OPINION DYNAMICS
CORPORATION

# EVALUATION OF AMERENUE'S LEED™ INCENTIVE GRANT PROGRAM

*Prepared for*

**AMERENUE**

*Prepared by*

**OPINION DYNAMICS CORPORATION**
1030 Massachusetts Avenue
Cambridge, MA 02138
(617) 492-1400
www.opiniondynamics.com

**June 2007**

# TABLE OF CONTENTS

## Executive Summary

The Leadership in Energy and Environmental Design (LEED™) Incentive Program is a collaboration between AmerenUE and the U.S. Green Building Council-St. Louis Regional Chapter (USGBC-STL). The main objective of this program is to encourage the construction of LEED™ certified green buildings in the St. Louis region. The program has two main components: (1) training sessions to educate those in the building industry – including architects, engineers, contractors, facility managers, interior designers, furnishing product manufacturers, and landscape architects – about the LEED™ Green Building Rating System© and the benefits of green building; and (2) incentive grants to project owners or developers of new construction and major renovations or remodeling projects that follow the LEED™ Green Building Rating System©. (See Section II for a full program description.)

Based on the findings from our process evaluation, program accomplishments to-date include:

- Five workshops conducted or scheduled, with attendance exceeding goal
- 28 workshop participants supported with AmerenUE funds
- Eighteen start-up grants awarded, including six applications for Gold-level certification *and one application for a Platinum-level certification*
- New USGBC-STL chapter members as result of participating in trainings and increased awareness about green building and energy efficiency among building professionals

These findings are described in Section III.

The participation goal for the first funding period was five workshops with 40 participants each, and five incentive grant awards.[1] Both of these goals were exceeded during the first funding period. The first year of the program appears to have been successful as all participation goals will be met. Moreover, participants generally expressed a high degree of satisfaction with the application process, information and support that they received from USGBC-STL.

For the remainder of this first round of funding, we recommend the following:

- ➢ Examine impacts, including non-energy benefits (NEBs) to demonstrate the effectiveness of this program.
- ➢ Ensure program tracking of baseline assumptions, soft costs, and additional details to assist with future impact evaluation efforts that AmerenUE or the Collaborative may wish to conduct.

Only one round of funding has been provided for this project to-date; however, if additional rounds of funding are conducted, AmerenUE and the Collaborative should consider the following recommendations:

- ➢ Define program goals for future funding

[1] Notably, the first funding period will not be complete until the projects are completed.

- Seek applicants prior to project design phase
- Set more stringent hurdles for applicants and work to increase the level of energy efficiency by being more selective in the award of future funds
- Better target promotional efforts to expand the reach of the program beyond those who would have pursued LEED certification anyway
- Develop a forum for feedback to assist with marketing and program redesign
- Document soft costs of LEED projects and consider providing additional support depending on findings
- Re-examine allocation of funds to future trainings as well as the goals of these trainings to ensure that AmerenUE support is used where it is needed most. Work to improve trainings and consider increasing scholarship funding.

Respondent suggestions to motivate future participants include additional financial incentives, education, and information. Details for all recommendations can be found in Section V.

# I. Introduction and Methodology

The Leadership in Energy and Environmental Design (LEED™) Incentive Program is a collaboration between AmerenUE and the U.S. Green Building Council-St. Louis Regional Chapter (USGBC-STL). The main objective of the program is to encourage the construction of LEED™ certified green buildings in the St. Louis region. The program was designed with two main components: (1) training sessions to educate those in the building industry – including architects, engineers, contractors, facility managers, interior designers, furnishing product manufacturers, and landscape architects – about the LEED™ Green Building Rating System© and the benefits of green building; and (2) incentive grants to project owners or developers of new construction and major renovations or remodeling projects that follow the LEED™ Green Building Rating System©.

The program was funded for only a single funding cycle, and to-date has proceeded through Phase 1, the distribution of start-up funds to the grant recipients. Phase 2, disbursement of the balance of funds upon individual projects achieving their stated LEED level of certification will occur throughout the next two years as projects complete the construction and LEED certification process. As such, no impact evaluation of this phase was required.

This report provides a process evaluation of the LEED Program, led by Opinion Dynamics Corp. This process evaluation is based on (1) our review of program materials, including a 2-page program description, program overviews on Ameren's and USGBC-STL's websites, an application form, and a USGBC-STL proposal letter addressed to Ameren Services; (2) in-depth interviews with the program administrator of USGBC-STL and the AmerenUE contact; (3) a review of the training participant databases; (4) a review of the data collected through the post-training follow-up survey conducted by USGBC-STL; and (5) telephone interviews with 16 of the 18 incentive award recipients.

## II. Program Description

The LEED™ Incentive Grant Program was designed to accelerate green building practices, energy conservation, and environmental performance. The LEED™ Green Building Rating System© is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water efficiency, energy and atmosphere, materials & resources, indoor environmental quality and innovation & design process (www.usgbc.org/LEED/). While LEED certifications have been available since the 1990s, the AmerenUE/USGBC-STL LEED partnership began in late 2004.

In October, 2004, under the direction of the State of Missouri Energy Efficiency Collaborative Team, AmerenUE and the Missouri Department of Natural Resources conducted a survey to discover the types of incentives that would most effectively support LEED certification of building projects in the St. Louis region. The AmerenUE/USGBC-STL LEED™ Incentive Grant Program was designed in October 2005, as a result of the survey findings and filed with the State of Missouri Public Service Commission in April of 2006. The program officially launched June 1, 2006 with applications due to the USGBC-STL by December 31. The program was targeted towards commercial and institutional projects in the AmerenUE service territory. Residential home projects were not eligible for participation.

The program consists of two main components: training and incentive grants, which are described in more detail below.

**Training:** The AmerenUE LEED program included the support of five training modules, organized by USGBC-STL. These trainings were conducted in addition to other LEED training, which USGBC-STL offers on a regular basis. The topics of the five training sessions were:

- LEED for General Contractors & Construction Managers Training
- Understanding LEED Project Costs & Returns
- Using LEED-NC on School Projects (K-12) Training
- Using LEED-NC on Health Care Projects
- Energy Modeling for LEED-NC Projects Workshop

LEED training modules are targeted towards a wide range of building industry professionals, including architects, engineers, contractors, facility managers, interior designers, furnishing product manufacturers, and landscape architects. The participation goal for the five training modules was at least 40 participants per module.

**Incentive Grants:** The incentive grant component of the program will provide up to $30,000 for obtaining a LEED certification. LEED™ incentive grants cannot be applied to construction costs; they have to be used for "soft" costs, such as LEED™ certification fees and documentation, professional services, and commissioning. To qualify for an incentive grant, applicants were required to submit a completed application form, verification of LEED™

registration, a LEED™ checklist of preliminary goals, and a signed Letter of Agreement.[2] Incentive grants could be submitted for four types of projects:

- New Commercial Construction & Major Renovations (LEED-NC)
- Existing Buildings Operations and Maintenance (LEED-EB)
- Commercial interiors (LEED-CI)
- Core and shell (LEED-CS)

For Phase 1, the start-up phase, the program was designed to pay $5,000 to the successful applicants within 45 days of grant award. The balance of funds, Phase 2, will be paid within 45 days of award of LEED™ certification. The total grant award depends on the level of certification, which is determined by the number of points the project receives under the LEED™ Green Building Rating System©. Points are awarded in five key areas of human and environmental health: sustainable site development, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and innovation & design process. In each category, the project must meet a minimum number of points. In an effort to increase the energy efficiency component of the applicants' projects, AmerenUE required projects to exceed the LEED prerequisite for energy efficiency. The total grant award, including the $5,000 start-up funding, for the four LEED™ certification levels are:

- LEED™ Certified: $15,000
- LEED™ Silver: $20,000
- LEED™ Gold: $25,000
- LEED™ Platinum: $30,000

The Energy Efficiency Collaborative initially anticipated budgeted funds to award incentive grants to five green building projects. The original program budget for the first funding period was $150,000, including $25,000 for the five training modules, up to $120,000 for five incentive grant awards, and up to $5,000 for program administration.

On Application close date, December 31, 2006, USGBC-STL received a total of 18 grant applications. The response was far greater than expected at the time the program was designed. AmerenUE program management totaled the amount of grant funding that would be needed to award all eighteen grants and went back to the State of Missouri Energy Efficiency Collaborative with a request for additional funding to award all 18 grants. The Collaborative was in immediate agreement that this response was exceptional and agreed to fund the additional moneys necessary to award the grants.

---

[2] The letter of agreement commits grantees to (1) achieving LEED™ certification; (2) agreeing to make their facilities available for green building tours; (3) providing proof of achieving energy cost reductions of 15% for new buildings and 5% for existing buildings compared to ASHRAE/IESNA Standard 90.1-1999 ("LEED EA credit 1.1"); (4) providing a schedule of how the grant funds will be used; and (5) providing proof of LEED™ certification to receive full grant funds. **Please Note:** MOU between USGBC-STL and projects requires projects to achieve at least two points under Optimize Energy Performance in the Energy and Atmosphere category of LEED NC 2.2, LEED CS, LEED CI 2.0 and LEED EB 2.0. The percentage of energy cost reduction differs between LEED NC v 2.2 and v 2.1 and Letter of Agreement was based on LEED NC v 2.1.

As a result, in January, 2007 the budget for grant awards was increased from $120,000 to $380,000 for the 18 projects, for a total program budget of $410,000. In addition, USGBC-STL requested an increase in the program administration budget to account for the larger number of projects to be tracked. Between June 2006 and early 2007, total spending has totaled $108,530. Of this $90,000, or 83% has gone towards the initial grants ($5,000 each for 18 projects).

**Table 1: LEED Program Budget/Costs**

| Budget Item | Budget |
|---|---|
| Training[a] | $25,000 |
| Initial Incentive Grants | $90,000 (actual costs) |
| Balance of Incentive Grants to be Paid | $290,000 (estimated balance given awards anticipated to be applied for) |
| Program Administration | $5,000 budgeted (to be increased) |
| **TOTAL** | **$410,000** |

a. The training budget consists of $10,000 to schedule, market, and coordinate five training modules; $5,000 in scholarships and/or registration subsidies; and $10,000 for follow up contact with attendees.

USGBC-STL administers the program and is responsible for program implementation, marketing and promotion, and operation. Program promotion is primarily targeted to USGBC-STL members and other professional organizations that have an interest in the building industry or that work in the building industry. USGBC-STL's website, newsletter, and e-mails are the main channels of promotion materials. Materials available on USGBC-STL's website include one-page electronic flyers about the various AmerenUE-sponsored training modules and a March 2007 press-release about the presentation of initial grant awards to the 18 program participants. According to the USGBC-STL program administrator, with more time and money, program promotion could be much more targeted, and participation in at least the training modules could be increased significantly. USGBC-STL also provides quarterly updates on the trainings, including promotional activities and attendance, to the collaborative.[3]

The National USGBC develops the trainings, provides the instructors, and conducts follow-up interviews with training attendees. The program provided funding for five training modules, the incentive grant awards, and USGBC-STL program administration. AmerenUE also promoted the program through its Ameren.com website and through its Key Account Executives, who send out information to AmerenUE's major commercial customers.

Notably, AmerenUE oversees in the program, in partnership with the USGBC-STL on behalf of the State of Missouri Energy Efficiency Collaborative. AmerenUE efforts are provided in-kind and are not documented in the program funding.

[3] The collaborative consists of AmerenUE, the Office of Public Counsel, the Missouri Public Service Commission Staff, and the Department of Natural Resources' Energy Center

## III. Program Accomplishments

The program has just completed Phase 1. As of May 2007, program accomplishments included:

- Five workshops conducted or scheduled, with attendance exceeding goal of 40 participants per training
- 28 workshop participants supported with AmerenUE scholarship funds
- Eighteen start-up grants awarded, including six Gold-level certifications and one Platinum-level certification
- New USGBC-STL chapter members as result of participating in trainings and increased awareness about green building and energy efficiency among building professionals

These accomplishments are described further below.

### Five Workshops Conducted or Scheduled, with Attendance Exceeding Goal

As of May 2007, four of the five workshops had been conducted, with the last one scheduled for June 2007. The USGBC-STL sees the goals of the trainings as educating players in the building industry about "the LEED Green Building rating system, about Green Building in general, and also about energy efficiency and what they can do in the design and the construction and operation of their buildings to increase their energy efficiency and reduce their impact on the environment using LEED." The trainings are designed to encourage green building and to help market actors bid on LEED projects by helping them better understand LEED. Workshop attendance has exceeded the target of 40 participants per event. According to the program training databases, attendance at the first three workshops averaged 48 people per training. The high level of participation is an indication of interest in the subject, awareness of the importance of green building and energy efficiency among building professionals as well as an indication that the marketing and promotion efforts for the program were successful. AmerenUE funds appear to have pushed the USGBC-STL to conduct trainings that it wanted to conduct, but would not have done without the additional funds.

### 28 Workshop Participants Supported With AmerenUE Funds

The USGBC-STL received and disbursed $5,000 for scholarships or discounts to the workshops to attract attendees who may not otherwise have been able to afford to attend. Most scholarship funds were distributed to students and school district & municipal employees whose budgets were not able to support the LEED course tuition. In total, 28 workshop participants were supported with AmerenUE funds.

### Eighteen Start-Up Grants Awarded, including Six Applications for Gold-level Certifications and One Application for a Platinum-level Certification

Participation in the incentive component of the program has also exceeded expectations. As indicated above, AmerenUE initially intended to award five incentive grants. However, when 18 eligible applications were received, AmerenUE asked to fund all of them. On March 14, 2007, AmerenUE and USGBC-STL officially presented $90,000 in start-up grants to the 18 project owners/developers. Due to the early stage in the program, no LEED™ certifications have been obtained, and no Phase 2 funds have been disbursed. Of those who have applied, four are

seeking "Certified" status, seven are seeking "Silver" status, six are seeking "Gold" status, and one is seeking "Platinum" status.

**Table 2: Certification Levels of Projects**

| Certification Level | Number of Projects |
|---|---|
| Platinum | 1 |
| Gold | 6 |
| Silver | 7 |
| Certified | 4 |
| TOTAL | 18 |

The 18 projects represent a good mix of building types. Five mixed-use buildings, three schools, three non-profit or institutional buildings, three commercial spaces, two public recreation centers, and two residential buildings comprise the grant awarded projects.

## New USGBC-STL chapter members as result of participating in trainings

Based on our in-depth interview with the USGBC-STL program administrator, the funding from AmerenUE led to new USGBC-STL chapter members as result of participating in trainings and increased awareness about green building and energy efficiency among building professionals.

## IV. Impacts and Cost Effectiveness

Because the program is still in only the second phase of the process – i.e., start-up funds have been disbursed but no LEED™ certifications have been achieved – this program evaluation does not include a review of program impacts or a cost-effectiveness analysis.

## V. Process Findings and Recommendations

The participation goals for the first funding period were five workshops with 40 participants each and five incentive grant awards. Both of these goals were exceeded during the initial start-up phase. Overall, the first year of the program appears to have been successful as all participation goals will be met. Participants generally expressed a high degree of satisfaction with the application process and the information and support they received from USGBC-STL, based on our in-depth interviews.

According to program participants, benefits of the program (apart from the incentive money) include: social/environmental benefits ("it's the right thing to do"); marketing opportunities; higher levels of publicity/mainstream media attention; energy efficiency; and access to guidance/resources/new ideas.

Approximately half of the participants learned about the program directly from the USGBC-STL.[4] All respondents found the USGBC-STL program administrator to be responsive and helpful and none expressed any difficulties with the initial application form. Because it is early in the process, only one respondent indicated having completed any of the LEED Incentive Award documentation (credits only), but this respondent did not have any problems with it; moreover, no respondents foresee any problems with attaining certification although most indicated planning on using outside resources to do their energy modeling.

Based on our process evaluation findings, for the remainder of this first round of funding, we recommend the following:

- **Examine impacts, including non-energy benefits to demonstrate effectiveness**

  While it is likely that these projects will result in energy savings, AmerenUE and the Collaborative should examine the impacts from these 18 projects, including the non-energy benefits (NEBs) that arise from the LEED certification process, such as brighter lighting and improved work environments.

- **Ensure program tracking of baseline assumptions, soft costs, and additional details to assist with future impact evaluation efforts that AmerenUE or the Collaborative may wish to conduct**

  Given the early stage of this program, it is unclear what program tracking will occur. As the 18 approved projects go forward, formal tracking of their status by the USGBC-STL would be useful. The USGBC-STL should track all information provided in the application forms (e.g., all project decisionmakers and contacts, budget, square footage, etc.), as well as indicate all information that is collected in hardcopy. AmerenUE should also consider tracking baseline assumptions if future programs require the calculation of energy savings, as well as the specific soft costs for these projects (as discussed below). Anecdotally, about half of the interviewees who responded to this question had a notion of their likely energy savings (ranging from 15% to 50%); the other half did not know.

[4] Three other participants found out through a contractor, architect, or consultant; and one through the internet.

While only one round of funding has been provided for this project to-date, our findings support AmerenUE and the Collaborative offering another round of grant funding in conjunction with the USGBC St. Louis Regional Chapter.

AmerenUE and the Collaborative should continue to partner with the USGBC-STL since this partnership appears to be successful while providing funding for administrative support that is commensurate with the expected level of effort. To date, the partnership with the USGBC-STL has been successful, but the AmerenUE funding reflected a goal of five trainings and five projects. Since additional projects have been selected, additional administrative support is expected. The USGBC-STL and AmerenUE are currently working with the State of Missouri Energy Efficiency Collaborative to increase the amount of AmerenUE support for USGBC-STL administration of this program, while still leveraging existing program funding from the USGBC-STL's other sources. Additional funds by AmerenUE would be expected given the larger number of AmerenUE-supported applicants.

If additional rounds of funding are conducted, recommendations to refine these future programs include:

- **Define program goals for future funding**

  The current program materials do not provide a precise definition of program goals for future AmerenUE funding periods. The two-page program summary states that this program seeks to "encourage green building practices by funding the LEED™ Incentive Program." Other descriptions by AmerenUE indicate that the grants will be awarded "to encourage the construction of green buildings that will serve as examples for future projects to emulate." In this early stage of the program, these general goals appear to be being met. As stated above, the participation goal for the first funding period was five workshops with 40 participants each and five incentive grant awards. Both of these goals were exceeded during the first funding period. Going forward, however, AmerenUE should more specifically define the goals for any subsequent funding. For example, it is not clear if participation in trainings is a goal in itself or simply a means to increasing the number of certifications. If the latter is the case, the effect of training attendance on certification grant applications should be examined. We also suggest including more specific impact goals, such as energy savings attributable to the program.

- **Seek applicants prior to project design phase**

  Most respondents indicated that they made only minor changes to their plans to meet LEED requirements. While no formal impact analysis was required for this program, our primary research did reveal that this first phase of funding went primarily to early adopters who would have completed the projects anyway. Interviews with 11 grant awardees (representing 16 of the 18 projects) indicated that 10 of the 16 projects would have been done to the same standard without the incentive (as might be expected with the start up of any new program). Notably, however, participants have not applied for the final grants, and there were a few who indicated that they would be trying for a higher level of certification.

The ability to make significant changes to designs seems to be a limiting factor in trying for higher certification standards. Respondents felt that it was expensive to make changes once they have been through the design process. As such, the program should seek applicants prior to project design phase.

- **Set more stringent hurdles for applicants and work to increase the level of energy efficiency by being more selective in the award of future funds.**

  For most awardees, the certification level in the initial application was determined by what was realistic to achieve given the available project budget. Two respondents indicated that they based their decision on cost-effectiveness and chose a level at which any additional costs were outweighed by additional savings. Both indicated that "Silver" is most cost-effective, and the City of St. Louis recently passed an ordinance adopting LEED Silver Certification for all new construction city-owned buildings over 5,000 square feet. Some interviewees also cited design constraints as a reason for their chosen certification level.

  There were, however, a couple of respondents with projects that were affected by the AmerenUE funds. One respondent would still have sought LEED certification but to a lower standard. An additional respondent, representing three projects, indicated that they would probably have incorporated some LEED-recommended methods anyway, but that the incentive made them push LEED to the forefront of the development process and "stretch their thinking".

  For the future, AmerenUE should further encourage energy efficiency enhancements (such as with these later two respondents). One way to do this is to encourage a system that is more selective and funds the higher levels of LEED certification or projects that clearly need assistance to reach any level of certification. Understandably, in the initial funding period, the goal was "to encourage the construction of green buildings that will serve as examples for future projects to emulate." As such, the program decided to fund all 18 projects that applied rather than just selecting five or six that originally were budgeted for. In the future, it may be advantageous to be more selective in awarding AmerenUE funds. Based on our in-depth interviews, AmerenUE and the USGBC-STL went through the process of developing metrics and sorting through projects to set up a process for the future. In addition, our interview with the AmerenUE overseer indicated that they do not plan to accept "Certified" status in the future.

- **Better target promotional efforts to expand the reach of the program beyond those who would have pursued LEED certification anyway**

  According to the USGBC-STL's program manager, promotional activities to date have targeted USGBC-STL's members and other professional organizations that have an interest in the building industry or that work in the building industry. However, the USGBC-STL program manager also indicated that with more time and money, marketing could be better focused and training participation could be significantly increased. Given that one of USGBC-STL's goals is to increase LEED-registered/certified building stock, promoting this program primarily to USGBC members might have contributed to project

applying for funds even though they planned on seeking LEED certification anyway. As such, in future funding cycles, AmerenUE should consider funds to expand the ability of the USGBC-STL to reach out to commercial and institutional buildings. Alternatively, AmerenUE could provide additional in-kind services to market the program (i.e., through current sources like the website, or other contacts with commercial customers.)

- **Develop a forum for feedback to assist with marketing and program redesign**

  AmerenUE may want to consider supporting a forum for feedback from ongoing projects via email/the Web, key account reps, focus groups and/or other ways to gather information. As part of this effort, the program should consider the creation of case studies to document the effects and assist with education and promotional efforts. AmerenUE should also seek to document the press from the promotion of the initial 18 awards.

- **Document soft costs of LEED projects and consider providing additional support depending on findings**

  According to respondents, perceived barriers to building to LEED standards include: cost premium; inexperience of contractors and building operators with LEED standards; record keeping for the existing building program; technical difficulty in making modifications to existing buildings; construction waste management; building to stringent energy standards when MO does not have an energy code at all (most local contractors currently do not have to build towards an energy code).

  Several interviewees indicated that they would benefit from financial and/or technical support; several others indicated already having resources lined up. Specific technical support issues mentioned were energy calculations and information on alternative energy systems. Many respondents also stated that they would use external resources to complete the required energy calculations. As such, AmerenUE's goal of supporting soft costs, such as the additional paperwork and calculations required of LEED certification, is a valuable one. The program should document soft costs of the 18 LEED projects and consider providing additional support depending on findings from the study of the initial 18.

- **Re-examine allocation of funds to future trainings as well as the goals of these trainings to ensure that AmerenUE support is used where it is needed most. Work to improve trainings and consider increasing scholarship funding for future programs.**

  Notably, all but four respondents indicated having attended some kind of training or event on green building and/or LEED prior to submitting the initial application. As might be expected, these respondents generally associate the training with USGBC-STL (only one interviewee recalled his training being an AmerenUE-sponsored one). While most respondents who attended some kind of green building/LEED training or other event found it valuable, all but one respondent indicated that the training was not instrumental in making the LEED decision for the specific project in question.

Based on a review of the data collected through a follow-up survey of training participants, there is room for improvements to the trainings, particularly in the exercises, in the level of detail provided to participants, and in the application to the region. (Notably, case studies of some of the first 18, described above, could be useful in providing details on the process and information specific to AmerenUE's territory.) Participant comments about the training also indicate that is may be good to have two levels of training, with one going beyond the basics for individuals already familiar with LEED.

Depending on the definition of overall program goals, AmerenUE should revisit its allocation of program funding. One specific area of inquiry we recommend is whether funding should be provided for training modules, and if so, whether AmerenUE and the Collaborative could use funds to improve the trainings. If the goal of the program is to increase the number of LEED certifications in the St. Louis area, then the effect of training attendance on participation in the grant component should be carefully evaluated, and program funds might be more effectively used for incentive grants or scholarships to the training sessions The USGBC-STL reported that scholarship recipients were very appreciative of the funding and viewed the contribution as goodwill on AmerenUE's part.

Respondent suggestions to motivate people to seek LEED certification included: higher incentives, lower LEED costs, more media coverage, more education, more information (e.g., that complying with standards is achievable and not cost-prohibitive or cumbersome; one interviewee stressed the need for more concrete information on monthly savings, health issues, etc.).

OPINION DYNAMICS
CORPORATION

# EVALUATION OF AMERENUE'S MISSOURI SCHOOLS GOING SOLAR PROGRAM

*Prepared for*

**AMERENUE**

*Prepared by*

**OPINION DYNAMICS CORPORATION**
1030 Massachusetts Avenue
Cambridge, MA 02138
(617) 492-1400
www.opiniondynamics.com

**June 2007**

# TABLE OF CONTENTS

## Executive Summary

The Missouri Schools Going Solar (MSGS) program is collaboration between participating St. Louis area schools, The EarthWays Center, the Department of Natural Resources (DNR Energy Center) and AmerenUE. The program works to educate students, teachers and communities about the importance of electricity as an energy form, the importance of energy efficiency and energy efficiency technologies, and the value of renewable solar energy in meeting current and future energy needs. This project serves K-12 schools that have an interest in solar electric energy by bringing a solar array, and a related curriculum, to participating schools.

Based on the findings from this report, program accomplishments during the program period include:

- Fourteen participating schools, from 3rd to 12th grade
- An award winning curriculum and program
- Fourteen solar arrays installed as part of Missouri's commitment to 500 solar roofs by 2010 (as a Million Solar Roofs Partner)
- Students from more than 14 classrooms impacted by the curriculum
- Additional impacts beyond the school.

Findings from interviews with seven of 14 of the participating schools show that overall satisfaction with this program is high. All of the teachers feel that the program has been successful and that their kids have learned a lot of information. The "hands on" learning style of the curriculum appeals to teachers and students alike for this program. The teachers are extremely enthusiastic about their program and the impact that it is having on their students. There is concern in some of the schools, however, that the education will either diminish, or not continue, after the first year.

This program evaluation does not include a review of energy savings or a cost-effectiveness analysis. An energy savings and cost-effectiveness evaluation was not required for this information-only program.

If AmerenUE and the Collaborative decide to run a similar program in the future, we recommend the following:

- Find ways to utilize parts of the current curriculum while placing more emphasis on energy efficiency
- Work to expand the effort beyond the lead classroom by integrating the curriculum into the schools more, using high-school students to teach younger students, and creating subject-based curriculums
- Ensure that the program works around the teacher and school-year schedules
- Consider other less expensive hands-on demonstrations that teach energy efficiency
- Work to make the data acquisition system (DAS) a more user-friendly platform
- Work to increase community-based events and consider opportunities to conduct similar classes outside of the schools, such as in the Botanical Gardens or Zoo

- Leverage the installed systems and experiences to-date to educate and create interest among other schools across Missouri, and to increase school contributions
- Work towards a more competitive application process to ensure that schools are very dedicated to the program before signing them up; Work through Principals to get continued buy-in to the program
- Follow up with schools to ensure that the education continues
- Continue to utilize EarthWays Center and DNR Energy Center since the process worked well and the schools feel both provided valuable services.

Details for all recommendations can be found in Section V.

## I. Introduction and Methodology

The Missouri Schools Going Solar (MSGS) program is a collaboration between participating St. Louis area schools, The EarthWays Center, the Department of Natural Resources (DNR Energy Center) and AmerenUE. The program works to educate students, teachers and communities about the importance of electricity as an energy form, the importance of energy efficiency and energy efficiency technologies, and the value of renewable solar energy in meeting current and future energy needs. This project serves K-12 schools that have an interest in solar electric energy by bringing a solar array, and a related curriculum, to participating schools.

The MSGS program was launched in January of 2004, and grew from an in-school energy efficiency program called SEED. Through the leadership of The EarthWays Center, DNR Energy Center and AmerenUE this program is bringing education about alternative energy sources and energy efficiency to communities throughout AmerenUE's electric service territory.

This program evaluation is based on (1) our review of the program materials such as the school lists, outreach efforts, site statements, developmental workshop evaluation forms, and quarterly reports for March 2004-December 2006, (2) in-depth interviews with the program administrators and program stakeholders, and (3) telephone interviews with participating schools.

Our in-depth interviews for this effort include seven lead teachers in the MSGS program as well as the lead contacts at EarthWays Center and the Department of Natural Resources.

## II. Program Description

The Missouri Schools Going Solar program is an educational program that brings knowledge of renewable energy, energy efficiency and a better understanding of how solar energy works. The program sought to "get the education into the classroom and affect the community," and aimed to reach 20 schools.

AmerenUE provides the funding behind this project and pledged $350,000 through June 2007 to implement this program. The program requires an initial training of the teachers, the installation of a 1 MV solar array and data acquisition system (DAS), working with EarthWays Center to adapt an energy efficiency/solar energy curriculum in their classroom, and the completion of a community outreach project. The total cost per school is approximately $25,000: $20,000 per school for the solar array, $4,000 for the data acquisition system; and $1,000 towards the cost of

the education component. (Note that the DAS links the solar array to the classroom. It is a critical piece in making the technology practical for the classroom). In order to participate, the school must provide a match of $2,500 to help fund some of the costs of the educational component, estimated at $3,500 per school.

The Department of Natural Resources coordinates with the solar contractors and deals with the interconnection, the software systems, and any solar array issues. Pat Justis is the main contact with the Department of Natural Resources. In this role, he works directly with schools and with the EarthWays Center coordinator to get the solar arrays installed.

The EarthWays Center developed the curriculum for this education program and provides the schools with the materials and assistance necessary to carry out the program. Julia Feder, the lead contact from the EarthWays Center, conducts the school trainings and works side by side with the lead teacher for 6-8 lessons during the program. This program developed out of another energy efficiency program, SEED (School Energy Efficient Development) where administrators, teachers and students work together to implement large scale energy efficiency changes in schools.

Within each school, one teacher is designated to be the "lead teacher" for the program. In most cases, the lead teacher is a science teacher, with some social studies teachers. Lead teachers generally write the grant for the assistance and are responsible for coordinating with the EarthWays Center to develop and adapt the curriculum, and teaching this curriculum in his or her classroom. The lead teacher works very closely with the EarthWays Center Coordinator to implement the lesson plans in their classroom. For most teachers interviewed, this is the first EarthWays Center program that their school had ever enrolled in. However, one teacher had participated in the LEED program, focusing on leadership and environmental projects for the past seven to eight years.

In order to market this program to schools, the DNR Energy Center sent letters to schools, put out press releases, posted information to the website, and also tried to include information about the program in newsletters for different associations (e.g., Missouri Science Teacher's Association). The program sent over 900 letters to schools (in two rounds) in order to solicit responses. Originally, three schools were handpicked, and then other applications came in and were selected to participate in the program. The number of schools chosen ended up being less than the 20 that the program had originally planned for due to budget constraints. All schools that applied were able to participate.

The key components of the AmerenUE Missouri Schools Going Solar program include:

**Kickoff project – Site coordinator training -** Before getting started in the program, the teacher (or administrative team) must complete the Site Coordinator Training. This involves reviewing the background of the program, establishing goals for their schools and projects, developing a plan for their site, beginning discussions about the service-learning event that they need to complete and reviewing the MSGS Program Manual. This two-hour session is led by The EarthWays Center and serves as the kickoff for the project.

*Participants: Lead teacher (or team) and EarthWays Center Coordinator*

**Installation of Solar Array** – The solar array is installed and the Data Acquisition System (DAS) is set up. With the DAS, teachers are able to access real world information about what is happening with the solar array that is on their school grounds. DNR Energy Center called for bids for this project and it was awarded to a solar contractor. The setup of the array and troubleshooting of any issues is handled by DNR Energy Center and the solar contractor. Notably, in the first year, there was a slow down in the installation process. This was mostly related to the procurement of equipment and installation services because the photovoltaic market in Missouri is immature relative to other states.

*Participants: DNR Energy Center Coordinator, Solar Contractor and Administration of school*

**MSGS Professional Development Workshop** – This four hour workshop is open to all interested faculty, staff, and administration. The main function of this workshop is to determine the scope of the project and to explore roles and responsibilities of everyone involved as well as look for ways to integrate energy ideas across the curriculum. It is a great way to administer information about the program to all interested parties in the school. In most cases, this workshop will take place after the solar array has been installed on the school grounds because the teachers will be accessing information from the Data Acquisition System (DAS). This system is something that the teachers would normally be utilizing throughout the lessons in the program.

*Participants: EarthWays Center Coordinator, Lead teacher (or team), all interested faculty, staff and administration of site school*

**Plan and Teach 6-8 Lessons from Curriculum** - The curriculum plan is reviewed by the site coordinator and the EarthWays Coordinator and adaptations are made to tailor it to the individual needs of the students at that particular school. For the site schools, 6-8 lessons will be taught in the classroom. This education program can be adapted for students in grades 3-12.

*Participants: EarthWays Center Coordinator, Lead teacher (or team)*

**Plan and Execute a Community Learning Project** – This is a project that will help extend the program to the community. This can involve presentations to the community and/or school board to show what the kids have learned from the project, conduct tours of the solar array for the public, etc.

*Participants: EarthWays Center Coordinator, Lead teacher (or team)*

After training and coaching from the EarthWays Center, it is envisioned that the program will be continued in the years to come, and spread to other classrooms throughout the school.

## III. Program Accomplishments

Program accomplishments during the program period include:

- Fourteen participating schools, from 3rd to 12th grade
- An award-winning curriculum and program

- Fourteen solar arrays installed as part of Missouri's commitment to 500 solar roofs by 2010 (as a Million Solar Roofs Partner)
- Students from more than 14 classrooms impacted by the curriculum
- Additional impacts beyond the schools.

These accomplishments are described in more detail below.

### Fourteen Participating Schools from 3rd to 12th Grade

Fourteen schools participated in the Missouri Schools Going Solar Program. These schools included a mix of four private schools and 10 public schools, with lead classrooms from 3rd to 12th grade. In the sample interviewed, most of the programs were lead by science teachers with one social studies teacher leading a global issues class.

**Table 1: Participating Schools**

| School, District | Grade Level |
|---|---|
| Whitfield School, Private | 12 |
| South Technical High School, Special School District | 11-12 |
| Potosi High School, Potosi | 9-12 |
| Notre Dame High School, Private | 9 |
| Brookfield Schools, Brookfield R-III | 9 |
| Lewis and Clark, Jefferson City | 8 |
| Orchard Farm Middle, Orchard Farm | 8 |
| Northeast Middle School, Parkway | 8 |
| Compton-Drew, St. Louis | 8 |
| Brittany Woods Middle, University City | 8 |
| Rockwood South Middle School, Rockwood | 7 |
| The Principia, Ferguson-Florissant | 5 |
| Duchesne Elementary and Little Creek Nature Area, Private | 5 |
| The College School, Private | 3 |

Notably, the program's original goal was 20 schools, but the solar arrays were much more expensive than anticipated due to the fact that solar is not prevalent in the Midwest.

### An Award-Winning Curriculum and Program

In the fall of 2006, the program was awarded the 2006 Inspiring Energy Efficiency Education Award from the Midwest Energy Efficiency Alliance. The program has also gotten great feedback on their curriculum from other states that are implementing similar programs. The curriculum is being used as a resource in other areas of the country.

For teachers and students, some of the major highlights include building solar ovens, collecting data from the solar array and the data from the MSGS website, learning about the various energy sources, and the final presentations or in-service events.

**Fourteen Solar Arrays Installed as Part of Missouri's Commitment to 500 Solar Roofs by 2010**

The DNR Energy Center is a Million Solar Roofs Partner and the 14 solar arrays installed under the MSGS program will count towards the goal of 500 solar roofs in the sate of Missouri by 2010. The Missouri market for photovoltaics is immature relative to other markets, and this MSGS program helped to bring solar panels, and experience with installing and interconnecting these panels, to Missouri.

**Students from More Than 14 Classrooms Impacted By the Curriculum**

While the program focused on the "lead classroom" which usually had between 12 and 20 students, some schools (such as the Compton Drew School) reported as many as seventy-six students involved in the program.

All teachers found their students to be engaged in the lessons. Teachers reported that their students were very engaged in the classroom and felt that the curriculum did a good job in piquing the students' interests. Most teachers felt that their students learned a lot about energy from the course. One teacher notes, "Truthfully, the kids that I had that really participated just exceeded my expectations." For example, two lead teachers wrote:

> "I was extremely pleased with the knowledge the students gained and their ability to share that knowledge. Students are able to identify renewable and non-renewable sources of energy. They can explain how the different energy sources are collected, and changed into useable forms." (*Compton Drew Middle School)*
>
> "...the program went far beyond expectations. Not only were students able to analyze solar energy as an energy sources, but also analyze data, compare and contract energy sources, and determine the energy footprint and the cost/benefit of such a footprint." (*Orchard Farms Middle School)*

Most of the teachers with whom we spoke had already been in the project for over a year, so they had already done all of the lessons at least once. The majority said that Julia would come in and model the lesson, and then the teacher would then supplement it and teach it to other classes.

Some teachers mentioned that they were particularly excited about the amount of "hands on" activities that made their students want to engage in the lessons. One teacher elaborates, "There's some where it's a little bit more discussion oriented or lecture oriented, but for the most part, it's very hands on. It's probably one of the more hands on units that I can imagine doing with something like energy or matter in that sense".

The students were also pleased with what they learned, as one student wrote:

> "When I was first given the assignment for the MSGS Program, I expected to learn about some plan the state of Missouri had to change Missouri's main source of energy to provide heat and electricity to solar energy. I never thought about how we got electricity or how we heated our homes."

This student went on to say that he learned how solar energy is actually changed into electricity and how to "collect solar energy and transfer it to homes and businesses."

Some schools have spread the curriculum to other subject areas including art, math and social studies. These teachers incorporate parts of the lessons that they like and use it that way.

There are several schools, however, where the lead teacher indicates that they have plans of using it, but that nothing has materialized about it yet.

**Additional Impacts Beyond the Schools**

As part of the program, the schools were also asked to commit to a community event to increase awareness in the larger community; and there were clear efforts to extend beyond the classroom including tours of the solar panels, talking with parents about the solar panels at parent/teacher conferences, presenting to the school board and public and also just having the solar array in a place that gets a lot of exposure from the community. Some of the events are shown in the table below. Notably, many of the events held by the participating schools were targeted at the school community, not necessarily the larger public.

**Table 2: In-Service Projects**

| District | Activities |
|---|---|
| Brittany Woods | Press invited to classroom, article in the *Suburban Journal* |
| Brookfield | Presentations to school boards, article in newspaper, tv story, created a children's book and posters/presentations for use in school |
| Compton Drew | Presentations to the public at St. Louis Science Center, article in *St. Louis American* |
| Lewis and Clark | Presentation to school board, presentations to other students in the school, article in *Jefferson City News* and *Tribune* |
| Parkway NE | Hosted event, article in *Suburban Journal*, presentation to school board |
| The College School | Presentation to school board; article in school newsletter, educational display in the school, all-school assembly of "a Ballet of Energy" |
| Orchard Farm | Presentation to school board |
| Ferguson-Florissant | Open house (Sept, 2006) with tours of the system |
| South Tech High School | Open house |
| Rockwood South High School | Earth Day Outdoor Classroom Expo |

Events mentioned by the lead teachers included:

- A couple of teachers set up an event where they could share their program with the school community. The students would do presentations about renewable energies, and talk about what they have learned through the program. For one teacher, it was a way to introduce the program to another grade. Typically, events held for the school brought school board members, superintendents, and other teachers and students. In at least one case, the public responded very positively to the school-based events that were done as part of the in-service service effort. One teacher says, "Well, the people that were there were so much just in awe that they couldn't believe it. The kids had so much knowledge." One teacher had his students present to the school board and they were very impressed with the students. They printed out certificates for the students.

- Another teacher is planning an event that is open to the public. She is planning an environmental expo day where booths will be set up and the students will be able to talk about alternative sources of energy, with a main focus on solar.

In addition, a couple of teachers stated that the visibility of their solar panel has helped the public become aware of the program at the school. One teacher said that he opens up his solar panel for tours, and another said that the location of the panel, close to the road, is something that people notice when they are driving in for sporting events. Another teacher recommended offering offer tours or something for the solar panels so that more people can find out about the program.

Some teachers also mentioned that they have handouts and fliers for the students to take home and one teacher even has a website for parents to log into to see what is going on in the class. One teacher said that the feedback that she has gotten from parents has been tremendous. The students have been learning a lot about solar energy and about energy in general. They are distinguishing what different cells look like, learning about qualities of solar energy, learning how to make it, and just generally understanding how to turn power from the sun into something that runs the computers in the lab.

## IV. Impacts and Cost Effectiveness

This program evaluation does not include a review of energy savings or a cost-effectiveness analysis. An energy savings and cost-effectiveness evaluation was not required for this information-only program.

## V. Process Findings and Recommendations

Overall satisfaction with this program is high. All of the teachers thought that the program was successful and feel that their kids learned a lot of information. The "hands on" learning style of the curriculum appeals to teachers and students alike for this program. The teachers are extremely enthusiastic about their program and the impact that it is having on their students. There is concern in some of the schools, however, that the education will either diminish, or not continue, after the first year.

If AmerenUE and the Collaborative decide to run a similar program in the future, we recommend the following:

➢ **Find ways to utilize parts of the current curriculum while placing more emphasis on energy efficiency**

The current curriculum is seen as a good curriculum that emphasizes solar energy rather than energy efficiency. Several teachers feel that the program teaches energy in a global sense with some saying that there is a stress on solar energy.

The main themes of the lessons focus on solar energy, making it understandable that teachers associate the program with solar energy. The major themes of the curriculum include:

- Introduction to Problem Solving and Introduction to Energy
- Forms and Energy Transformations

- Renewable & Non-Renewable Sources/Efficiency & Conservation
- Solar Energy Data
- Solar Array and SunViewer Software
- Service Learning Project – to spread program to the community

If educating the community about energy efficiency is a goal of the program, in order to bring energy efficiency to the forefront of the class, it is important to emphasize energy efficiency throughout the lesson plans. The program should be adapted to tailor a few lesson plans around energy efficiency to bring the focus back to where AmerenUE would like to see it.

Energy efficiency is a topic that is included in the program, but not necessarily at the forefront of the teachers' minds. When asked, most teachers thought that the materials did include energy-efficiency, but "energy efficiency" wasn't mentioned as something that the students took home from the class. Teachers felt that the students took away a lot of knowledge about solar energy, renewable and alternative energies. One teacher said that it definitely taught sources of energy, but didn't feel that the materials focused on energy efficiency.

By focusing some lesson plans on energy efficiency, the students will gain an understanding of what they can do at home to help be more energy conscious, and at the same time learn about renewable energy sources and gain better understanding of solar energy.

From the teacher's perspective, this program is an education program, rather than a means for saving energy for the school. School boards generally thought this was a good idea because of the educational merit and weren't concerned with the amount of savings that the solar array would obtain for the school. One teacher explains, "Definitely an education program. It's definitely the way it goes. What little energy we get from this solar panel is a drop in the bucket, not eve a drop in the bucket compared to what the school's bill of electricity." However, one teacher, whose school is no longer continuing the program, said that it may have been easier for her to keep the program going if she could have shown an energy offset in addition to the educational benefits of the program. However, this was not the general consensus of the group.

For the most part, the curriculum was a good fit for the teachers. In any event where it did not mesh well with the students, the teachers were able to adapt it so that it would work well. One teacher states, "I think it started simple, kind of give them an overview of what it was and where we're going… It really and truly is well written." Another, "It definitely lays the groundwork before it ever goes in depth into anything." In most cases, the teachers found that the curriculum gave enough background for the students. In one situation, the teacher felt that a couple of topics may have been over the students head, but said that the students still got some things out of those particular materials.

The only real drawback mentioned by several of the teachers who attended the workshop (who were not necessarily the lead teacher) is that the vocabulary was unfamiliar, difficult, and sometimes over their heads. As such, the program materials should include a key of terms and definitions related to the subject that can help teachers and students alike.

- **Work to expand the effort beyond the lead classroom by integrating the curriculum into the schools more, using high-school students to teach younger students, and creating subject-based curriculums**

  One of the goals of the program is that the lead teacher expands the program past his/her classroom. Several teachers mention that this is something that is not being done enough. There were a couple of teachers say that said that no one else is using it, and no one else is planning on using it for a couple of reasons. As one teacher mentioned, teachers are caught up in making sure that their curriculum lines up with the state. He explains, "Since it's not expected until the eighth grade level I don't see the sixth and seventh grade getting a chance to go beyond their scope simply because we have the ability to… I just think everybody's trying to line up with the state so much that they don't get the freedom." For another school, it was political in nature as to why the school doesn't want to support projects like this.

  However, of teachers that are in schools where the MAP test is required, most feel that MSGS does help prepare their students for the MAP Test. It incorporates real world data. Some of the other reasons why teachers think it supports MAP include the amount of writing and analytical thinking that is done in the program, the fact that energy is something that comes up on the test, particularly renewable energy, graphing interpretations, as well as an environmental component that requires the students to do some scientific reasoning dealing with energy conservation and alternative energy.

  If the program is funded again, AmerenUE and the Collaborative should consider ways to use the program to penetrate the schools more deeply. Two possible ways include having EarthWays expand the current program to create subject-based curriculums to help the schools integrate the program into their schools more; and creating an educational component that would help the older students teach the younger students in the school about the subject.

  If the program seeks to create subject based curriculums, these could either be developed with teachers across multiple schools; or they could be used to draw in and create interest among teachers at other schools. For example, a math-based curriculum could be put together and the EarthWays Center could hold a workshop for math teachers to educate them on the program.

  When adapting the curriculum, however, it is very important that it aligns with the standard curriculum taught by the schools because, as the teachers stated, they "don't have time for extras".

- **Ensure that the program works around the teacher and school-year schedules**

  As mentioned earlier, the program had a slow start up. The initial schedule slipped because the solar contractor had a difficult time getting solar panels. Moreover, contractors with lots of experience did not respond to the RFP for a solar contractor, and the chosen contractor did not have a lot of experience. These delays impacted the schools because they were not able to align the curriculum with the school year as originally planned. As one teacher stated, "It is my feeling that if the math and science teachers had the opportunity to get excited about working elements of the data capture into their courses while planning over the summer, they may have been more successful with some level of integration." Future problems should be aware of these equipment delays and technical expertise shortcomings that could impact the program.

- **Consider other less-expensive hands-on demonstrations that teach energy efficiency**

  The solar array and data acquisition system are greatly appreciated. Actually seeing the data display helps teachers and students alike understand the subject matter. However, it is an expensive way to teach.

  Although a couple of teachers said that the materials were great and no changes were needed, some did provide suggestions. Some teachers would like to see more hands-on-tools for the kids to us (little solar cars and solar connects kits, hands on materials so the kids can see other uses of solar energy. One teacher mentioned the solar oven that the EarthWays Center brought in. "The kids actually got to cook s'mores in there, and so of course they're going to learn the value of the solar heating they're making…"

  To add to this, one teacher suggests a donation of a bicycle that powers a light-bulb through pedaling. His school has one in the science lab, but he thinks it would be a great piece to have in the classroom full time to help show that using a compact fluorescent light uses less energy. He explains, "We can see it when we pull up the data from the solar panel, but for them to actually feel it as they're pedaling a bike, I think would make the point much more dramatically."

  If AmerenUE and the Collaborative choose to use an educational program such as this one to teach more about energy efficiency than solar energy, they should consider alternative hands-on demonstrations that are less expensive.

- **Work to make the data acquisition system (DAS) a more user-friendly platform**

  Teachers are utilizing the DAS system in their classroom. In a lot of cases, other teachers involved in the program in the same school are using it as well. Most teachers plan on using it when they do the program next year. Whether or not other participating teachers use the materials depends a lot on what subject the lead teacher teaches.

  Teachers found that students were easily able to use the system, but some had a few suggestions for making it better. If it were built on a windows model it would be more user-friendly because of the familiarity of the layout and could be a lot stronger visually than it is. "I think some of the information – the gauges and things – in one kind of segment of the program, they appear on one side of the screen versus the other and then in another segment they're flip-flopped." The students notice this and it hinders their ability to make a comparison.

  One teacher said that she would like it to be adaptable to a Mac because educational institutions tend to use Macs and it would be a lot more convenient and powerful for her.

  Another teacher said that the computers should be hooked up to a battery so that if the power goes out for a short amount of time the computer will be able to still receive data instead of shutting down and resetting. Another teacher would like to see more information displayed. For example, the program would be able to tell not only that the energy is being used by a computer, but by a computer with a flat screen monitor.

- **Work to increase community-based events and consider opportunities to conduct similar classes outside of the schools, such as in the Botanical Gardens or Zoo**

  Community outreach is a goal of this program, and the in-service community project was designed for that reason. Several schools reported not having completed a community service event. The EarthWays Center could work closely with the schools from the beginning to ensure that such an event does take place. If the right emphasis is placed in the beginning about the importance of planning this event early, more schools might complete the community outreach.

  One suggestion is to encourage opening up the solar panels for tours for parents and the public. This could be something that the students could lead or participate in to showcase their knowledge of the program as well as let more community members know about AmerenUE's program.

  In addition, the DNR Energy Center suggested that a similar adult-level course be taught at local institutions such as the Missouri Botanical Gardens or the Zoo in order to extend the impact beyond the schools.

- **Leverage the installed systems and experiences to-date to educate and create interest from other schools across Missouri and increase school contributions to the projects**

  Future programs may want to consider using the currently installed systems to educate and create an interest in other schools. Case studies of the systems that are installed, and how they are impacting schools, teachers, and students could help create interest. As one teacher mentioned when she was just learning about the program, "Being informed of what is happening with solar at...other Missouri schools...the resources are also great to have." The DNR Energy Center, or EarthWays, could consider holding seminars at participating schools to discuss how other schools could implement similar programs. Now that the program is active, it may also be possible to garner enough support to get the schools to fundraise more for their own system. In the first rounds of the program, the initial support required by the school was not tremendous. In most cases, schools got the $2,500 match for the PV equipment from the administration. There were no special fundraising events that were underway to make up the money. In some cases the money came from the senior class funds, coke machine funds, or just a general revenue fund.

- **Work towards a more competitive application process to ensure that schools are very dedicated to the program before signing them up; Work through Principals to get continued buy-in to the program**

  The application process was not very competitive. Everyone who applied in the initial rounds received a solar array. In the future, this or similar programs should consider seeking to get more applicants so that you can choose those who are most committed.

  This program is a very expensive program to implement, and was intended to be used for the long-term. As such, it is very important that this program is teamed with the right school and lead teacher. It is not enough to just have one champion (the lead teacher) behind the project. If the school itself isn't dedicated to the program, and the lead teacher leaves the school without having any other teachers learn the curriculum, the program very likely could cease from continuing.

A couple of teachers expressed concerns about what was going to happen with the program due to retirement with a lack of interest of other teachers to take over the program or discontinued support from the school. The support and involvement of the school is the deciding factor for this. For these teachers, they are the only champions of the program and worry that when they retire, no one will be there for them to pass the baton to. In this case, it would be helpful if the EarthWays Center could come in and train other teachers, or maybe even do a presentation to the administration (with the lead teacher) to campaign for the program and its continued use.

The program should make sure the schools are on board for the next five years, and require the support from two-or three and full school support so that the program doesn't die with one teacher.

Based on our findings, it would be appropriate for AmerenUE representatives to first contact the principal of the school that they want to involve in the program. Several respondents heard about the MSGS program from the principal of the school and in most cases, it was the principal that had at least some say in whether the program was going to be approved. When the principal of the school found out about it s/he passed the information down to the appropriate teacher.

- **Follow up with schools to ensure that the education continues**

Some schools reported that they would be continuing a condensed version of the program next year, and they will try to integrate it into other grades (*The College School*); or that they would be refining the program for high school freshmen in the second year (*Brookfield High School*). However, teachers experiences vary on continued support from the administrations. Some teachers say that the administration is less involved now than they were in the beginning and that it is now the lead teacher's responsibility to pass the program on to other teachers. In one situation, although initially very supportive, a school no longer supported the program due to political reasons. She says that she feels the support started disappearing quickly because of "some pressure from some pretty conservative parents that don't really understand why environmental issues should even be a part of high school curriculum." It has been extremely challenging for her to pass on the program information to any other teachers without the support of the administration.

Teachers are finding the program successful, but some would like a follow-up from AmerenUE. Several teachers mentioned that if the EarthWays Center could come in and model the lessons for other teachers in the same school, it would be a great way to keep the program going and growing. The teachers feel a need for assistance in recruiting their fellow colleagues to participate. The teachers see the program as very valuable and want it to be used in other areas of the school, even in other disciplines such as language arts, math and social studies. In these classrooms, the program can be incorporated into a project, such as a writing exercise about the solar array.

One teacher said that he would appreciate a detailed follow up from AmerenUE to see where the project went, how it is doing and to let him know of any other project that are available. One teacher suggested having EarthWays hold a training session in the summer that would be open to teachers all over the state to help keep the program afloat. Another suggestion is for AmerenUE to do a survey for teachers at the end of the program to gauge how teachers felt about the team materials and brainstorm that way. Many of the teachers indicated that

the conversations with the entire faculty helped make the connections for the school and their classrooms.

Non-lead teachers involved in the initial training mentioned that they were rushed and need more collaboration. They need time to play with it and then come back to collaborate. "We should have teachers who have used it come and talk to us about their experience with it. I would also like to have a follow-up to see how the group uses it."

Julia Feder of the EarthWays Center also supports the idea of a follow-up workshop two or three months after the program to see what the schools are doing with the program, what the obstacles are, and discussing ways to utilize the program in a group setting.

For future efforts, the program should aim for workshops that have between eight and twelve teachers. Fewer committed teachers are better than many teachers who are not interested in pursuing the curriculum.

- **Continue to utilize EarthWays Center and DNR Energy Center since the process worked well and the schools feel both provided valuable services**

The teachers felt that the EarthWays did a great job with the program. All teachers asked had positive feedback in the amount and quality of communication with EarthWays, over the course of the program. The amount of communication ranged from once a month to some even emailing a few times a day. The amount of contact varies with exactly where in the program the teachers are as well as with the amount of the training that the teacher has. One teacher who is currently in her second year with the program says that in the first year of the program she talked with Julia weekly and now it is once a month. She elaborates, "She did a great job last year. She'd come in and modeling the lessons and all of that so I feel very comfortable with the materials." The amount was appropriate and favorable for everyone involved. Notably, however, the educational component of this program is more work than expected. It required lots of travel time because the participating schools are all over the state.

Teacher comments about the EarthWays Center included:

> "Our education consultant, Julia Feder, was an amazing asset as she created documents and rubrics that allowed the students to visualize key ideas and major points so poignantly that the learning was long lasting." "...she was exceptional in her scheduling and flexibility." (*Orchard Farms Middle School*)

Teachers also categorized their involvement with DNR Energy Center as appropriate. Most teachers are only in communication with DNR Energy Center when they have technical problems with the array or the DAS, and therefore only contact DNR Energy Center a handful of times over the program. Some teachers noted that DNR Energy Center does a good job in monitoring their equipment and will let them know if something is down.

Several of the teachers experienced delays when it came to getting the solar panels installed at their school. Some of the delays were seen as avoidable and occurred because of miscommunication. Besides having to reset and troubleshoot the system, there were no other real issues with the solar panels.

There were no substantial problems with the DAS or with the solar arrays once everything was installed and ready. If at any time something came up and the system needed to be reset,

DNR Energy Center was there fixing it. One teacher says, "I think Pat Justis is really keeping a close eye on that on a daily basis. If he sees any sort of glitch going on, he emails me immediately."

**STATE OF ILLINOIS**

**ILLINOIS COMMERCE COMMISSION**

| | | |
|---|---|---|
| COMMONWEALTH EDISON COMPANY | ) | |
| | ) | |
| Approval of the Energy Efficiency and | ) | Docket No. 07 - 0540 |
| Demand-Response Plan Pursuant to Section12-130(f) | ) | |
| of the Public Utilities Act. | ) | |

**Affidavit of Philip H. Mosenthal**

| | | |
|---|---|---|
| STATE OF VERMONT | ) | |
| | ) | SS. |
| COUNTY OF ADDISON | ) | |

I, Philip H. Mosenthal, being first duly sworn, declare under oath as follows:

1. I the founding partner in Optimal Energy, Inc., a consultancy specializing in energy efficiency and utility planning.

2. I provided Direct Testimony, identified as AG Exhibit 1.0, and additional attachments to that testimony, identified as AG Exhibits 1.1 to 1.10, in this proceeding. That testimony, filed on December 14, 2007, was prepared by me or under my direction and control.

3. I swear and affirm that the testimony provided is true and correct, to the best of my knowledge and ability, and that there are no corrections or revisions to be made to my testimony. If I were asked the same questions today, my answers would be the same. It is my desire that my testimony and attachments be considered as evidence by the Administrative Law Judge and by the Illinois Commerce Commission in this Docket.

Further Affiant Sayeth Not.

Philip H. Mosenthal

On this 4th day of January, 2008, before me, the undersigned notary public, personally appeared Philip H. Mosenthal, who proved to me through personal knowledge to be the person whose name is signed above on this document in my presence.

Laurel Fallmore
Notary Public

My commission expires on Feb 10, 2011.