

# REAP-CEP Grant Agreement #21003

Sustainable School Design Workshops

FINAL REPORT

Prepared by  
Iowa Department of Natural Resources  
Energy and Waste Management Bureau

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# Introduction

## Sustainability

Sustainability and its implications on activities of the societies that comprise this nation and the collective of nations across the planet has become an area of immense interest. Sustainability has been affiliated with and incited new and innovative viewpoints, activities, and policy in a diversity of areas including: agriculture, design, building, development, and growth.

The most commonly recognized definition of sustainability is from the Brundtland Commission, as an outcome from the World Commission on Environment and Development in 1987.

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

The basis of this definition assumes that sustainability originates at the level of development - the foundation from which societies expand be it through technological advancements, creation and/or revision of policy, population support systems, or architecture.

## Sustainable Architecture

The realization that architecture and the planning and design that is included within, has a direct cause and effect impact on societal growth, development, and sustainability is becoming increasingly recognized.

Sustainable architecture specifically places emphasis on the reduction of negative impacts through consideration of sustainability in the design, construction, and operation of buildings and is defined as the following:

“To **design, construct and operate** buildings to reduce negative impact on:

- the environment
- and the health and comfort of building occupants

with the goal of improving building performance.”

Facilities and buildings are no longer simply considered structures within which functions are completed. Rather, more credence is being paid to the fact that buildings are footprints that have extensive potential impact not only on the functions that are to be completed within them and the individuals completing those functions, but also on the surrounding community and environment. Additionally, recognition is also being given to the national, and international connection that exists in relation to the decisions and precedents that are being made with regard to local projects and policy in the area of design and construction.

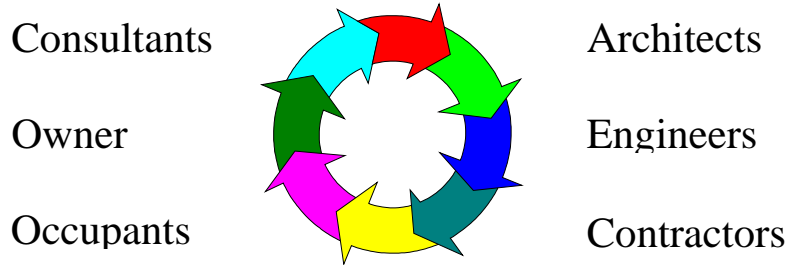
The primary principles of sustainable design for purposes of sustainable architecture focus on five primary areas:

- Energy Use
- Materials & Resources
- Water Use

- Indoor Environmental Quality
- Sustainable Sites

Sustainable design, as with other applications of sustainability is strongly founded in the principle of sustainability as a process that involves multi-stakeholder input and involvement through an integrated approach as noted below.

## Integrated Approach



Through adherence to these principles in an integrated manner, sustainable design has been incorporated into a variety of project types including, but not limited to: remodels and renovations, new construction, and historic preservation. The recognition of impact and applicability of sustainable design has been so considerable that many state and local governments are requiring the incorporation of sustainable design principles into construction projects. As well, many federal agencies including the Department of Defense and the U.S. Postal Service require any project to not only incorporate principles of sustainable design, but to achieve national certification standards.

### Iowa and Sustainable Design

In 1999, the Iowa Department of Natural Resources', Waste Management Assistance Division fostered a partnership with the Iowa Department of General Services', Design and Construction Division to incorporate principles of sustainable design into state of Iowa projects. Thus beginning the Iowa Sustainable Design Initiative focused upon the following mission:

“The Iowa Sustainable Design Initiative supports the integration of sustainable design principles in all projects in the state of Iowa by educating constituents and agencies on the benefits of sustainable design.”

A three-phase approach has guided this initiative from 1999 to present:

1. Incorporation of sustainable principles into Capitol Complex projects
2. Incorporation of sustainable principles into other state projects
3. Incorporation of sustainable principles into other projects in the state of Iowa

To date, a number of accomplishments have been achieved through this Initiative including, but not limited to:

- The incorporation of sustainable principle recommendations into the Capitol Complex Master Plan
- Technical assistance and consultation provided to various state government and state of Iowa projects
- Establishment of a monthly sustainable design lecture series
- Completion of an Iowa sustainable design website

Through strategic planning and specifically the consideration of focal areas within which the Initiative could provide assistance toward impacting statewide design of sustainable buildings, the subject of sustainable schools became of interest due to numerous statewide initiatives for renovation and construction of schools using local option sales tax dollars. This coupled with green building being an area of emphasis for the FY03 REAP Conservation Education Grant Program, provided interest and incentive in pursuing this area.

### Sustainable Schools Project

The need and potential impacts for schools with regard to the incorporation of sustainable design principles is considerable. For example, a 1995 United States General Accounting Office Report on the condition of schools found:

- **\$112 billion needed to bring buildings to good condition,**
- **33% need extensive repair or replacement,**
- 60% need at least one major building feature repaired or replaced,
- 50% have environmental problems, and
- 46% have inadequate wiring for computers, communications and technology.
- 28,000+ schools nation wide have less-than-adequate heating, ventilation and air conditioning systems
- 23,000+ schools nation wide have less-than-adequate plumbing
- 21,000 schools nation wide have less-than-adequate roofs

In looking specifically at conditions within Midwest schools, the U.S. General Accounting Office has noted results are equally concerning with unsatisfactory environmental conditions being commonly found the areas of lighting, heating, ventilation, and energy efficiency.

Beyond the common concerns of health and safety, substantial research has been completed that shows a strong relationship between scholastic achievement and progress and the state of a school's environmental conditions. For example, a study in the District of Columbia found that students in school buildings that were in poor condition had achievement 11 percent below students in schools in excellent condition. Another study in rural Virginia examined the relationship between building condition and student achievement. The study found that student scores on achievement tests were up to five percentile points lower in buildings with lower quality ratings, after adjusting for socioeconomic status.

Similarly, a study conducted in Orange county California for the California Board for Energy Efficiency found that students with the most daylighting in their classrooms progressed 20% faster on math tests and 26% on reading tests in one year compared with those students in classrooms with the least amount of daylighting. Students in classrooms where windows could be opened were found to progress 7-8% faster than those in classrooms with fixed windows

regardless of whether the rooms also had air conditioning. In the same study, students in the classrooms with the most daylighting in schools in Seattle, Washington and Fort Collins, Colorado were found to have 7-18% higher math and reading test scores than the students in rooms with the least daylighting.

The construction and renovation of large facilities such as schools can generate a lot of debris (16% of Iowa landfills), waste energy, deplete our natural resources, and negatively impact the performance of students and teachers if not constructed with sustainability in mind. The construction and renovation of these facilities however can also be an opportunity; an opportunity to protect our environment, enhance our communities and improve the performance of students and teachers.

One of the most important ways to increase the number of communities with green schools is to provide school administrators and facility managers with the tools to know what to ask for from their architects, engineers, and contractors. This was the aim of the Sustainable Schools project for which the Iowa Sustainable Design Initiative received funding from the REAP-CEP.

## Methodology

The goals of this project were to provide a minimum of 60 school administrators, facility managers, school construction contractors, and building trades teachers with an understanding of:

- Green building principles,
- Green building resources available,
- Benefits accrued to the community, school, staff and students by incorporating green building design,
- Green building programs, initiatives, and projects in place in Iowa and the United States, and
- Incentives for building sustainable schools.

To encourage participation, stipends of \$100 were offered to participants to defray costs of travel and time out of the office.

Three multi-media workshops were planned and marketed to take place in sustainable facilities in Oakland (Golden Hills RC&D Offices), Ankeny (Iowa Association of Municipal Utilities Headquarters), and Cedar Falls (Black Hawk County Conservation Board Offices) (Appendix A). These locations were based upon their availability to a wide range of target audience members and their commitment to sustainable principles in their own projects.

Beyond the members of the Iowa Sustainable Design Initiative, a diverse and talented team was put together to offer expertise in planning and delivering these workshops consisting of the following:

**Michaella Wright** joined HDR in 1993 and is a Vice President and Director of HDR's Sustainable Design Services Program. Ms. Wright provides consulting services on integrated sustainable building design with a focus on site design, indoor environmental quality, energy efficiency, sustainable materials, waste reduction, and resource efficiency. Ms. Wright was also intimately involved in the creation and development of the LEED™ Rating System (Leadership in Energy and Environmental Design) and is one of the first people

in the country to become a LEED™ Accredited Professional.

**Kristin Ralff Douglas** brings over 15 years of experience in sustainable design and environmental advocacy to HDR. With notable experience in marketing and business development, Ms. Douglas previously served as the Managing Director of the U.S. Green Building Council, where she was instrumental in the development and launch of the LEED Green Building Rating System. Recently she served as the publisher and editor of Environmental Design + Construction, a well-respected publication that educates the industry on strategies, technologies and products to successfully implement sustainable design.

**Michael H Nicklas** has served as an Officer/Owner of Innovative Design, Inc for 22 years. Innovation Design's mission is to be the world's leading architectural firm in advancing energy-efficient, environmentally sound building design. His extensive professional experience includes: American Institute of Architects; American Solar Energy Society; National Organizing Chairman for SOLAR '85; International Solar Energy Society - Past President; North Carolina Solar Energy Association - Past Chairman and Director; North Carolina Home Builders Association; Passive Solar Industry Council - Past Director; NC Governor's Task Force on Solar Law, 1982-83; NC Trade and Industrial Education Advisory Committee.

Although planning had included consultation with the School Administrators of Iowa Association, the Iowa Department of Education, construction contractor associations and building trades instructors to determine the ideal dates and locations for the workshops, and extensive marketing had been completed through targeted emails, newsletter notifications and website announcements, registrant numbers were considerably low. Conversations with random targeted potential registrants revealed that our events, though not conflicting, were within days of required state training sessions for school administrators and personnel. While there was considerable interest in our workshop, concerns over time out of the office were substantial enough for individuals to forego registering.

While our original intent was to complete all three workshops by the end of 2002 and we did have some registrants for all three locations, we felt it would not be a good use of resources to complete all three workshops with registration numbers that did not support the goals of the grant proposal. One location, however, Ankeny, did have over 20 registrants, which did fall within our workshop goals, and the project team decided to hold the Ankeny workshop as planned, but chose to cancel the workshops in Oakland and Cedar Falls and postpone the remaining two workshops until Spring 2003 as was suggested to us through numerous discussions with the Department of Education, the School Administrators of Iowa, and members from the REAP-CEP Board.

In determining the locations and dates for the remaining two workshops, the project team completed substantial consultations and discussions with the above named entities as well as additional educational and architectural contacts. The primary caution seemed focused around making our workshop one that could be connected or affiliated with another event or in conjunction with a primary organization that was very familiar and relevant to our potential attendees.

After many failed attempts to be incorporated into fall events and workshops of educational affiliations and organizations, primarily due to timing and full agendas, we made a connection with the Iowa Energy Bank Program. This program provides education, awareness and financial

assistance in relation to energy use and efficiency and specifically targets Iowa schools and communities. Each spring the Iowa Energy Bank Program hosts a workshop on energy awareness that has the same target audience as was set about in the goals of the sustainable schools workshop project. In addition, the principles of sustainable design seemed a natural extension for the Energy Bank workshop. As a result, an Energy and Sustainability Solutions Workshop was planned for June 12, 2003 (Appendix B). The workshop location was chosen to be the Center for Energy and Environmental Education in Cedar Falls on the University of Northern Iowa campus. The CEEE facility is one that is known for its incorporation of sustainable principles and was large enough to house our anticipated number of attendees. This facility was also located in Cedar Falls, which was one of our initial target workshop areas.

Our third workshop was scheduled based upon the proactive means of some attendees from the 2002 workshop held in Ankeny, IA. Staff of Maharishi University of Management in Fairfield approached the project team following the Ankeny workshop and asked that we consider allowing the university to host one of our remaining workshops. In consideration of Maharishi University's extensive work in the area of sustainability, we felt the facility and its location in southeastern Iowa would be a good choice for our final workshop. To accommodate traveling availability for our speakers and to complete all workshops by the end of the fiscal year (as was requested by the Department of Education), we scheduled the third workshop for June 13, 2003 (Appendix C).

An extensive effort was made to get the words out on the workshops while at the same time keeping costs in check. The Department of Natural Resources partnered with these organizations to promote the workshops.

Alliant Energy  
Aquila  
Center for Energy and Environmental Education  
City of Centerville  
Hamilton County S.E.E.D  
Iowa Association of College & University Business Officers  
Iowa Association of Community College Trustees  
Iowa Association of County Conservation Boards  
Iowa Association of Independent Colleges & Universities  
Iowa Association of Municipal Utilities  
Iowa Association of School Boards  
Iowa Association of School Business Officials  
Iowa Department of Education  
Iowa League of Cities  
Iowa School Buildings & Grounds Association  
Iowa State Association of Counties  
MidAmerican Energy  
Muscatine Power & Water  
Polk County General Services  
School Administrators of Iowa  
Vedic City Rebuild Program

The workshops averaged 5 hours in length (including lunch), except the workshop done in partnership with the Iowa Energy Bank that offered 4 hours each of energy and sustainable design training. At all workshops a dedicated effort was made to “walk the talk” in relation to sustainable principles which included serving of locally-produced food, the use of durable, non-disposable dishware and utensils, and the donation of leftover food to local homeless shelters.

All workshops focused on the target areas of understanding and awareness with respect to sustainable principles as designated in the grant proposal. These target areas included the following:

- 1) An overview of green building
  - a) What is it?
  - b) Why do it?
  - c) What are the benefits?
  - d) Does it cost more?
  - e) Who is doing it?
  
- 2) Green schools built outside Iowa
  - a) Where are they?
  - b) What makes them green?
  - c) How have the buildings performed?
  - d) Impact of green buildings on operations, maintenance, faculty and student performance?
  - e) What did it cost?
  - f) Why were they built (who/what initiated?)
  - g) Overview of green school initiatives, programs & incentives (local, state & federal level)
  
- 3) Green schools in Iowa – information on sustainable design in Iowa
  - a) Where are they?
  - b) What makes them green?
  - c) How have the buildings performed?
  - d) Impact of green buildings on operations, maintenance, faculty and student performance?
  - e) What did it cost?
  - f) How to start a green school building program in your district
  
- 4) Take home resources and classroom curriculum activities (Appendix D)

An evaluation was completed at each workshop to gauge pre and post understanding of sustainable development and interest in the incorporation of sustainable principles into current and future projects (Appendix E). Questions were also asked regarding the appropriateness of detailed information offered in each of the above areas and the speakers who provided it in order to plan for future workshops and initiatives. Evaluation results from the first workshop were tabulated and used in the planning process for the second and third workshops.

## Results

Pre and post workshop results came back very favorable in terms of impact and interest. More than double the grant proposed 60 attendees attended the sustainable school design workshops.

A total of 129 participants attended the three offered workshops including 30 on November 7<sup>th</sup>, 54 on June 12<sup>th</sup>, and 45 on June 13<sup>th</sup>.

Extensive evaluation results and the evaluation tools are included in appendices A-C. To gauge the effectiveness of the workshops in disseminating information and increase the overall sustainable design knowledge base in Iowa, workshop attendees were asked to evaluate their knowledge of sustainable design principles prior to the workshop and after the workshop. Attendees to the November 2002 workshop indicated that nearly 50 percent (47%) of attendees had less than a moderate understanding of sustainable design principles as shown in table 1. Likewise as shown in tables 2 and 3 respectively, only 43 percent of attendees to the June 12, 2003 workshop and 80 percent of attendees at the June 13, 2003 workshop indicated an average or above average knowledge of sustainable design.

Table 1

**To what extent did you understand sustainable building principles prior to attending this workshop (n=19)**

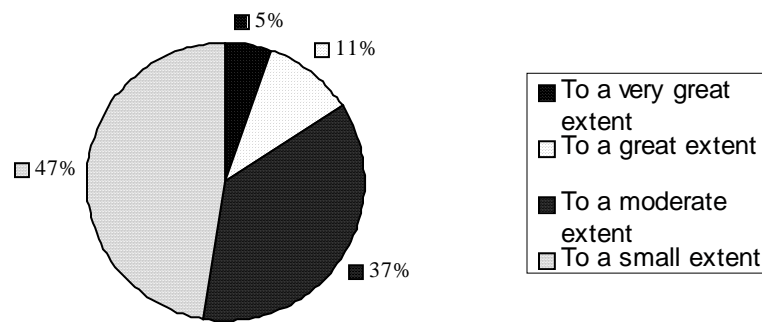


Table 2

**Please rate your knowledge of sustainable design prior to this workshop (n=32)**

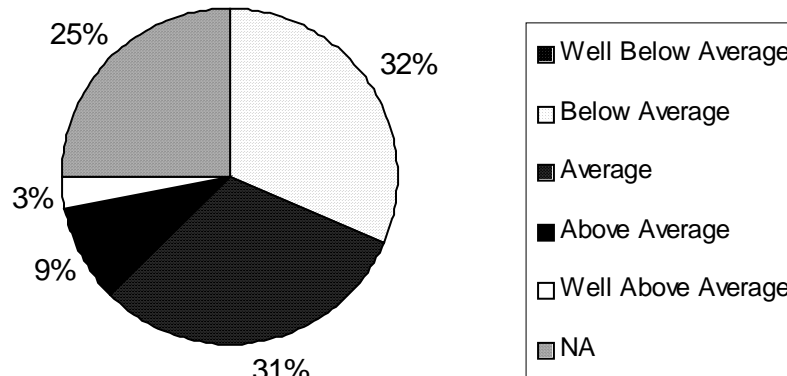
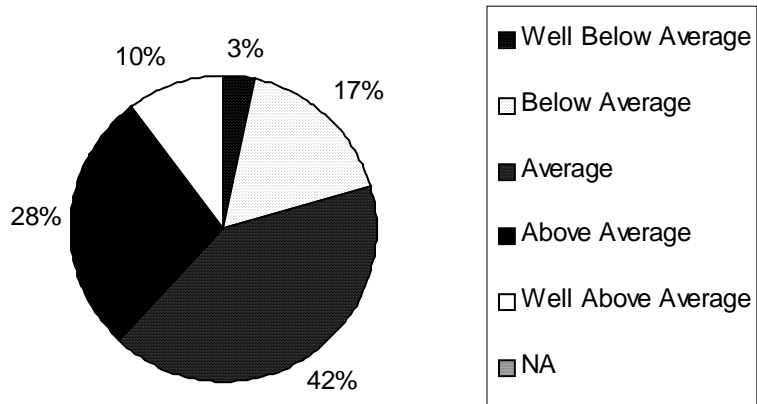


Table 3

**Please rate your knowledge of sustainable design prior to this workshop (n=29)**



After the workshop was completed, attendees were asked to rate their knowledge of sustainable design. All 100 percent of attendees of the November workshop reported as described in table 4 that they now had at least a moderate understanding of sustainable design principles following the workshop. As depicted in table 5, the percent of attendees having an average or higher understanding of sustainable design principles increased from 80 percent to 87 percent following the June 13, 2003 workshop. This follow up question was not directly asked at the June 12, 2003 workshop resulting in unuseable data.

Table 4

**To what extent did you understand sustainable building principles after attending this workshop (n=19)**

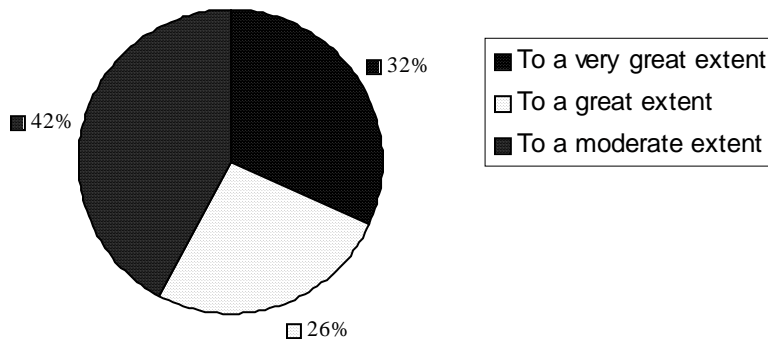
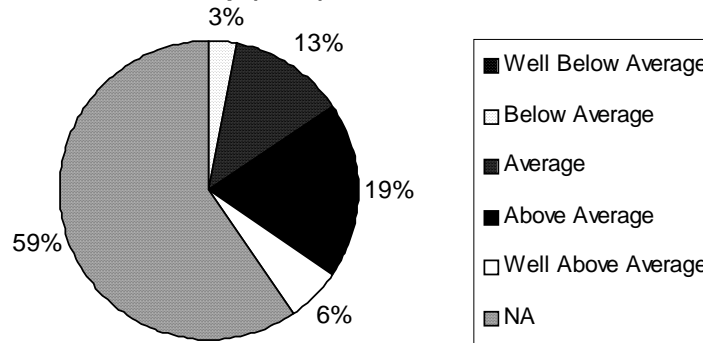


Table 5

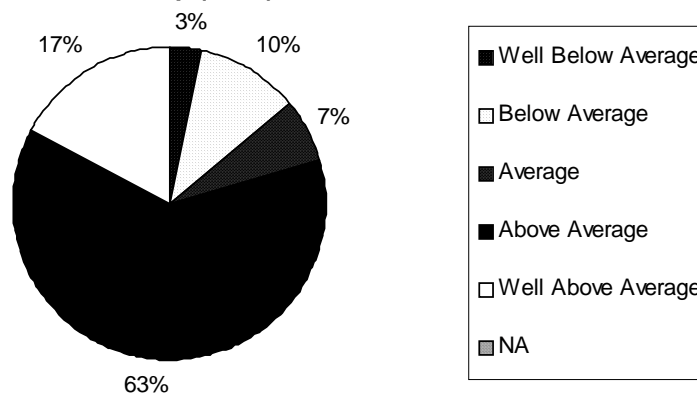
**Please rate your knowledge of sustainable design after the workshop (n=32)**



Prior to the November 7, 2002 workshop, attendees were asked to what extent they were incorporating any sustainable building principles. Five percent of attendees indicated they were incorporating sustainable building principles to a very great extent, followed by 16 percent to a great extent, 16 percent to a moderate extent, 42 percent to a small extent and 16 percent not at all as shown in table 6.

Table 6

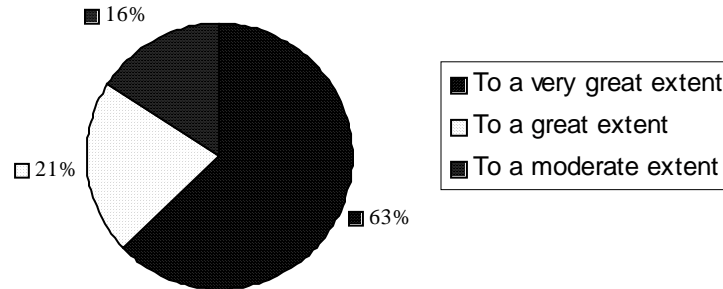
**Please rate your knowledge of sustainable design after the workshop (n=29)**



After the November 7 workshop, attendees were asked how interested they were in incorporating any sustainable design principles after attending the workshop. To this question, 63 percent were interested to a moderate extent, 21 percent were interested to a great extent and 16 percent indicated they were interested to a very great extent as depicted in table 7. These responses indicate almost a 400 percent increase in attendees interested to a moderate extent in incorporating sustainable design.

Table 7

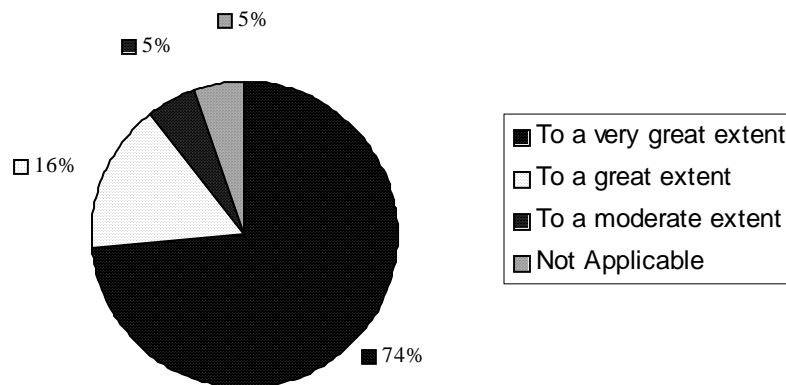
**How interested are you in incorporating any sustainable building principles after attending this workshop (n=19)**



Workshop attendees were asked to evaluate the overall quality of the presentation on November 7, 2002 and the usefulness of the new information they received at the June 12 and June 13 workshops. The responses are additional indications that the workshops were a valuable experience to attendees. As table 8 displays, the November 7 attendees rated the overall quality of the presentation as meeting their needs to a moderate extent (74 percent), to a great extent (16%), to a very great extent (5 percent) respectively.

Table 8

**Please rate the overall quality of the presentation (n=19)**



Survey responses from the June 12 workshop participants indicate that 47 percent of respondents rate the usefulness of the information as above average, followed by 25 percent as average, 22 percent well above average, 3 percent below average and 3 percent did not answer as shown in table 9. As indicated in table 10, 77 percent of respondents found the usefulness of information from the June 13 workshop to be well above average followed by 17 percent above average, 3 percent average and 3 below average.

Table 9

Please rate the usefulness of new information you received (n=29)

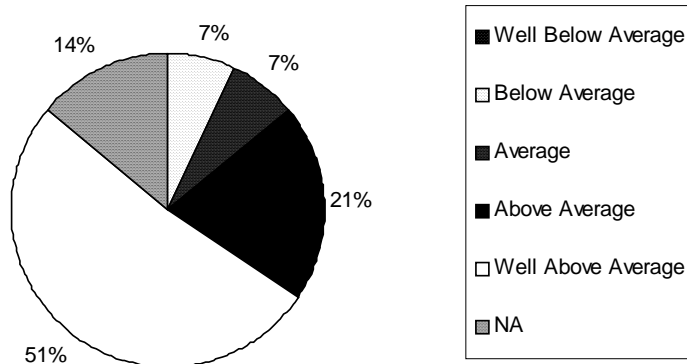
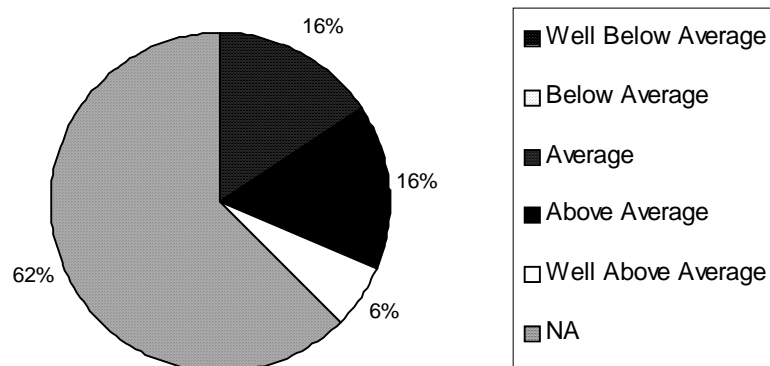


Table 10

Please rate the usefulness of new information you received (n=32)

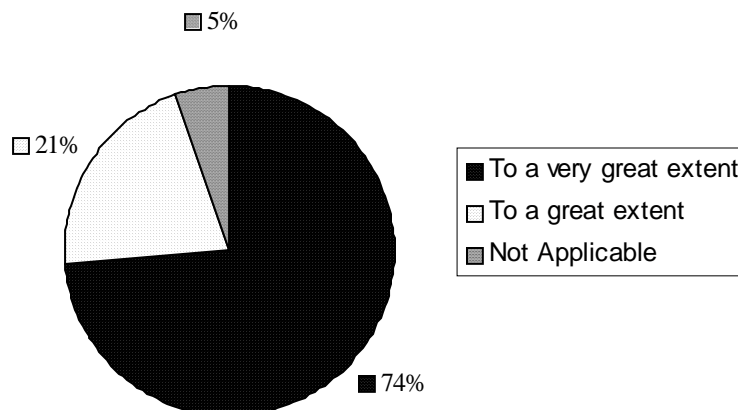


The Department of Natural Resources believes that the main reason for such positive feedback from the meeting attendees was the experience, professionalism and overall quality of the workshop presenters. Mike Nicklas, Kristin Ralff Douglas, and Michaella Wright did an excellent job in presenting the information in an entertaining and insightful fashion. The workshop attendees responses to survey questions about the quality of the presentations confirms

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v  
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Please rate the overall quality of the speakers (n=19)

scale of 1 to 5  
November 7,



]



Table 12

**Please rate the overall quality of the presenters (n=32)**

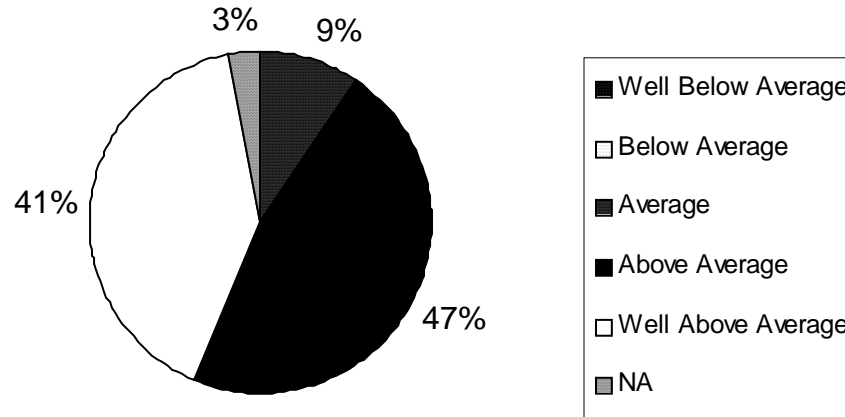
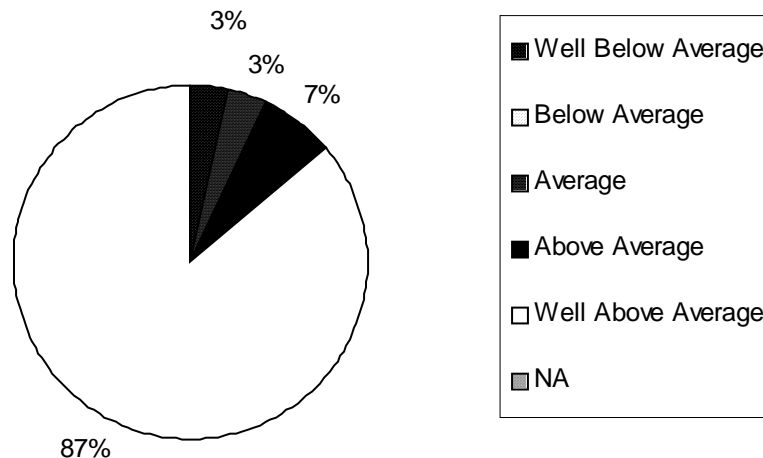


Table 13

**Please rate the overall quality of the presenters (n=29)**



The Department of Natural Resources also included an evaluation component for the June 12 and June 13 workshops to determine which avenues used to promote the workshops was most effective. For the June 12, 2003 workshop 71 percent of workshop registrants indicated they became aware of the workshop via e-mail while 29 percent indicated becoming aware via the mailed brochure. For the June 13, 2003 workshop 46 percent became of the workshop via word of mouth, followed by 39 percent indicating other method, 12 percent DNR e-mails and 3 percent trade association e-mails.

### Discussion

As illustrated in our compiled evaluation statistics as well as the numerous testimonials we received in addition, we feel this project was successful as per the goals of our initial grant proposal. Specifically, we feel this project has been of specific importance and relevance for

four reasons. 1. The increased awareness of and potential for incorporation of sustainable principles in the educational community, in both construction and curriculum; 2. The creation of a multi-stakeholder network of entities and organizations to utilize for expertise, marketing, strategic planning, and continued education and awareness; 3. The transferability of workshop information and project deliverables to other target audiences; 4. The furthering of REAP-CEP goals and objectives.

Firstly, 129 people attended the workshops. These workshops increased the attendees' knowledge of sustainable design concepts. Attendees were presented information on schools across the country that have incorporated sustainable design giving attendees concrete examples that sustainable design can be incorporated, has value and does not have to cost more.

Secondly, by attending these workshops, attendees were made aware of a large network of entities and organizations to assist them in implementing sustainable design projects in their local schools. The demographics of workshop attendees included more than 35 different school districts, engineering firms, architectural firms, county conservation boards, cities, counties, sustainable building product manufacturers and retailers, utilities, contractors, councils of government, and consultants.

Thirdly, while the workshops targeted implementing sustainable design principles into school construction and renovation projects, the principles and resources presented are applicable as well to commercial and institutional facilities.

Finally, these workshops further the REAP-CEP goals and objectives by giving school officials the knowledge and resources necessary to incorporate sustainable design into future school building renovation and construction projects. Incorporating sustainable design into Iowa's schools will improve student performance, increase retention and performance of educators, reduce the environmental impacts of schools, save schools on long-term operating and maintenance costs and will provide opportunities for the school buildings themselves to be an educational tool.

### Where from here

In addition to the evaluation exercises put forth in the grant proposal, post workshop follow-up surveys are also in the process of being completed. Six month follow-up surveys will be completed for all workshop participants. Due to the planning calendars of most educational institutions, a follow-up survey of six months, rather than three months was felt most appropriate by the project team. The purpose of the follow-up surveys will be to gauge the extent to which sustainable principles have been incorporated into the planning process and contract language and requirements for school-related construction projects. Follow-up surveys are currently being developed and will be mailed to the November workshop attendees in July and to the attendees of the June workshops in December. Results from these follow-up surveys will be provided as an addendum to this report.

As noted by the United States Department of Energy,  
“School buildings are more than shells for classrooms—  
they help shape attitudes toward learning, make  
statements to and about their communities, and consume  
large portions of annual school budgets. They can promote  
good education or inhibit it.”

Through our project we feel we have brought to Iowa schools the tools to be strong  
activists for promoting good education. We thank the REAP-CEP Board for their support  
of this project.

APPENDIX A

**Workshop Evaluations**

November 7, 2002

***SUSTAINABLE SCHOOLS WORKSHOP***

Iowa Association of Municipal Utilities, Ankeny, Iowa

Total Attendees: 30

Total Surveys: 19











APPENDIX B

**Workshop Evaluations**

June 12, 2003

***ENERGY AND SUSTAINABLE SOLUTIONS WORKSHOP***

**Center for Energy and Environmental Education, University of Northern Iowa, Cedar  
Falls, Iowa**

Total Attendees 54

Total Surveys: 32

















APPENDIX C

**Workshop Evaluations**

June 13, 2003

***SUSTAINABLE SCHOOLS WORKSHOP***

**Maharishi University of Management, Raj Hotel, Vedic City, Iowa**

Total Attendees:45

Total Surveys:29