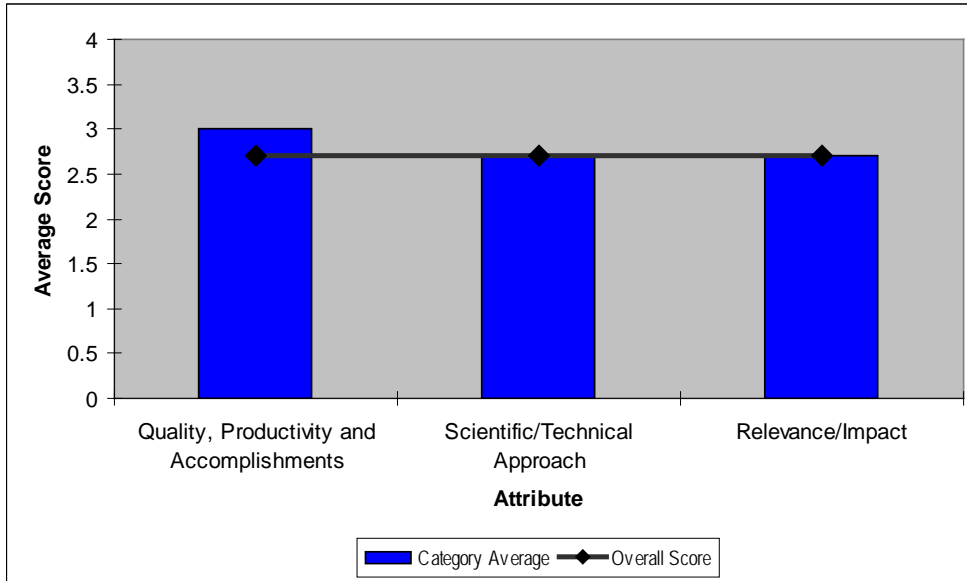


Sustainable Buildings at the University of Louisville

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This task includes several sustainable buildings projects designed by University of Louisville, including solar streetlights, solar daylighting, a solar water heating rebate program, solar water heating, a 50 kW PV array, a portable heliodon, and an instrumented thermal/PV 2-axis tracker. The group has also organized solar installer training programs and is researching additional solar applications.

Quality, Productivity and Accomplishments (Average Rating 3.0)

Rating Comments

3.0 This demonstration project consisted of seven relatively independent components. The effectiveness of the components varied considerably – the daylighting for schools was quite productive; the solar water heating rebates not particularly valuable. The thermochemical heat storage appears to be quite innovative. I would consider that more R&D than demonstration.

3.0 There was little information on the breakdown of effort and budget for the many projects included in this program. It sound like much of the work may have been subcontracted or done by some other institution. The PI seems extremely well qualified. He must know that all the work described here has been done before and has been in the literature for decades (since he was at CSU). I assume that the primary objective is demonstration for a Kentucky audience or for students. Individual activities seem to be well executed, but the documentation is rather terse. The roles of institutions and individuals involved in the project are not well described, so it is difficult to determine if the resource are well matched to the projects.

It is a little disturbing to think the 25 solar water heaters doubled the total in Kentucky. I have always believed that market development dollars should be concentrated in regions that have the highest potential. Develop the good markets and let the poorer markets evolve. Kentucky is probably not a high impact area – it is better known for horses, tobacco, and coal.

3.0 The number of demonstration components of this project was impressive, ranging from solar streetlights to thermal solar rebate programs. It is, however, difficult to put these programs in to perspective. They seemed, on the whole, to be projects that were popular as demonstrations 15 or 20 years ago. Were these projects chosen because the population of Kentucky is generally not

receptive to renewable energy, and thus this was the most that the project organizers could attain? Having said that, as stand-alone demonstrations, these were well-planned, incorporated educational components and seemed to revisit older projects in a meaningful way. It did not seem that the projects were just meant to “install and forget.”

Each project had metrics that were designed to encourage follow-on work, study and development. It was particularly positive that the solar thermal rebates and solar PV training resulted in newly-certified installers. This will certainly result in the development of a new, albeit small, industry in Kentucky. Regarding productivity, this project was notable in what it was able to accomplish with relatively limited resources. The re-use and refurbishment of the YMCA solar collector was a case in point.

Scientific/Technical Approach (Average Rating 2.7)

Rating	Comments
2.0	The technical approach was not too focused, due to the diversity of components of the project. The comparison of the three types of solar street lights, for example, was not nearly as comprehensive as other comparisons funded by DOE that were much broader in scope.
3.0	The technical approach is so diverse that it is difficult to evaluate. Some of the demo projects seem to have achieved positive results, i.e. acceptance by school systems and energy agencies in Kentucky. Some of the projects were aimed at educating undergraduate or graduate students in the fundamentals of solar engineering and were well designed for that objective. Some are new research and could have interesting results, e.g. the heat pipe and chemical storage projects. Some were simply designed to satisfy political objectives.
3.0	The technical approach for these demonstrations was solid. The educational aspects of the installations were clear, in that they provided an opportunity for observation by students. However, it would have been helpful to know which and how many students the educational components hoped to reach. The research aspects of the demonstration were both surprising and perplexing. On one hand, the passive solar heat pipe system seemed in line with the scale and ambition of the other projects. The simulation and bench-top experiments seemed in line with the educational goals of the other projects already completed. However, the thermochemical storage of solar energy experiment seemed less grounded in any particular simulations, research or small-scale experiments. This is not to say that this group was any less equipped to complete this experiment, but it seemed (1) to be promising almost too much than what could be delivered and (2) seemed like an experiment that would eventually be very costly. There was, for instance, no specific detailing of the cost of a Stirling engine, which was to be used in the experiment.

Relevance/Impact (Average Rating 2.7)

Rating	Comments
3.0	The project did a good job of addressing market barriers – especially the heat pipe application for passive solar heating, and the light shelves for daylighting the school building.
2.0	The project seems to have mixed objectives: technology demonstration, technology evaluation, education, and research. The impact of the various activities would appear to be quite limited given their size, the solar resource of Kentucky and the limited interest in alternative technologies. While the educational value of some of the projects may be high for the students who can take advantage of it, I doubt that there are very many. The relevance of the work is mixed. The heat pipe and chemical storage work is probably the only novel part of the program.
3.0	This project clearly met the goal of demonstrating the basic uses of solar energy for educational and local public awareness. It is not clear whether this demonstration project meets the long-term

goals of DOE, if that is what is meant by the sentence above. Nor is it clear that the demonstration contributes in any significant way to society, if by “society” one includes all of America. It seemed that the demonstration projects and the future experiments were very useful for the state of Kentucky and the University of Louisville. Given the economic and political climate of a “coal state,” this is probably a laudable goal. Certainly, they reduced some market barriers by training certified solar PV and thermal installers. However, given the multitude of market barriers in Kentucky, such as utility resistance and public awareness, it is almost daunting to consider how far they have yet to go.

Having said that, the potential outcome of the research in Thermochemical Storage is striking and significant. If, on one hand, this is an experiment that most engineers already know will not result in much more than a lesson for students in the difficulty of energy storage, then it is properly placed as an educational demonstration. However, if this method of energy storage has merit as a potential for nation-wide application, then, DOE should consider reviewing that potential under the technical track of the peer review process

Overall (Average Rating 2.7)

Rating	Comments
3.0	In addition to my previous comments, I thought that the student-built heliodon was a worthwhile educational project for teaching architecture students about building orientation and its effect on daylighting.
2.0	Overall, it seem like the project performed some good work. It just does not seem to fit into a well-defined set of goals and objectives. I don't think DOE can get much bang for their buck in Kentucky.
3.0	This project did a better job than others in the March 2009 Peer Review demonstration track of truly demonstrating. The goal was simply to demonstrate to students and the public that these technologies are applicable and valuable. However, as is the case with all of the demonstration projects, at least of this year, there was little attention paid to proving that any actual demonstration was done to any groups larger than those immediately associated with the demonstration. If the goal is to get the maximum demonstration for the tax dollar, then I would ask the following questions: (1) Was there a plan to target a certain audience, other than students or those who are predisposed to support solar energy?; (2) If there was a plan, how was it executed? Were there goals established for the number of people who would see the project? Was there an attempt to get media attention for the project?; (3) What metrics will the team use to track the reach of their demonstration in society, in education, among opinion leaders or among skeptical observers? If any team cannot answer these questions, then why demonstrate anything at all?