
- ☐ Have all necessary inspections occurred?
- ☐ Has the installer left descriptive materials and equipment operating manuals as reference materials?

Training Modules

Goal

- The training modules provide background information and tools with goal of increasing understanding of solar photovoltaics (PV) in Greater Philadelphia. This training program will be easily updated, replicated and given by multiple entities.

Module Introduction

Each training module includes a word document that outlines the materials available in the training module as well as how to integrate them.

1. Target Audiences - The target audiences for the training module are included in the module introduction.
2. Sources - Each introduction provides you with the location of source materials to assist in updating materials where possible. Notes are made when source materials are made from a study which isn't regularly updated.
3. Contacts - Each module introduction includes information on who to contact to get more information, suggest updates, or feedback on how the module worked for your needs (or didn't).
4. Follow Up -These are modules that can follow up if the audience is looking for more information on a specific topic area.

Training Module Content

One-Page Primer
- Target Audiences
- Update Sources
- Contacts

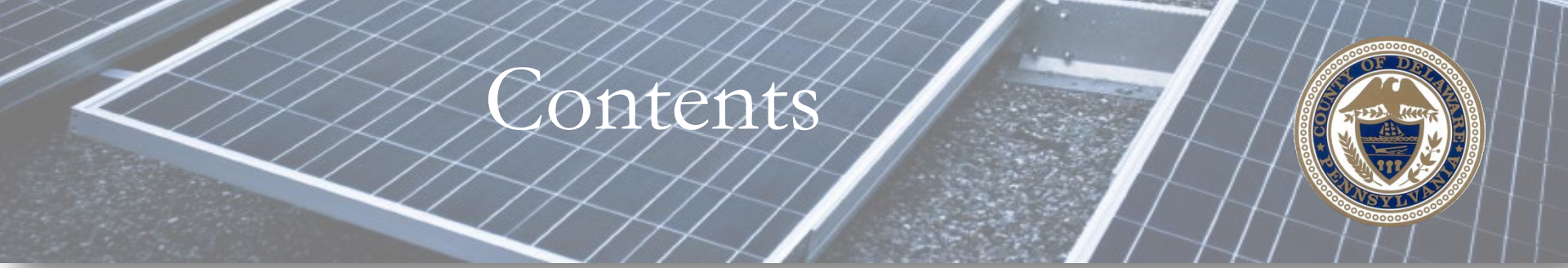
Helpful Documents
- Talking Point Handouts
- Model Ordinances
- Follow Up Trainings

PowerPoint Presentations
- PowerPoint Presentations
- Word document with Target Audiences if multiple PowerPoints
- Update Sources specific to PowerPoint data
- Contacts for more information

Stakeholders/ Target Audiences

- Local government building officials
- Municipal managers
- Solar industry representatives
- Local developers
- Utility companies
- Permitting bodies
- Trade groups
- Building officials
- Planners
- State government decision makers
- Electric utility officials
- Inspectors
- Residents
- Local APA Chapters

Solar Basics



Contents

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Solar Ready II

Training Module Next Steps

Create a working group to review content of training modules.

- Notes will include links to the modules for those who wish to provide input.
- There will be an availability poll for a meeting or call to run through the completed Solar 101 training.
- The working group on Zoning and Permitting will work with the group to create training modules on these topics.
- Help spread the word about the completed training modules

For More Information

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http://www.eere.energy.gov/solarchallenge/index.html

Acknowledgment: This material is based upon work supported by the U.S. Department of Energy under Award Number DE-EE0006310