



ASES National Solar Conference 2016

Solar Power for Rural America

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Abstract

This paper describes the methods for reaching rural citizens of all ages to communicate information regarding solar power and sustainability. In the Ozarks, citizens are genuinely interested in solar power but may not trust the technology initially, perhaps they are cost conscious or perhaps they may not have direct access to reliable, detailed information on the subject. In many cases, these individuals still lack access to the Internet. Big solar providers tend to be located in major cities and it's often troublesome for rural families to travel regularly to these hubs. I explore techniques for reaching this demographic with greater ease. I draw from personal experience and have analyzed approaches from within the small town of Rolla, Missouri. More specifically, I have analyzed the role Missouri University of Science and Technology has played in getting complex topics like solar power to the general populace. Often, the target population are of a lower income tax bracket and big solar companies may discredit the rural population for that reason. Methods for reaching these individuals must be encouraged and well understood. The future is the sun, but we must not forget citizens in hard to reach areas. If one listens to the community, more often than not, they are willing to take the risk of a small array but require a different approach of spreading the word about solar.

Keywords: rural solar, solar, outreach, US Department of Energy Solar Decathlon, energy, sustainability, community, Rolla, Missouri

1. Introduction

The U.S Department of Energy hosts a Solar Decathlon every two years with the help of sponsors. The goal is to inspire clever technology that is eco-friendly, design a home that promotes a sustainable lifestyle and all involving solar power. Universities from around the world design and then build a solar powered home for competition. Students construct the home off site than transport the home to a competition location for about a month. During this time thousands of tours are conducted and different competition contests are conducted to analyze the newest ideas for being more environmentally friendly in an attractive home that's based on Solar Power. Judge walk throughs occur as well as direct measured contests. Richard King the creator of the original solar decathlon spurs great questions that are original to the decathlon but is great inspiration for the challenge. (Sanchez 2016) "How do you design a home that is self-sufficient? A house that is healthy to live in and produces it's own clean power?" This all relates to truly attempting to rebuild twentieth-century infrastructure one house at a time with the focus being solar. Overall Missouri S & T expands on the efforts of the competition including interactive displays, volunteer activities, community outreach and even hands on construction.

Missouri S & T has participated in seven of the eight solar decathlons. It is the 2002, 2005, 2007, 2009, 2013, 2015 and then this includes participation in the upcoming 2017 decathlon. What makes this University unique is the fact that they bring each home back to Rolla to create a Solar Village. This serves as

not only a living lab with different demographics living in the homes at different times but to give daily tours to people from all walks of life. Efforts have even been made to conduct tours in another language including French for example. Families have lived in the homes, single occupants, and even students that include an occasional roommate. The solar village residents try to maintain a sustainable lifestyle at the same time showing tips and suggestions to anyone that passes through regarding life with solar.

Various experiments are always being conducted over a wide range of disciplines and energy usage is monitored on each home. Biology studies have been conducted analyzing the bacteria in the compost bins, and even include analysis on the native plantings within the gardens of the village which is National Wildlife Federation Certified. Economics is also talked about. There is even a 5kw natural gas fuel cell as well as 60 kWh lithium ion battery banks that adds power and storage to the homes. There is an automated intelligent switch gear as well. A micro-grid has been created to connect all the homes together with 21 kw of solar and includes an electric vehicle charging station. The live in laboratories maintain constant feed back with hard data. There is also a great human element of promoting interactions with the public in regards to the panels of monocrystalline, multicrystalline, bifacial, and amorphous. Solar water heating gets described with the solar thermals and the evacuated tubes. An effort to include comprehensive passive solar information is included. The village display is quite a treat because it shows a wide variety of solar applications and a great time frame to illustrate how much the technology truly improves every couple of years with each house.

There are two main elements on the Missouri S & T campus that focuses on Solar. This includes the Office of Sustainable Energy and Environmental Engagement. OSE3 controls the village along with the new Solar Suburb. The suburb is the new location for future homes to be placed as to the fact that the original Solar Village has ran out of room! The OSE3 encourages continued research and promotion that includes many applications for grants. The other element at work to promote solar is the actual Solar House Design Team. The design team has a main focus of building the next competition show piece. The design team is an extracurricular activity on campus and OSE3 is an office sector on campus. Both of these groups are heavily involved in public relation tasks and outreach in the community. The Solar House Design Team has even raised money to provide solar self- help books to the local Rolla Public Library.

Methods to reach rural children include tours of a solar display home in Earth Day festivities, Scout outings, participation in the local parades and regular field trips. Tour guides include students that are passionate about sharing tips in eco friendly ideals. The environmentalist mentality of the tour guides and tenants creates the recipe for success that begins to brew in the rural citizens' mindset. Children that are unable to come can still have fun learning about solar power because events are held fairly often throughout town. Some event examples are that university students create children's books that deal with solar power and sustainability topics. This specific activity will have two functions. University students are forced to think of complex topics and find ways to break that down to simpler terms. This will enable them to talk and teach solar at later times because they had to be able to write stories for children creating examples, and of course including fun pictures for a range of younger children. Then have those children critique books and explain their own thoughts on how to improve the book. The reviewed books eventually aid the university student with revisions and to flush out ideas. Giving the younger children a mission to make a better story so it can be shared later on with others inspires deep thought and dialogue about solar as well.

A method to tie in nursing homes tenants as well as senior citizens in general is key to a successfully integrated community that promotes solar. An effort to include older citizens by having them receive crafts from the young ones have been made. Children make door decorations along side solar house team members. These are crafts and drawings that include everything in relation to the sun. Solar House team members can aid in thinking up inspirational sun related quotes and this promotes bonding in the community.

To reach adults in a rural setting one must have a platform to host question answer periods. Interactive tours are great for this but so is hosting an eco-home show, and lectures at libraries and various venues, Rotary Clubs and info-stations set up at a hardware stores. Fundraisers for various causes centered in the village are often times a big draw as well. The various fundraising events often times are 5 k run events, dance a thons, cooking sessions, and crafting moments. Holiday themed activities range from haunted house tours in October, and community gift wrapping. Setting up an informational tents at the local farmers market really can bring in a crowd as well. Efforts to discuss the solar powered homes on the local radio stations have been made, blog articles written and newspaper stories have been typed up all in an effort to get the word out about solar or even just the announcements of when events will be held in the Solar Village. Teaching adults about the cost benefits of solar, the ease of living with solar, current projects, explaining any flukes that may occur and the quick easy install methods is essential. Many rural citizens are very receptive of open house tours where they can freely tour the Solar Homes and take a look at the mechanical systems labeled and displayed.

Missouri S & T has become the forefront of trying to bridge the gap between complex solar topics and the rural public. They do this by making it simple, accessible and a frequently available knowledge

location to the immediate area and beyond. The university gives a lot of encouragement to hands on displays. In the basement of the 2009 home, posters, labels, 3d models, actual solar panels, evacuated tubes, and a solar oven are available for the public to touch and analyze close up. The Department OSE3 has been set up to immediately deal with research going on in the Solar Village and Solar Suburb. Then the university also encourages the production of new homes. The Missouri University of Science and Technology Solar House Design Team concentrates on the next building project and strives to have a net zero home while implementing remarkable technology. The students truly design and are heavily involved in construction of the home. Thus, they are able to pass on information to the local community that solar installation is an easy thing to put together and install. They have first hand knowledge from the design, build, research and livability of what solar is. More often than not tenants of the solar village are officers of the solar house team. In this regard, the students eat, drink, sleep and breathe solar energy and sustainability. Giving tours enables that knowledge to spread to the local community.

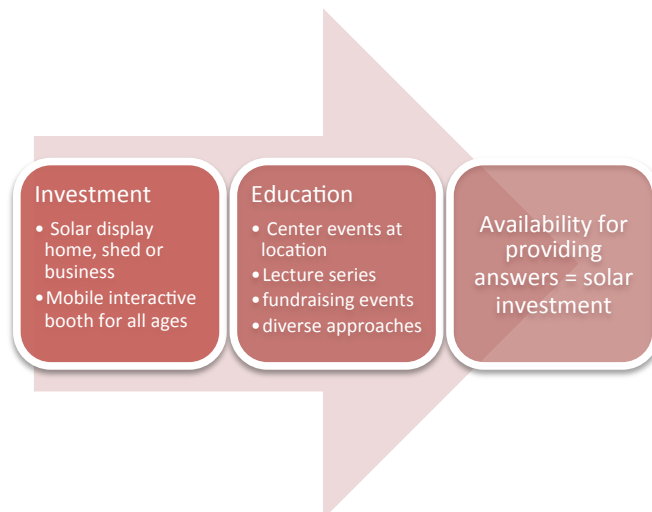
Since 2002, Rolla has become a solar friendly town besides just the campus displays. More people than ever have homes, cabins, and businesses powered by the sun. (Hoenfeldt 2016a) There is even a 3.20MW facility that has been constructed by MC Power on property then owned by Rolla Community Development Program. This fixed tilt ground mount sits on 20 acres on the east side of the Hy Point industrial Park. The citizens of Rolla and MoPEP will directly receive energy produced here. The local Phelps County Bank even has a solar drive-through. (Staff Reports 2015) This system provides electricity for ATM machines, lighting and other electric systems in place. Another site for Solar in the community is at Troop I Highway Patrol headquarters with a PV 2KW array system.

All in all, community involvement, volunteer experiences, charity benefits, home shows, eco-festivals, information booths around town, lectures, question and answer periods, local business meetings, live in displays are the suggested ways to sell a rural area on solar. Citizens in these areas want to hear first hand experience, have a platform to have dialogue and soon or later the rural town and countryside homes sway towards the solar way.

Tables

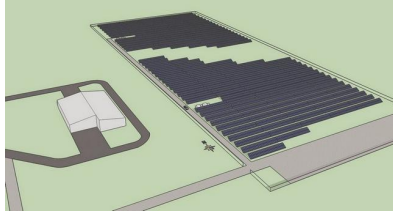
3.1 Flow table

Here is a basic lay out to illustrate the flow of information and then an end result.



3.2 Figure (Hohenfeldt 2016b)

Artist lay out of 20-acre solar farm with MC Power Companies on property then owned by Rolla Community Development Program. Location is 2301 Brewer Drive, Rolla Missouri.



3.3 List for tour breakdown

- Walk around the perimeter of the homes describing outside features
 - Solar array specific to home
 - solar water heater elements
 - research projects in village
 - green house, compost bins, native garden
- Walk through inside of homes
 - appliances
 - passive solar elements
 - architecture
 - US department of Energy Solar Decathlon description
- Basement tour of 2009 home
 - question answer period
 - 3d displays
 - mechanical systems

Appendix: Units and Symbols in Solar Energy

Mega Watts MW
Kilowatts KW
Photo voltaic PV
Kilo watt hour kWh

References

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