



Program Guide for Small Wind Trade Allies

Developed by Energy Trust of Oregon

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1 Introduction

1.1 Purpose of the Program Guide

This Program Guide provides an overview of Energy Trust's Small Wind Program (also referred to in this Guide as the "Program") requirements, processes, and policies. Approved Small Wind Program trade allies are required to comply with this Program Guide as a condition of their agreement with Energy Trust.

1.2 Revisions to the Program Guide

This Program Guide undergoes occasional revisions as policies and processes change. When changes are made, a new version of the Guide will be issued and posted to the small wind trade ally pages on the Energy Trust website at energytrust.org. Energy Trust will typically announce any new versions in the *INSIDER*—a monthly newsletter distributed by Energy Trust electronically to all active Energy Trust trade allies. Program trade allies should check the small wind trade ally pages on Energy Trust's website to ensure they are using the current version of the Guide.

2 Program Overview

2.1 Energy Trust

Since 1999, the Oregon legislature has required Portland General Electric (PGE) and Pacific Power to collect "public purpose funds" from their Oregon customers to support energy conservation, renewable energy and energy market transformation efforts. The Oregon Public Utility Commission ("OPUC") was authorized to direct the manner in which the collected funds would be spent.

Energy Trust, a 501(c)(3) non-profit, was formed to manage the investment of the bulk of these funds in energy efficiency, renewable energy and energy market transformation pursuant to a grant agreement with the OPUC. Energy Trust expects all Small Wind Program trade allies to be generally aware of the background and history of Energy Trust and the Program, and to review the Energy Trust policies which can affect the Program's requirements.

More details on Energy Trust's history, mission, programs, and policies, as well as a copy of Energy Trust's grant agreement with the OPUC, by-laws, and strategic plan, are posted on the website. Please contact Energy Trust with questions.

2.2 Program purpose and design

The Small Wind Program is one of Energy Trust's renewable energy program offerings. Small wind energy's availability throughout the state offers the advantage of distributed generation by producing electricity at the point of use.

The purpose of Energy Trust's Small Wind Program is to develop the small wind market across all sectors in Oregon and gain long-term renewable electricity production to benefit the customers of PGE and Pacific Power in Oregon.

The Program is structured to address the primary market barriers of cost, quality and awareness. Energy Trust provides:

- cash incentives to eligible Program participants to reduce the above market costs associated with installing small wind
- installation standards that help promote system performance and longevity
- a network of experienced, trade ally installers who are familiar with our Program requirements
- industry support in the form of trainings and cooperative marketing assistance for active trade allies
- consumer outreach and education to help inform Oregonians about their wind options

3 Policy Overview

Complete copies of all of Energy Trust's Board of Director-approved policies are available for review on our website, www.energytrust.org. The following is an overview of some of the policies that directly affect the Program and that all Program trade allies should be aware of:

3.1 Confidentiality of Program participant information

Program trade allies are obligated to maintain the confidentiality of all information submitted by Program participants under the Program.

3.2 Environmental Attributes

Energy Trust must receive a portion of the Environmental Attributes¹ associated with the renewable energy projects for which we provide incentive funding. Based upon an anticipated 15-year small wind system operating life, the Program calculates the Environmental Attribute ownership arrangement for the sizes and types of systems that the Program provides funding to, in relation to the incentive amount it will provide for a system. This is reflected in the terms and conditions of the Program's incentive applications that refer to Environmental Attributes.

3.3 Above-market cost

Energy Trust is limited to providing funding for all or a portion of the "above-market costs of new renewable energy resources." Energy Trust developed a policy outlining an approach and methodology for determining a project's above-market costs. The

¹ "Environmental Attributes," also commonly referred to as Green Tags, Renewable Energy Certificates or "RECs", represent the environmental benefits associated with 1 MWh of electricity generated by a renewable energy resource (such as a small wind system). Environmental Attributes are generated by a renewable energy resource concurrently with the electricity generated by that resource and may be traded, separately from the electricity, to businesses and utilities who want to purchase/support renewable energy.

incentives that Energy Trust makes available through the Program for small wind systems are calculated by Energy Trust in accordance with this policy's requirements.

3.4 Self-direction

If a site is certified for self-direction² by the Oregon Department of Energy (ODOE), that "self-director" may receive self-direct credits from ODOE in exchange for purchasing Green Tags or green power for its site, or for directly investing in an ODOE-certified renewable energy project at its site. The self-director may then use these credits to reduce the renewable energy portion of the 3% public purpose charge included in its electric bill. If a Program participant is currently self-directing, or decides to in the future, it can affect the amount of incentive funding they will be eligible to receive from the Program.

4 Program Incentive Offerings

4.1 Energy Trust small wind incentives

Energy Trust's small wind incentives are paid in a lump sum to lower the initial cost of systems. For simplicity, the Program offers standard incentive rates based on the rated power capacity or rotor diameter of the small wind turbine. The rates are set in consideration of many factors, such as system costs, available tax credits, market demand and available budget. They are also based on an expectation that each small wind system will remain operational for at least 15 years.

The funds Energy Trust receives from PGE and Pacific Power ratepayers are managed separately. As a result, small wind incentive rates and maximum incentive amounts may be different for PGE and Pacific Power customers, and the incentive budget for one utility may be exhausted before the incentive budget for the other utility. Energy Trust strives to set incentive levels to manage consumer demand so that incentives are available all year.

Incentive rates are subject to change. Incentive reservations for qualifying projects are subject to funding availability and processed on a first-come, first served basis.

Current incentive levels can be found on the commercial, residential and government small wind pages of the Energy Trust website.

² Under the OPUC grant agreement, Energy Trust receives and invests a portion of the funds generated by the 3% public purpose charge collected from certain PGE and Pacific Power. Although payment of the public purpose charge is generally mandatory, Oregon law recognizes a special group of large electric energy users (those using over one average megawatt a year at a site) who can "self-direct" a portion of their public purpose charge to fund electric energy efficiency and renewable energy investments at their own sites.

5 Project Eligibility

5.1 Pre-Screening for project eligibility

Program trade allies are required to perform initial project pre-screening to help determine whether or not a small wind project is eligible to apply for Program incentives. Final determination of eligibility for the Program shall always rest with Energy Trust.

5.1.1 Electric utility

In order to be eligible for Energy Trust incentives, the small wind system must be located on real property and must be grid-tied to a PGE or Pacific Power electric utility account. Floating homes, RVs, sailboats or other portable applications are not allowed.

5.1.2 Add-ons and expansions

Customers wishing to add an additional turbine to an existing small wind installation are eligible to apply for Program incentives if the new system is installed separate from the existing system. The expansion will be required to meet Energy Trust's ***Small Wind System Requirements***, and the total incentive for which the customer may apply, *including* the amount of any incentive previously provided for a system at the site, may not exceed the maximum incentive cap established by the Program.

For example, if a system originally received \$30,000 from Energy Trust, and the current cap is \$45,000, an expansion will only be eligible to apply for a maximum of \$15,000.

5.1.3 Site criteria

Sites must meet certain minimum criteria in order to be eligible for Program incentives. Program trade allies must submit a site plan with the incentive application package ("Incentive Application," see **Section 6.2.4**), demonstrating that it meets this requirement, and an Energy Trust Inspector must visit the site prior to incentive reservation.

Sites must meet the following criteria:

- Property size must be greater than or equal to one acre,
- Proposed tower height must be greater than or equal to 60 feet,
- Distance from the location where the proposed tower will be installed ("tower site") to property lines, power lines or habitable buildings must be greater than the proposed system height ("system height" = tower height + rotor radius),
 - If property lines are within the system height, a ***Turbine Location Consent and Release - Form 765C***, signed by the owner of the affected property, must be submitted with the Incentive Application.

- As shown in **Figure 1**, the height of any obstacles within 300 feet of the tower site must be 30 feet below the turbine blades, i.e.:

$$\text{Obstacle Height}_{300'} < \text{Tower Height} - \text{Rotor Radius}$$

- With prior approval from Energy Turst, obstacles that do not meet this requirement *may* be allowed, provided that that the obstacles are not in the predominant wind energy direction and there is no displacement height impact in affect (see **Section 5.1.4** for more about displacement heights).

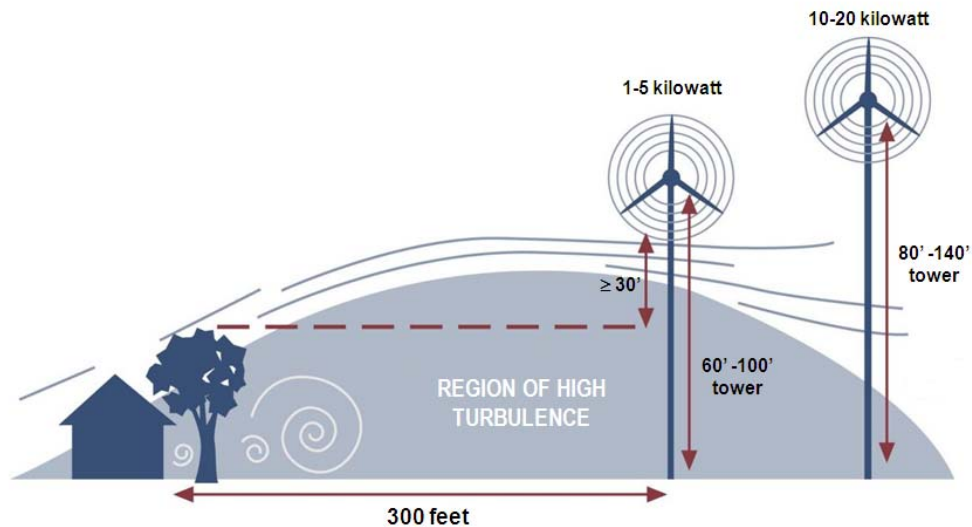


Figure 1. The tip of the wind turbine blades, when in their lower position, must be at least 30 feet above any obstacles within 300 feet of the tower.

5.1.4 Acceptable wind resource

Wind resource assessments evaluate a proposed site's annual average wind speed and site characteristics to estimate the wind speed at a given turbine height and location, and the expected annual production of the small wind system. To ensure reasonable system production and promote the installation of small wind systems at appropriate sites, Energy Trust has a minimum average annual wind speed requirement.

To be eligible for Program incentives, the tower site must have average annual wind speed at hub height of 10 mph (4.47 m/s) or greater at hub height.

To demonstrate that a tower site meets this requirement, Program trade allies must submit their wind speed calculations (see **Section 6.2.4**) showing how the wind speed at hub height was estimated with the Incentive Application. This estimation must take into consideration the difference between the reference wind speed and the tower height, the terrain type and roughness, displacement height effects (if applicable), and the prevailing wind energy direction.

Approved methodology for calculating the wind speed at tower height for Program purposes is described in detail in **Appendix B: Calculating Wind Speed at Tower Height**.

5.2 Eligible turbines

Energy Trust maintains a list of small wind turbine systems that have been reviewed by the Program and are eligible for incentives when installed in accordance with this document and the ***Small Wind System Installation Requirements***. The current list of qualified turbines can be found on the small wind program pages of the Energy Trust website.

Small wind turbine systems that are not on this list must be reviewed and approved by the Program prior to the submission of an Incentive Application (a complete Incentive Application is described in **Section 6.2.4**).

For information on the turbine requirements for eligibility, please review the ***Eligible Small Wind System Requirements***, which can be found on the trade ally pages of the Energy Trust website at energytrust.org.

NOTE: Energy Trust does not endorse any particular manufacturer or product in promoting its programs. The fact that the names of particular manufacturers, products or systems may appear on Energy Trust program materials does not constitute an endorsement. Manufacturers, products or systems not mentioned are not implied to be unsuitable or defective in any way. Energy Trust is not responsible for assuring that the design, engineering, or construction of any wind system project is proper or complies with any particular laws, regulations, codes, licensing, certification and permit requirements or industry standards. Energy Trust does not make any representations of any kind regarding the results to be achieved by any eligible turbine listed or any wind energy system or the adequacy or safety of such measures.

5.3 Determining type of project

Program trade allies will need to determine the type of project in order to (i) calculate the correct incentive estimate, (ii) choose the appropriate incentive application form to complete use and (iii) determine what additional documentation, if any, will need to be included with the Incentive Application.

One of the criteria the Program considers to determine whether it will treat a project as residential or commercial is whether the System Owner will be applying to the Oregon Department of Energy for a Residential Energy Tax Credit or a Business Energy Tax Credit.

Direct-owned Residential - (use **Form 720R**)

The System Owner is the owner of the site property.

The power produced by the small wind system will be net-metered to a utility account held by the property owner.

Third Party-Owned Residential - (contact the Program)

The System Owner is a third-party with a written agreement to deliver wind-generated power to a Host who is the residential site property owner.

The power produced by the small wind system will be net-metered to a utility account held by the Host.

Direct-Owned Commercial - (use Form **720C**)

The System Owner is either (i) the owner of the site property, or (ii) a tenant who has received written permission from the property owner to install and operate the system (requires submission of a signed **Owner/Lessor Confirmation Addendum – Form 720C**).

The power produced by the small wind system will be either (i) net-metered to utility account held by either the property owner or a tenant, or (ii) delivered directly to PGE or Pacific Power via a qualifying facility interconnection agreement.

Third Party-Owned Commercial - (contact the Program)

The System Owner is a third party with a written agreement to deliver wind-generated power to a Host who is either (i) the site property owner, or (ii) a tenant who has received written permission from the property owner to have the system installed and operated for the term of the agreement.

The power produced by the small wind system will be either (i) net-metered to serve the Host's utility account, or (ii) delivered directly to PGE or Pacific Power via a qualifying facility interconnection agreement.

6 Applying for Program Incentives

All Small Wind Program trade allies are expected to understand the Program's incentive application forms, the submission procedure, and the review and approval process to receive Program incentives. Typically, Incentive Applications are submitted to Energy Trust by the Small Wind Program trade ally. The basics steps to receive a Program incentive are shown in **Figure 1**.

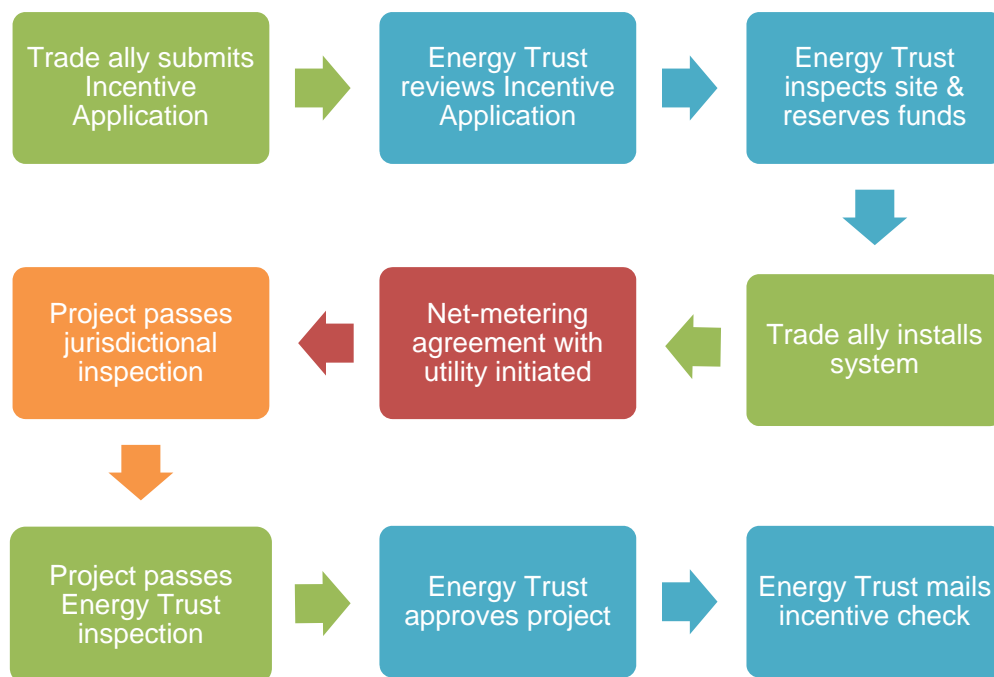


Figure 2. Incentive application, review and approval process flowchart.

6.1 Maximum number of active projects per Program trade ally

A Program trade ally is not allowed to have any more than six (6) small wind projects pending with reserved Energy Trust incentives at any one time. When six projects are pending, Energy Trust will not accept a new project application from the Program trade ally until after a pending project has been completed, inspected and approved.

6.2 Applying for incentives on behalf of customers

Incentive rates are subject to change. Incentive reservations for qualifying projects are subject to funding availability and processed on a first-come, first served basis.

6.2.1 Providing information to the customer

Program trade allies must give customers time to read and understand the terms and conditions of the incentive application form before obtaining a signature. Program trade allies must also explain, at a minimum, the information listed below when providing an application to a customer for review. If a customer has questions about the Incentive Application or the process, have them contact the Program *before* they sign the application.

Wind resource information: Explain the project's wind resource, the impact of terrain, obstacles and other site specific characteristics on the wind speed at tower height, and annual variations in wind speed.

Performance estimate: Describe the relationship between wind speed and system production. Explain the amount of electricity the system should generate annually so that they have a realistic expectation for performance. Program trade allies are required to submit their performance estimate calculations with the Incentive Application (see **Section 6.2.4**).

Site maintenance: Explain that the site must stay in compliance with Energy Trust's site criteria (**Section 5.1.3**) for fifteen years, and that this may require annual maintenance, such as trimming trees to keep them at least 30 feet below the lower tip of the turbine blades.

Energy Trust incentive and process: Explain Energy Trust's incentive rate, the application and reservation process, that the installation must be completed, inspected and receive final approval during the Incentive Reservation Period, and who will be the recipient of the incentive payment (the System Owner directly or Program trade ally in exchange for a lower price, depending on the payee selected on the incentive application form – see **Section 9.2**).

Ensure customers understand that incentive rates for a project are subject to change at any time prior to reservation, and that incentive reservations for qualifying projects are subject to funding availability and processed on a first-come, first served basis. The final incentive may vary from the estimate included in the initial application depending on the actual system installed and

the results of the Energy Trust inspection. See **Section 6.3.1** for details on notification of incentive reservation.

6.2.2 Tax credits and other sources of project funding

Program trade allies are expected to be familiar with other non-Energy Trust sources of small wind funding and incentives, and provide customers with reasonable assistance in pursuing these funds and incentives.

Program trade allies must explain any state or federal tax credits a customer may be eligible to receive, and how these tax credits may affect the final installed cost of the small wind system. Describe the timing, process and requirements for applying for these tax credits. Program trade allies are required to provide reasonable assistance to customers in applying for available tax credits (See **Section 7.2.5**).

Projects may qualify for other financial assistance, such as a [U.S. Department of Agriculture Rural Energy for America Program \(REAP\)](#) grant or loan guarantee, or loan from the [State Energy Loan Program \(SELP\)](#). Program trade allies should provide the customer with information and resources about applying for additional financial assistance.

6.2.3 Submitting applications on time

To obtain an incentive reservation for a small wind system installation, an Incentive Application must be submitted to program staff *before* a Program trade ally begins installing a system. Systems installed prior to Energy Trust's receipt of an Incentive Application will not be eligible for incentives.

Until Energy Trust issues a **Notice of Incentive Reservation** for a project, there is no commitment by Energy Trust to reserve any incentive funding for that project. See **Section 6.3.1** for details on notification of incentive reservation.

NOTE: Program trade allies are expected to help their customers apply for Oregon Energy Tax Credits. ODOE administers these tax credits and has very specific timing requirements for application. To ensure that a customer is eligible for Oregon Energy Tax Credits, read and follow ODOE's instructions carefully and contact them at **1.800.221.8035** or oregon.gov/energy with questions.

6.2.4 Submitting a complete application package

A complete Incentive Application package includes, at minimum, the following elements.

Incentive application form, appropriate for the project type, filled out in its entirety and signed by all necessary parties. An electronically scanned image of the signed form is preferred; a fax or hardcopy is also acceptable.

Photographs of site, taken from the proposed tower site in each of the eight directions: N, NE, E, SE, S, SW, W, and NW.

Site plan, showing the proposed tower site, the locations of structures (habitable structures should be labeled to differentiate them from non-habitable), vegetation and trees, power and property lines, and approximate elevation changes. The site plan shall be to scale or provide distances between features.

Electrical diagram, showing detailed system design. This should accurately depict all planned electrical components, plus: AC breaker sizing, conductor and ground wire types and sizing, length of wire runs, conduit types and sizing, and voltage drop calculations.

Wind speed and annual production calculations, showing how the wind speed at tower height and estimate range of annual electricity production was determined. The wind speed calculation should clearly show the values used for: reference wind speed and reference height, wind shear exponent and displacement height, if applicable. **Appendix B: Calculating Wind Speed at Tower Height** describes the approved approach for estimating wind speed at tower height.

Estimation of the annual energy output (AEO) may be done using one of the approved AEO estimation methods discussed in **Appendix C: Estimating Annual Energy Production**. For all methods, Program trade allies must show their calculations, along with the turbulence and system de-rate factors they applied.

Wind monitoring equipment addendum, if the System Owner wishes to participate in Energy Trust's performance monitoring efforts. This optional incentive supports the installation of wind monitoring equipment to track the wind resource and performance at project sites. To qualify for this incentive, the **Wind Monitoring Equipment Bonus Incentive** section of the incentive application form must be filled out. Energy Trust will pay the bonus incentive directly to the Program trade ally to reduce the amount the customer owes the Program trade ally.

Other documents, as needed, to demonstrate project eligibility and comply with Program requirements.

The application package can be submitted to Energy Trust Program staff via fax at 503.546.6862 or e-mail at wind@energytrust.org.

Energy Trust *will not* review any incomplete applications. Complete applications will be reviewed in the order in which they are received and must include all required application documents and be signed by all necessary parties. Because incentive funds are not reserved until Energy Trust's review is complete and an incentive reservation notice has been issued, it is imperative

that Program trade allies ensure that all required documents are submitted together in order to avoid delays in the application review process.

Incentives are subject to availability of funds, reservations for funding are provided on a first-come, first served basis and incentive rates may change at any time prior to reservation.

6.3 Energy Trust review and incentive reservation

Incentive Applications must be submitted for review *before* a Program trade ally begins installing a system. The review process is intended to protect the Program trade ally and System Owner from purchasing equipment or doing other installation preparation work for a system that may not meet Program requirements.

First, Program staff reviews the application for completeness and eligibility. Then, an Inspector performs a technical review and performs a site visit. The Inspector will notify Energy Trust whether the proposed system design and site appear to meet Program requirements.

6.3.1 Communications

Unless otherwise stated, all project review, revision, reservation and inspection communications from Program staff to Program trade allies and customers are made by email. This greatly facilitates project documentation. Accordingly, Program staff prefer to receive communications from Program trade allies electronically as well. Email and fax contact information is provided in **Section 11**.

6.3.2 Timing of application review process

Energy Trust's application review and incentive reservation process typically takes ten business days, but will take longer if the Incentive Application is missing information, the site inspection is difficult to schedule or if there are concerns with eligibility or system design.

6.3.3 Incomplete and incorrect applications

If a submitted Incentive Application is incomplete or requires design changes to be eligible, the Program trade ally will be notified and asked to submit additional information.

6.3.4 Inspector technical review and site visit

After an Incentive Application has been reviewed internally by Energy Trust, it is sent to a Program Inspector for technical review and a site inspection. The Inspector reviews the Incentive Application for compliance with Energy Trust's Program eligibility and technical installation requirements prior to scheduling the site inspection.

The Inspector will contact the Program trade ally and System Owner to schedule a site inspection to review the proposed site and verify it meets Energy Trust's site eligibility criteria (see **Section 5.1.3**). The Program trade

ally *must* mark the tower site with a flagged stake, the location of which should correspond with the coordinates provided on the incentive application form.

If the Inspector identifies ineligible site or system issues during their review of the Application, the Program trade ally will be notified. The site inspection may be delayed until the issues have been addressed.

6.3.5 Notification of incentive reservation

Once Energy Trust and the Inspector complete their review of the Incentive Application and site, a **Notice of Incentive Reservation** will be sent to the system owner and Program trade ally. After receipt of this notice, the Program trade ally may move forward with system installation.

The **Notice of Incentive Reservation** will reference the system size, reserved incentive amount, reservation period and any Inspector comments that must be addressed by the Program trade ally during the installation.

The small wind system must be installed and successfully inspected during the reservation period, which is typically twelve (12) months, to qualify for Program incentives.

6.3.6 System design changes during the reservation period

If the system owner and Program trade ally make any changes to the system during the reservation period, the Program trade ally must send an email to Program staff describing the changes, along with the relevant revised paperwork, and any other documentation requested by Energy Trust.

The revised system information must be submitted to Energy Trust for review *before* implementing any changes and must again go through Energy Trust's review process to determine whether or not the system is still eligible for our incentives. If the design changes are eligible, Energy Trust will send a **Notice of Revised Incentive Reservation** to the Program trade ally and system owner acknowledging the changes.

Any changes to system design, the tower site or reserved incentive amount are subject to fund availability and Energy Trust approval.

7 Installation Requirements

All installations performed by a Program trade ally must meet the **Small Wind System Installation Requirements** in effect at the time of incentive reservation to be eligible for Program incentives. A copy of the **Small Wind System Installation Requirements** document can be found on the small wind trade ally pages of the Energy Trust website at energytrust.org. Installations will be inspected by Energy Trust in accordance with Program and installation requirements. See **Section 8** for more information on Energy Trust's inspection process.

7.1 Timing of installation

Incentive applications must be submitted to Energy Trust *before* beginning installation. Furthermore, until Energy Trust issues an incentive reservation notice,

there is no commitment by Energy Trust to reserve any incentive funding for a project. For this reason, Energy Trust recommends that Program trade allies do not begin work until an incentive reservation has been issued.

Program trade allies may *choose* to begin construction of a project after submitting an Incentive Application but before receiving notice of an incentive reservation. However, any purchase of equipment or other work towards an installation before Energy Trust has notified a Program trade ally of incentive reservation is done solely at a Program trade ally's risk.

7.2 Required actions prior to Energy Trust inspection

The Program trade ally must act as the project manager, meaning the Program trade ally must be responsible for coordinating all aspects of the system installation.

7.2.1 Net-metering with the utility

Prior to inspection by Energy Trust, the Program trade ally and the Program participant must initiate the net-metering process with the utility.

The Program participant is responsible for executing the agreement for net-metering with their utility, but the Program trade ally is responsible for obtaining and verifying the relevant utility's current net metering requirements. While Program trade allies cannot complete the net-metering process for their customers, you can assist them with the process by informing them ahead of time that they will need to enter into an agreement, helping them understand the timeline in which it must be executed, and providing the appropriate contact information at their utility.

Pacific Power customer service number: (888) 221-7070

PGE customer service number: (800) 542-8818

7.2.2 Jurisdictional inspections

Program trade allies must successfully pass any and all jurisdictional inspections required by the city or county where the project is located *before* the Energy Trust inspection. Projects that cannot provide proof of passing their jurisdictional inspections at the time of Energy Trust inspection will be failed and subject to any applicable re-inspection fees.

7.2.3 Contractor warranty

Program trade ally shall provide participant with a written warranty providing the following minimum guarantees: equipment shall be free from all defects in workmanship and materials for at least two years from the date of final approved building inspection. The warranty shall cover all labor for repairs resulting from workmanship or equipment defects.

7.2.4 Customer education

Prior to inspection by Energy Trust, Program trade allies should instruct the customer in the operation and maintenance of the system, including how to

identify if the system is operating normally, what to do in case of poor performance, routine maintenance activities and emergency shut down and start up procedures. Program trade allies must provide a customer manual according to the ***Small Wind System Installation Requirements***.

7.2.5 Tax credit applications

Program trade allies are required to help System Owners apply for state and federal tax credits by completing the technical portions of any tax credit applications and providing the required project documentation necessary for the System Owner's tax records.

8 Energy Trust Inspection Process

Energy Trust inspects small wind systems to ensure that they meet the Program requirements and qualify to receive Program incentives.

An Energy Trust inspection is not a health and safety inspection, which is one reason projects are required to pass jurisdictional inspections first. Unlike jurisdictional inspectors, Energy Trust Inspectors review installations to determine whether they meet Program requirements. Among other things, Program Inspectors verify that the system installed matches the system described in the Incentive Application, help identify issues that might affect system performance or shorten the anticipated 15-year operating life of the system, and verify that the customer manual has been provided to the System Owner.

8.1 Scheduling

It is the Program trade ally's responsibility to contact your assigned Inspector directly to schedule an inspection. During the review process, Energy Trust provides Program trade allies with the appropriate Inspector contact information.

Program trade allies must schedule inspections so that a Program trade ally representative or the System Owner will be present during the inspection. Energy Trust highly recommends that the Program trade ally be present at the inspection. If the System Owner is not available during the inspection, the Inspector will complete a phone interview with the System Owner to verify that they have been informed of the information described in ***Section 7.2.4***.

Program trade allies must provide an Inspector with *no less than three (3) business days* notice for cancellation or rescheduling. To reschedule an inspection, Program trade allies should contact the Inspector directly.

8.2 Inspection documentation

During the inspection, the Inspector will complete a ***Small Wind System Installation Checklist - Form 731***. After completing the inspection, the Inspector will provide review comments and indicate whether the project passed or failed inspection on a ***Project Inspection - Form 732***. Program staff will review the results and, if approved, notify the Program trade ally.

8.3 Failed inspections

Energy Trust will notify the Program trade ally of a failed inspection by email, and will include a copy of the failed **Project Inspection**. The Program trade ally must fix all violations identified on the **Project Inspection** *within thirty (30) days of notification*. If the violations are not resolved within the thirty days, the Program trade ally will be placed in suspension status (see **Section 10.3**), the System Owner will be notified of the unresolved violations and, at the Program's discretion, the incentive reservation may be terminated.

Once the violations have been fixed, the Program trade ally must contact the Inspector to schedule a re-inspection. In certain circumstances, and at Energy Trust's discretion, verbal or photographic verification of the changes may be allowed in place of re-inspection.

- Repeat violations

If the violation(s) identified during inspection have been the cause of inspection failures on previous projects, the Program may, at its discretion, place the Program trade ally on Program suspension (see **Section 10.3**). If the violation is particularly egregious and/or chronic, the Program trade ally may be subject to termination (see **Section 10.4**).

- Re-inspection fees

Program trade allies may be required to pay for additional inspections that result from Program violations. Energy Trust will provide the Program trade ally with prior notification if it will be charging the Program trade ally for the re-inspection. The re-inspection fee is subject to change by Energy Trust and is currently \$100 per inspection.

If the project incentive is to be paid to a Program trade ally, any re-inspection fees will be deducted from the incentive payment.

If the incentive payment is to be paid to the Program participant, the Program trade ally will be invoiced for the re-inspection.

9 Payment of Incentives

Once the final inspection paperwork has been submitted to Energy Trust, a copy of the **Project Inspection** form will be sent to the Program trade ally for their records. If the project is approved, Energy Trust will begin processing the incentive payment.

9.1 Timing

Incentive checks are paid after Energy Trust receives written inspection approval from the Inspector.

Incentive payments are approved weekly, and incentive checks are typically mailed within thirty (30) days of Energy Trust's receipt and approval of all required final inspection paperwork.

9.2 Incentive payee

For all projects, incentives are paid directly to the System Owner *unless* the Program trade ally and System Owner opt for the incentive to be paid to the Program trade ally by signing the ***Option to Assign Incentive Payment*** section located at the end of the Incentive Application form. In this case, the Program trade ally is required to reduce the System Owner's project cost by an equivalent amount. The Program trade ally *may not* charge the full project cost and reimburse the customer with the value of the incentive after the Program trade ally receives the incentive payment from Energy Trust.

Bonus incentives for wind monitoring equipment will be paid directly to the Program trade ally. The Program trade ally must subtract the amount of the bonus incentive from the System Owner's wind monitoring equipment purchase and installation cost.

Program trade allies may receive incentive payments for multiple projects in a single check. The individual project incentive amounts will be listed on the check stub.

9.3 Questions about status of incentive check

Program staff request that Program trade allies to wait the full thirty days before contacting the Program about the status of an incentive payment. If a Program trade ally discovers an overdue or missing incentive payment, they should contact the Program staff to resolve the situation.

10 Maintaining Program Trade Ally Status

10.1 Annual Program participation requirements

In addition to complying with all terms and conditions of the Program trade ally agreement with Energy Trust, Program trade allies must do the following *each calendar year* to remain eligible to be a Program trade ally:

- Successfully apply for and obtain an Energy Trust incentive (as the trade ally contractor, not as a subcontractor) for at least one (1) small wind system,

OR

- Attend a Program training session.

If a Program trade ally does not install at least one (1) small wind system in Energy Trust service territory within two (2) calendar years, the Program will require proof that they have either i) successfully installed one or more projects outside of Energy Trust's territory during that time period, or ii) completed 24 hours of classroom and hands-on small wind system installation training.

Program training sessions are typically twice a year via webinar. Check the small wind trade ally pages of the website to learn when sessions will be offered and how to register to participate.

If the personnel who attended the small wind system installation trainings for initial Program trade ally application purposes are no longer employed by the Program trade ally at any point, Program trade ally must *immediately* notify Energy Trust.

10.2 Program trade ally listing on Energy Trust website

Energy Trust maintains a searchable database of all current trade allies for various programs on its website. The searchable list includes all of the Program's trade allies. Program trade allies who do not wish to be listed on Energy Trust's website should notify the Program.

10.2.1 Professional certifications

The Small Wind Program does not currently require any professional certifications, but Program trade allies are encouraged to obtain third-party certification, such as NABCEP (www.nabcep.org). Energy Trust will include such certifications on Program trade ally website listings.

10.3 Suspension

Certain actions may result in suspension from the Program. A Program trade ally will be notified in writing if it has been placed in Program suspension, and will have thirty (30) days from the notice date to resolve the situation to the Program's satisfaction. Actions resulting in suspension may include, but are not limited to:

- Failure to fix violations identified during inspection within 30 days of notification
- Failure to follow a required Program processes
- Chronic failed inspections or repeated violations of installation or Program requirements
- Failure to attend any required Energy Trust trainings
- Allowing insurance or licenses to lapse
- Failure to resolve any reasonable Program participant complaint regarding the Program trade ally's work under the Program
- Failure to accurately inform Program participants of current Program requirements, including but not limited to incentive levels

10.3.1 Effect of suspension

During Program suspension, a Program trade ally may not submit any new Incentive Applications to Energy Trust. In addition, the Program trade ally will be removed from the searchable trade ally database on the website and Energy Trust may impose other restrictions on the Program trade ally's participation in the Program.

Program trade allies must resolve violations resulting in suspension within 30 days. Failure to do so may result in the Program terminating a Program trade ally.

10.4 Termination

In addition to any other termination provisions set forth in the Program trade ally agreement with Energy Trust, certain actions may result in Energy Trust immediately terminating a contractor from participating as a Program trade ally. In the event of termination, the contractor will be notified by Energy Trust in writing. Actions resulting in immediate termination of Program trade ally status may include, but are not limited to:

- Failure to resolve any action resulting in suspension within 30 days
- Repeated Program violations
- Passing or attempting to pass any required re-inspection fees on to a Program participant
- Violation of license laws
- Misrepresentation of system components or installation characteristics at more than one site
- Failure to pass the full value of the Energy Trust incentive on to the customer in cases where the incentive payment is issued to the Program trade ally

10.4.1 Effect of termination

Effective upon notice of termination, Energy Trust will not accept any new incentive applications, will not process any submitted incentive applications that have not yet been pre-approved, and will remove the terminated contractor from the Program's searchable trade ally database on Energy Trust's website. Energy Trust will continue to process, in accordance with Program requirements, any incentive applications that were pre-approved by Energy Trust prior to the notification of termination.

Energy Trust may, in its sole discretion, allow a terminated contractor to re-apply for participation in the Program at a later date. However, Energy Trust will most likely require additional documentation and proof from that contractor that it has taken appropriate measures to prevent further Program violations.

11 Program Contact Information

In general, Incentive Application materials and other Program paperwork should be submitted to the contact information at the bottom of the applicable Program form. Program staff prefer to receive documents via fax or electronically as attachments to email. If necessary, written documents can be delivered to our mailing address: Small Wind Program, Energy Trust of Oregon, 851 SW 6th Avenue, Suite 1200, Portland, OR 97204. All hard-copy documents received via mail or other courier will be stamped with the date they were received and a time stamp of 5:00 pm, regardless of the exact time of arrival.

Fax

The general fax number for the Program is **503.546.6862**.

Email

The general email for Program staff is wind@energytrust.org.

Phone

To reach a staff member in the Program, call the main Energy Trust office number at **503-493-8888** and ask for a Small Wind Program staff member.

11.1 Questions and Feedback

It is extremely important that Program trade allies have a thorough understanding of all Program documents, so please contact the Program immediately with any questions about this ***Program Guide for Small Wind Trade Allies***, the ***Small Wind Installation Requirements***, or any other related Program document.

Program trade allies are also welcome and encouraged to participate in Energy Trust's public meetings. The Renewable Energy Advisory Committee, and Conservation Advisory Committee and Energy Trust Board of Directors typically meet monthly. See the Energy Trust website for more meeting schedules and agendas.

Appendix A: Forms Matrix

Most Program forms are available for download in both Excel and PDF formats on the small wind trade ally pages of our website. The Excel version of the forms have formula calculations, eligible equipment lists and incentive rates built directly into the document to make it easier and faster for Program trade allies to complete.

Form Number	Form Name	Intended User	Purpose of Form
117A + 721E	Small Wind Trade Ally Contractor Application	Trade Ally	Application to become a Small Wind Ally Contractor (becomes Program trade ally agreement once approved by Energy Trust)
214	Substitute W-9	Trade Ally, Commercial System Owners	Tax identification information necessary for Energy Trust to report incentive payments to the IRS
720R	Small Wind System Incentive Application - Residential	Trade Ally	Residential small wind incentive application form for direct-owned projects.
720C	Small Wind System Incentive Application - Commercial	Trade Ally	Commercial small wind incentive application form for direct-owned projects.
765	Turbine Location Consent and Release	Trade Ally	Neighbor's consent to allow installation of a turbine in a location that does not meet the Energy Trust required minimum set-back.
715	Project Non-Acceptance	Inspector, Program staff	Notifies trade ally of missing information or incorrect/ineligible Incentive Application elements.
740SI	Site Inspection and Technical Review	Inspector	Documentation of whether a site meets Energy Trust site eligibility criteria.
--	Notice of Incentive Reservation	Program Staff	Notifies trade ally and System Owner that project is approved for incentive reservation.
--	Notice of Revised Incentive Reservation	Program Staff	Notifies trade ally and System Owner that revisions to an existing incentive reservation have been approved. Supersedes previous version of notice.
731	Small Wind System Installation Checklist	Inspector	Checklist used to verify if a project meets the Small Wind System Installation Requirements .
732	Project Inspection	Inspector, Small Wind Program Staff	Documentation of whether a project has passed Energy Trust inspection and/or been approved for incentive payment.

Appendix B: Calculating Wind Speed at Tower Height

Due to friction with the surface of the earth, wind speed varies with height above ground. The rougher the surface of the ground, and the more obstacles the wind encounters while travelling over it, the more pronounced the difference is between wind speeds at and above ground level.

To properly characterize the wind resource at a site and assist with the selection of a suitably sized tower, Program trade allies must understand the basic methodology for translating a reference wind speed from a wind map, anemometer or other resource, to a proposed tower location and height. Program trade allies must use reasonable values for reference wind speed, wind shear and effective tower height, based on a particular site's terrain and characteristics. These values are reviewed by Program staff and Inspectors during the application review process. If they do not seem appropriate for the site, the application will not be accepted and the Program trade ally will be required to resubmit an application.

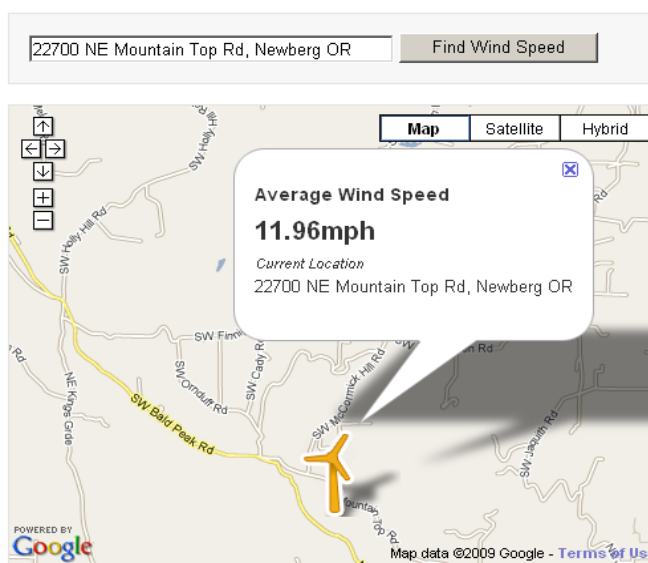
Reference wind speed

Energy Trust uses an interactive, Geographical Information System (GIS) map populated with AWS Truepower annual average wind speed data to qualify tower sites for Program incentives. The wind speed data provides modeled wind speeds at 30 and 50 meters, wind roses, and a variety of demographic information.

There is an [online version of this wind map](#) available to potential customers and trade allies on the small wind pages of the Energy Trust website. This free, easy-to-use, interactive map used data from the National Renewable Energy Laboratory (NREL) and provides annual average wind speeds at 30 meters above ground with a 400 meter resolution based on an entered address (using a Google maps interface, as shown in **Figure 33**). Program trade allies are invited to use the online Energy Trust wind map or other wind speed resource when performing preliminary assessments for potential customer site.

Prior to submitting an Incentive Application, Program trade allies must request an Energy Trust Wind Resource Assessment report ("wind report") at the coordinate location of the tower site. The wind report will contain the following information:

- Coordinates for the tower site requested
- Reference wind speeds for the tower site at 30 and 50 meters
- Elevation of the tower site
- A wind rose for the vicinity of the tower site



Click on the map to see wind speed for the location at that point.

Figure 3. Screenshot of Energy Trust's online wind map

- Satellite image with the tower site coordinates indicated

Optional: a colored wind speed data layer can be overlaid on the satellite image, indicating nearby areas of greater or lesser wind, as shown in **Figure 4**.

To request a wind report, Program trade allies should send an email with the exact tower coordinates to wind@energytrust.org. Program allies should note it in the request if a visible wind speed layer at 50 or 30 meters is desired.

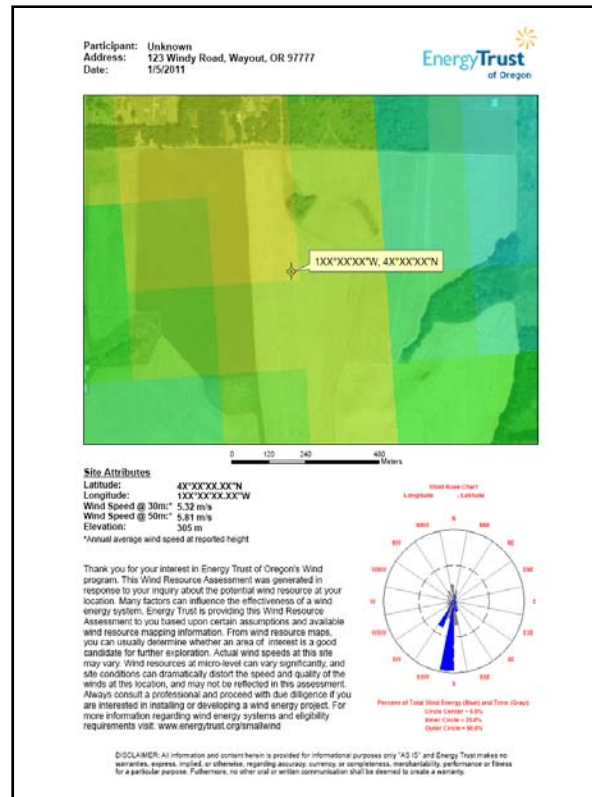


Figure 4. Sample Energy Trust wind report with a visible, colored 30m wind speed data layer shown

Adjusting wind speeds to tower height

For a selected tower height, a value for the annual average wind speed should be estimated using the Power Law equation:

$$Wind\ Speed_{site} = Wind\ Speed_{ref} \times \left(\frac{Height_{site}}{Height_{ref}} \right)^{\alpha}$$

where $Wind\ Speed_{ref}$ is the reference wind speed as verified by an Energy Trust wind report, $Height_{ref}$ is the corresponding height from the wind report, $Height_{site}$ is the proposed tower height, and α is the wind shear exponent based on the Program trade ally's evaluation of the terrain.

$Height_{ref}$ should always be greater than or equal to $Height_{site}$. Therefore, Program trade allies must use 50 meter reference wind speeds for towers above 100 feet. In general, Program trade allies are encouraged to use the reference speed that results in the most conservative wind speed estimate at tower height.

Determining wind shear exponent (α)

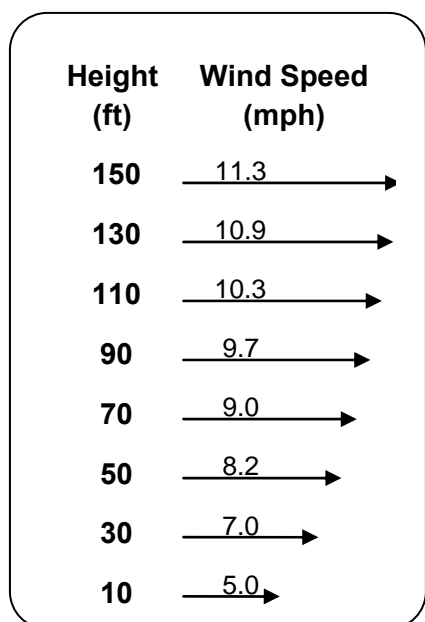


Figure 5. Wind speed varies with height. Calculations given for 10mph at 30m, with $\alpha = .3$

Program trade allies should use a wind shear exponent that corresponds to the surface terrain of the surrounding area. Particular emphasis should be given to the terrain in the prevailing wind energy direction, as indicated on a wind rose.

Studies nation and worldwide have concluded that commonly published wind shear exponents (which typically range from .14 for short grass on flat ground to .4 for wooded country or suburban areas), and particularly the “1/7 power law,”³ tend to underestimate shear values—often dramatically. In Oregon, which is characterized by variations in terrain type, elevation and vegetation, higher than typical wind shear exponents should be used.

Program trade allies must use shear exponents that fall within the ranges shown in **Table 1**, below. And, while selection of the exact shear value is at the discretion of the Program trade ally, Energy Trust encourages the use of conservative values to help manage customer expectations.

Terrain Surface Description	Wind Shear (α)
Well exposed; only short grass or very low crops	.14-.20
Mid-to-tall crops, shrubs, hedges or a few trees	.20-.30
Many trees and occasional buildings	.30-.40
Wooded country or many buildings	.40-.50

Table 1. Energy Trust wind shear estimates based on terrain description

Applying displacement heights

Localized obstructions such as trees or buildings located in the prevailing wind energy direction can reduce the effective height of a tower. The “displacement height” is a correction to determine the effective tower height when these site conditions exist.

A displacement height adjustment should be applied if an obstruction or obstructions:

- have a depth of 50 feet or more, *and*
- are in the direction(s) of the prevailing wind energy (as verified by a wind rose), *and*
- are closer than ten times the height of the obstruction

³ In North America, the 1/7 power law, which corresponds to a wind shear exponent of .143, is often used as a guide. However, this wind shear value corresponds to the terrain of the Great Plains—a terrain type not seen in most parts of Oregon.

For example, if there is a grove of 40 foot trees in the direction of prevailing wind energy, they must be over 400 feet away to negate their effect. See **Figure 6** for further explanation.

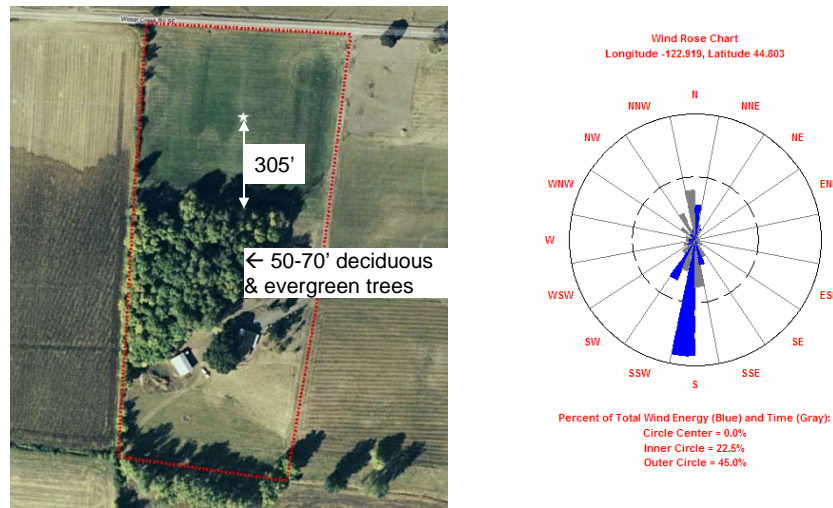


Figure 6. Since the trees at the site pictured to the left are in the prevailing wind energy direction (South) and located within 10 times their height of the tower site, they will have a displacement effect on the wind. If the prevailing height of the trees is ~60', the displacement height will be: $\frac{3}{4} \times 60' = 45'$ In order to achieve a desired wind speed at a given height, the trade ally will need to add 45' to the tower height.

The displacement height should be calculated as described for the appropriate type of dense obstruction, as described in **Table 2**, below:

Obstruction	Displacement Height
Deciduous trees or vegetation	$\frac{2}{3}$ x prevailing mature tree height
Evergreen trees or vegetation	$\frac{3}{4}$ x prevailing mature tree height
Peak-roofed buildings	Height halfway between eaves and peak
Flat-roofed buildings	Height of building

Table 2. Displacement height calculations for various dense obstructions

The effective tower height is calculated as:

$$\text{Effective Tower Height} = \text{Tower Height} - \text{Displacement Height}$$

Therefore, the calculation of the wind speed at tower height should be adjusted accordingly:

$$\text{Wind Speed at Tower Height} = \text{Wind Speed at Effective Tower Height}$$

In order to qualify for Program incentives, the **Wind Speed at Effective Tower Height must be greater than or equal to 10 mph (4.47 m/s).**

Appendix C: Estimating Annual Energy Production

Program trade allies are required to provide customers with a reasonable expectation for the performance of their small wind turbine. Energy Trust appreciates that there are numerous challenges to accurately predicting wind system production. However, it is critical to the development and growth of the market that installers, manufacturers, researchers and organizations like Energy Trust focus on improving the quality and accuracy of performance estimates to demonstrate that small wind turbines are a reliable and reasonable long-term financial investment.

In acknowledgement that a “right way” of estimating annual energy output (AEO) has yet to be found, Energy Trust currently allows Program trade allies to use one of several very different approaches. As the Program gathers data on the actual performance of its small wind turbines, it is expected that best practices for estimating output will be identified, and the allowable approaches limited.

Approved methods for estimating AEO

- Power Curve Method (recommended)

Where Program trade allies have access to a wind speed distribution for a site (or a reasonable approximation), the Power Curve Method is believed to be the most accurate means of estimating optimal AEO.

This method matches the speed distribution for the site with the power curve for a selected turbine to determine the number of hours per year the turbine will be generating at various power levels. From there, AEO can be easily calculated.

While these calculations can be done manually using a spreadsheet, there are also several software modeling tools that facilitate the calculations. A copy of a Program trade ally's custom spreadsheet calculations or software modeling reports is considered acceptable documentation of energy calculations for the purposes of the Incentive Application, providing that the input variables used are within the ranges shown in *Table 3*.

NOTE: Power curves published by some small wind turbine manufacturers have been shown to be inaccurate when tested in the field. Studies indicate that published energy production curves may be even more inaccurate.

At this time, none of the power curves of Energy Trust eligible turbines have been independently certified. Therefore, it is recommended that Program trade allies use the most conservative values appropriate when estimating output.

Power Curve Method Input Variable	Range of acceptable values
Weibull K (frequency distribution)	1.5 – 2.5
Availability	90 - 100%
Turbulence Intensity	15 - 35% (see Table 4)
System or Miscellaneous Losses	5 - 10%

Table 3. Range of reasonable and accepted values to be used as inputs when modeling AEO using the Power Curve Method

Most modeling tools will allow the user to input turbulence and/or de-rate factors. If not, Program trade allies should be sure to de-rate the total AEO for system losses (5-10%) and site-appropriate turbulence (as shown in **Table 4**).

Terrain Surface Description	Turbulence Derate Factor
Well exposed; only short grass or very low crops	15-20%
Mid-to-tall crops, shrubs, hedges or a few trees	20-25%
Many trees and occasional buildings	25-30%
Wooded country or many buildings	30-35%

Table 4. Energy Trust turbulence derate factors based on terrain description

- Swept Area Method

There are several formulas that can be applied when using the Swept Area Method, all of which result in approximately the same results. All use the same basic of inputs: average annual wind speed at tower height, turbine swept area, air density and a turbine efficiency factor.

Energy Trust recommends using the following equation when applying the Swept Area Method:

$$AEO = A \times v^3 \times 10.24 \times F_{turbine} \times (1 - F_{turbulence})$$

where,

A = the swept area of the rotor (in square meters) = πr^2 , where r = rotor radius

v = average annual wind speed at tower height (in meters per second)

$F_{turbine}$ = system efficiency factor,⁴ within the range show in **Table 5**

$F_{turbulence}$ = turbulence derate factor, corresponding to the terrain of the site per **Table 4**

Swept Area / Manufacturer Estimate Method Variables	Range of acceptable values
Turbulence Intensity ($F_{turbulence}$)	15 - 35% (see Table 4)
System Efficiency ($F_{turbine}$)	10 - 20%

Table 5. Range of reasonable and accepted values to be used as inputs when modeling AEO using the Swept Area Method or manufacturer estimates

- Manufacturer Production Estimates

In addition to power curves, most manufacturers provide energy output estimates for their turbines under standard conditions. These are generally published as tables or charts for a variety of average wind speeds, with values for either average kWh per year or average kWh per month.

These estimates are subject to the inconsistencies noted for power curves (see *NOTE*, above) and, furthermore, represent the *gross* energy produced by the turbine under optimal site conditions. Reductions in production due to wire losses, system and inverter efficiency, availability and turbulence are not included and must be applied.

⁴ This value takes into consideration the factors, except turbulence, that affect a turbine's ability to convert wind energy into useable electricity. This includes inverter and generator efficiency, reasonable turbine availability and the power coefficient of the blades.

Program trade allies who opt to use manufacturer production estimates to determine AEO must derate the estimates for turbulence and overall system efficiency, using values that fall within the acceptable range shown in **Table 5**:

$$AEO = AEO_{manufacturer} \times (1 - F_{turbine}) \times (1 - F_{turbulence})$$