

## REQUEST FOR PROPOSAL: SOLAR ENERGY ACTIVITY DEVELOPMENT

*A project funded by the Bonneville Environmental Foundation*

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240 Southwest First Avenue  
Portland, Oregon  
(503) 248-1905

[www.solar4rschools.org](http://www.solar4rschools.org)  
[www.b-e-f.org](http://www.b-e-f.org)



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**Proposals due:**  
May 30, 2014 by 5:00 pm

**Contact:**  
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## INTRODUCTION

Solar 4R Schools, a program administered by Bonneville Environmental Foundation (BEF), is soliciting proposals from teachers to participate in the development of new solar energy activities for the classroom. To support this development work, BEF is offering participating teachers a \$5,000 stipend for their time and an allowance for material testing. Additionally, BEF will provide the required materials for classroom implementation of the activities developed (up to an additional \$3000 in classroom materials). The total value of each teacher grant will be up to \$8,500 in cash and materials.

## GENERAL INFORMATION

**ABOUT SOLAR 4R SCHOOLS**— At Bonneville Environmental Foundation (BEF), we believe addressing the planet’s most pressing environmental challenges requires innovation, creative problem solving and discovering a new way of doing business that values the natural resources we depend on. We also believe education plays a critical role in securing a clean energy, low-carbon future.

BEF’s nationally renowned Solar 4R Schools™ program is igniting a new generation of clean energy leaders with the insight and innovative thinking necessary to solve the nation’s most pressing energy challenges. To get there, we’re transforming solar technology into a complete STEM classroom learning experience. With the help of our corporate, nonprofit and utility funding partners, our vision is to integrate engaging renewable energy education into every science classroom in the nation. Learn more at [Solar4RSchools.org](http://Solar4RSchools.org).

Providing teachers and students with fun, relevant and informative solar activities is an integral part of the work we do. This project will be the second iteration of a development program piloted last year; our goals are to provide funding opportunities, which support teachers in developing solar energy activities and then to bring these activities back to our larger teacher community.

## PROCESS OVERVIEW

Teachers who are interested in participating in the development project have until May 30<sup>th</sup> to submit a proposal. Proposals need not be more than a one to two page statement of what the teacher would like to do if granted funding, why the teacher is interested in participating in the project and that the teacher is able to commit to participating fully if his or her proposal is accepted. It is our experience and expectation that during the course of the development process the nature of the activities will evolve and change. That’s the value of the project and an integral part of what we will be doing. The proposal may simply serve as a jumping off place.

BEF will then review the submitted proposals and select up to five to receive funding. During the course of the development process, there will be a minimum of five in-person sessions at the BEF office located in downtown Portland to facilitate collaboration, discussion and peer review. In its entirety, the process will begin over the summer with the testing of materials and the development of an activity outline and a working draft. During the 2014-15 school year, teachers

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will have an opportunity to implement the activities they have developed and then, as the last project deliverable once they have classroom-tested their activities, provide final revisions and an evaluation.

## ELEMENTS OF A PROPOSAL

Teachers have until May 30, 2014 to develop and submit an Activity Proposal. Below is an outline of the recommended components of a proposal, but most importantly, the proposal should express in whatever format is most appropriate why the teacher is interested in participating and what the teacher would like to work on if granted funding. Two sample proposals are provided as reference and can be found at the end of the Request of Proposals in Appendix B.

- A. *Teacher Information*
  - a. Name
  - b. Email Address
  - c. Phone Number
  - d. Grade Level(s) Taught
  - e. School Name
  - f. Subject Area(s)
- B. *Applicant's Statement*: A brief statement explaining the applicant's interest in the program, including what kind of support or collaboration the teacher hopes to receive and/or what particular skills or expertise the applicant would bring to the program.
- C. *Statement of the Activity Concept*: A succinct description of the activity that the teacher would like to develop. This section is the meat of the proposal and although it does not need to be long (a few paragraphs should suffice), it should be well thought out, clearly written and answer the following questions.
  - a. What would the activity entail?
    - A few sentences describing the experiment or student activity procedure, including an estimate of how long it would take, what the setting would be (indoor, outdoor, etc.) and any other prerequisites or requirements.
  - b. For which grade level(s) would the activity be appropriate?
  - c. What would students learn?
    - A one- to two-sentence statement of the targeted learning goal(s).
  - d. What background information would teachers and students require in order to do this activity?
  - e. What makes you want to develop this activity and share it with the Solar 4R Schools teaching community?
  - f. What need will this activity fill in field of STEM education? How will this activity meet educational standards? Develop core competencies? Promote science, technology, energy and engineering literacy?
- D. *Relevant Common Core and Next Generation Science Standard*
  - a. Which of the national education standards would teaching this activity satisfy?
- E. *Materials List*: A list of the materials required, with cost estimates, for:

- a. Use in development. Each participating teaching may request up to \$500 in materials to be used in the activity development process.
  - b. Classroom implementation. A set of the classroom materials provided by BEF for implementation of the activity should cost no more than \$1,000. A request should not include materials to which teachers would typically have access (i.e. rulers, markers, etc.). BEF recognizes that the materials list is subject to change during activity development.
- F. *Availability, Scheduling Concerns or Other Participation Considerations:* Please include a brief statement assessing your ability to participate in the program as outlined and described in this Request for Proposals. If you know, for instance, that you will have a conflict during the entire month of August, please let us know. If there are no issues or concerns, please simply indicate that. Conflicts or other scheduling concerns will be taken into account during proposal review, but will not necessarily preclude an applicant from receiving a funding award.

## DEVELOPMENT PROJECT DESCRIPTION

### 1. Participant Commitment

By accepting a funding award, teachers are committing to participate in all aspects of the program as outlined and described below.

### 2. Program Sessions

There will be a total of five, mandatory in-person sessions during the course of the program. These sessions will be about two hours long and will be held at the BEF office in downtown Portland, Oregon. While we are happy to accept applications from teachers outside of the Portland metro area, we are unfortunately not able to provide reimbursement for the cost of travel to these sessions. We will do our best to schedule these meetings at times that are convenient for the entire group, and we ask that participants commit to being present for them. We intend that each session will be fun, educational, collaborative and valuable.

Additionally, and at the option of each participant, there will be many opportunities to meet with the Solar 4R Schools team, and in particular the manager of the development program, outside of the formal program sessions. This time can be used in developing new ideas, testing activity procedure, discussing photovoltaic/energy science or working with the materials.

- A. **Kick-Off Meeting** - *Mid June*. All teachers who have been awarded funding will be invited to BEF's office to meet one another, sign the funding agreement, discuss the activity proposals and formally submit their material requests. BEF will work with teachers at this meeting to develop a final schedule for the rest of the program.
- B. *Outline Review Forum – Late July or Early August*. Prior to this session, all participants will have received copies of the activity outlines drafted by the other participants and have had time to review them. The goal of the session will be for participants to provide feedback on one another's outlines, ask questions and exchange ideas.

- C. *Final Activity Review Forum - Early October.* Similar to the Outline Review Forum described above, this session will provide a time to review and discuss the final activities, which have been developed by participants.
- D. *Check-In Meeting - Early March.* This session will be a time for the group to meet back up a couple months after materials have been dispersed for classroom implementation. This will provide an opportunity for participants to reengage with one another, ask questions that have come up or discuss challenges they've encountered.
- E. *Final Celebration - Mid May or Early June.* This final event will be an opportunity to debrief with the group after activity implementation, celebrate what was accomplished, and give a formal evaluation of the activities and program.

### 3. Funding Agreement

At the first program session and kick-off meeting, teachers will sign a funding agreement with BEF, outlining the details of funding remission and the expected deliverables to come out of the project. This will formalize the commitment between BEF and the participating teacher.

### 4. Activity Outline

Participants will have between four and six weeks to develop their activity outlines, which will be submitted to BEF at the end of July. This document will provide a complete, detailed and descriptive outline of what will be included in the final activity as well as any questions for the group, a description and evaluation of the materials tested, and a summary of lessons learned during the testing process.

### 5. Final Activity

After receiving comments on their outlines, participants will have six to eight weeks to develop the first draft of their activities, which will be submitted to BEF at the end of August. Once these first drafts have been reviewed and participants have received feedback, they will have an additional four to five weeks for revision before submitting the final activity at the end of September. The program session for in-person review will be held in October after the final activities have been submitted unless the group votes to hold the review session earlier to discuss the activity drafts instead. Final decisions on scheduling will be made at the program kick-off meeting. Ultimately, the final activities provided by participating teachers will include the following:

- A. *Activity Name*
- B. *Abstract: A brief description of the activity*
- C. *Learning Goal(s)*
- D. *Target Grade Level(s)*
- E. *Subject Areas*
- F. *Classroom Time Required*
- G. *Addressed Next Generation Science and Common Core Standards*
- H. *Material List for a 30-Student Classroom*
- I. *Vocabulary/Glossary*

- J. *Teacher Guide*: The teacher guide should provide all the information that a teacher would need to implement the activity in their own classroom, and should include at a minimum the following components.
  - a. Teacher background information: A comprehensive and detailed list of necessary background topics is sufficient; however, if there are particular resources that were valuable to the activity architect or during the development process, those are great to include here.
  - b. Teacher instructions, activity procedure and/or answer guide
- K. *Student Guide*: The student guide should provide all of the resources required to allow students to undertake the activity.
  - a. Student background information
  - b. Student instructions, activity procedure and/or lab manual
  - c. Any necessary student hand-outs
- L. *Activity Extension(s)*: While not a mandatory component of the activity, extensions such as follow-up classroom activities, homework assignments, post-activity discussion topics, or a student writing assignment may occur to participants during the process, and we encourage including these in the final activity.

## 6. Peer Review

In addition to developing their own activity, participants will be asked to engage in a peer review process by which they will give feedback to other participants and then receive feedback on their own work. The peer review component of this program will entail reviewing activity outlines and full activity drafts. Additionally, participants will be asked to take part in two, in-person review sessions as described in Part II of this section.

## 7. Classroom Implementation

Once the final activities have been fully developed, participating teachers will have an opportunity to implement and test any three of the developed activities in their classrooms, including their own. To this end, participants will be provided with a full, 30-student set of the materials needed to do each activity as soon as the activities have been finalized. Participants will then have until the beginning of May to implement the activities and provide a final activity evaluation.

Participants will not be required to beta test all activities in their classrooms, but BEF does request that participants agree to implement the activity that they have developed. Participants are free to elect to test – and receive materials for – up to three activities during the implementation period and provide a formal evaluation of each activity for which they received materials.

## 8. Integration into Online Activity Library

Once the activities has been developed, tested, and revised, Participants will be asked to upload them to the Solar 4R Schools online activity library. Participants will be listed as the author of their activities on the site and will be notified if any activity library users provide comments, upload an activity extension or ask questions about implementation.

## 9. Final Evaluation

Participants will be asked to provide a final evaluation of each activity that they have tested in their classroom – including their own – as well as an overall evaluation of the activity development program. This shall be submitted to BEF in mid May or early June.

## SUBMITTAL REQUIREMENTS

- A. Proposals are due **May 30<sup>th</sup>, 2014 by 5:00 pm**
- B. Proposals can be submitted by email or postal mail
  - a. *By Email.* Proposals can be emailed to Emily Barrett at [ebarrett@b-e-f.org](mailto:ebarrett@b-e-f.org). Proposals should be submitted as an email attachments and can be either .pdf or .doc files. If you would like to submit another file type or need more information about what this means, please contact Emily Barrett at the above email address or by phone at (503) 553-3950.
  - b. *By Postal Mail:* Proposals can also be mailed to:  
Bonneville Environmental Foundation  
Attn: Emily Barrett  
240 SW 1<sup>st</sup> Avenue  
Portland, OR 97204

## ELIGIBILITY

BEF is soliciting proposals from kindergarten – 12<sup>th</sup> grade classroom teachers. Any educator currently working as a classroom teacher in a k-12 school who is interested in participating and able to take part in the program is encouraged to submit a proposal for consideration. If you have questions about your eligibility for this program, please email Emily Barrett at [ebarrett@b-e-f.org](mailto:ebarrett@b-e-f.org).

## PROPOSAL SELECTION

BEF will select up to five proposals from teachers to receive funding. Proposals will be selected based on their merit and completeness, an evaluation of the activity to be developed, and our assessment of how the activity would fit within the larger Solar 4R Schools educational program. One of our goals for this project is to be able to bring valuable, engaging, innovative and diverse activities back to our larger teacher community, and proposals will be evaluated in part based on our assessment of their alignment with this goal.

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**APPENDIX A – TIMELINE**

*Actual dates for non-specified session times will be determined during the project kick-off meeting. By accepting a funding award, participants are committing to be present at program sessions, meet program deadlines and participate in peer review.*

BEF releases RFP	February 3, 2014
<b>Proposals due</b>	May 30, 2014
BEF reviews proposals	May 31 – June 15, 2014
BEF awards funding	June 16, 2014
<b>Program Session: Kick-Off Meeting</b> ⇒ Participants sign agreements ⇒ Participants submit material lists	June 20, 2014
BEF provides materials to participants	Within 2 weeks of material list submission
<b>Participants submit activity outlines</b>	July 25, 2014
BEF circulates activity outlines to all participants	July 28, 2014
<b>Program Session: Outline Review Forum</b> ⇒ Participants meet to share feedback	First week in August
BEF provides compiled comments	Within a week of the review session
<b>Participants submit activity drafts</b>	August 22, 2014
BEF circulates drafts to all participants	August 25, 2014
<b>Participants provide comments on the activities developed</b>	August 29, 2014
<b>Program Session: Activity Review Forum</b> ⇒ Participants meet to share feedback	Early October, 2014
BEF provides compiled comments	Within a week of the review session
Participants submit implementation plan and materials requests as well as any final activity revisions	Mid October – November, 2014
BEF distributes revised activities and materials	As requested
<b>Program Session: Check-In Meeting</b> ⇒ Participants meet to check-in, discuss their progress, ask questions, etc.	March, 2014
Teachers test the activities in their classrooms	As determined by Participant
<b>Participants upload final activities to the Solar 4R Schools website</b>	Mid May or Early June, 2014
<b>Program Session: Final Celebration &amp; Program Evaluation</b>	Mid May or Early June, 2014

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## APPENDIX B – SAMPLE PROPOSALS

### Sample Proposal One

John Waters  
 Douglas Fir Elementary School  
 4<sup>th</sup> Grade Teacher  
[email@email.com](mailto:email@email.com)  
 (503) 555-5555

I propose developing a solar car construction activity in which students would build cars powered by small solar modules and then test them on tracks facing in different directions and at different angles relative to the Sun. Students would thereby gain an understanding of how solar modules work in a way that would be fun for them and provide an opportunity to record quantitative data. I would like to develop this activity because I think that it would give my students a way to engage with solar energy technology that they would enjoy, allow them to experience the technology working and provide an example of energy transfer, in this case solar energy into electrical energy and finally into kinetic energy.

**Grade Levels:** 3<sup>rd</sup> – 6<sup>th</sup> Grades

**Learning Goal:** Students understand that solar modules generate electricity when put into sunlight because of the photovoltaic effect.

#### **Standards Correlation:**

- ⇒ *Oregon Grade 4 Engineering Design Standards.* Identify a problem that can be addressed through engineering design using science principles; Design, construct, and test a prototype of a possible solution to a problem using appropriate tools, materials, and resources; Explain how the solution to one problem may create other problems.
- ⇒ *Oregon Grade 6 Structure and Function Standard:* Compare and contrast the characteristic properties of forms of energy.

#### **Activity Procedure:**

- ⇒ Students build solar cars based on step-by-step, illustrated instructions
- ⇒ Students do some free, exploratory testing of their cars, (e.g. orienting them in different ways, changing the tilt of the module) and make final adjustments
- ⇒ After making some initial predictions, students run their cars along prescribed tracks and time how long it takes at different angles in relation to the Sun

#### **Teacher Background Information:**

- ⇒ What the photovoltaic effect is and how it works
- ⇒ Incident angle and how it affects PV module productivity

#### **Background for Students:**

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- ⇒ The term “photovoltaic effect,” and the concept that this is a phenomenon whereby electricity is created when a photovoltaic material is exposed to light
- ⇒ A basic understanding that solar modules produce electricity through the photovoltaic effect, and that this electricity is essentially the same as the energy we use to power the electrical devices we all use every day
- ⇒ An understanding that the amount of energy produced by a PV module is directly proportional to the amount of sunlight that strikes its surface

**Development Materials:**

- ⇒ OWI Solar Car Kit, \$45
- ⇒ Tamiya Solar Car Kit, \$43
- ⇒ SolGear Solar Car Kit, \$25
- ⇒ Silicon Solar Car Kit, \$15
- ⇒ KidWind Solar Car Kit, \$15

**Classroom Set of Materials:**

- ⇒ Full Classroom Set of Solar Car Kits to be selected after material testing and activity development

**My Availability:**

- ⇒ I currently know of no conflicts

Sample Proposal Two**TEACHER INFORMATION**

Name: Jane Woods  
 Email: email@email.edu  
 Phone Number: (503) 555-5556  
 Grades Taught: High School, Grades 10-12  
 School: Stumptown High School  
 Subject Area(s): Physics, Environmental Science

**ACTIVITY CONCEPT**

I would like to develop an activity that would give my students the opportunity to use a Solar Pathfinder to do a solar resource assessment. Students would be asked to select a site and to take three readings, compile three different shading analyses, and then write up a report including the sun charts and all calculations required to determine the annual solar resource. As an extension, students would then design a mock solar array including the tilt and orientation factor to find the total solar resource fraction as well as the anticipated annual production of the system. I believe this will give my students a better understanding how solar energy systems work, while providing them with experience using a real-world engineering and design tool.

I will be away for two weeks in July around July 4<sup>th</sup>, but am otherwise available to take part in the program. If I am awarded funding, I commit to making every effort to attend program sessions, meet program deadlines and participate in activity review and testing.

<b>Learning Goal</b>	Students gain a deeper understanding of solar resource and how to assess it.
<b>Standards</b>	Currently unknown, but if I receive a funding award, I will research both the Common Core Standards.
<b>Activity Description</b>	After receiving a tutorial from the teacher on how to use a Solar Pathfinder, students take turns doing solar resource assessments at locations of their choosing. Students then compile a report to summarize their findings.
<b>Grade Levels</b>	9 <sup>th</sup> – 12 <sup>th</sup>
<b>Teacher Background Information</b>	<ul style="list-style-type: none"> <li>▪ Solar resource and how it's quantified</li> <li>▪ How the available solar resource varies depending on location, time of day, time of year, and shading</li> <li>▪ How the Solar Pathfinder works</li> </ul>
<b>Student Background Information</b>	<ul style="list-style-type: none"> <li>▪ An understanding of irradiation, how it's quantified and that it varies depending on geographical location, time of day and time or year</li> </ul>
<b>Materials List</b>	<p><i>For Activity Development:</i></p> <ul style="list-style-type: none"> <li>▪ (1) Solar Pathfinder – estimate cost \$250</li> </ul> <p><i>For Classroom Implementation:</i></p> <ul style="list-style-type: none"> <li>▪ (4) Solar Pathfinders – estimate cost \$1,000</li> </ul>

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