Buchanan County Conservation Board
Excellence in Action Nomination Summary
Sustainable Living Cabins

Abstract of the program
The Buchanan County Conservation Board (BCCB) designed and constructed two "Sustainable Living Cabins" in the county's most popular park, while meeting their mission of conservation, education, and recreation. **The cabins model conservation and sustainability, and serve as hands-on, live-in displays.** No such facilities exist in the county or state parks system. The BCCB showed leadership and innovation by providing the public an opportunity to experience living in a facility with such a degree of practical conservation, energy efficiency and renewable energy. The Board imposed a very tight budgetary constraint – not allowing use of techniques and materials that a normal citizen couldn't realistically consider. Elements include:

- **A solar energy system** providing all electrical needs.
- Energy efficient **structural insulated panels** used for exterior walls and roof.
- **Triple pane windows**.
- **Water conserving** toilets and faucets.
- **High efficiency** furnaces and water heaters.
- **Local natural and human resources,** including local materials, labor, and businesses.
- **A comfortable, overnight park experience –** connecting people to the outdoors, while providing indoor comforts, including separate bedrooms, full bathroom, a living/dining area, and kitchenette.
- **Techniques that can be replicated/adapted** by Iowa citizens and public facilities.
- **Educational displays.**

2. The problem/need for the program
During the past decade, public demand for cabin facilities in public parks has been rising. To meet this demand, many county parks throughout Iowa have been providing cabins. The need for additional cabins to meet public demand still remains high, with cabins at surrounding county parks reserved well in advance. The BCCB understood this as an apparent need by the public for a different type of overnight park experience. Tent camping is inexpensive, but does not provide the comfort desired by some people, and physical conditions sometimes make tent camping impossible. RV or motor home camping requires relatively high expense, especially for those who camp infrequently. Cabins provide extreme comfort and accessibility with almost no upfront costs or equipment.

The BCCB began to examine potential downsides to cabins. The BCCB mission is to *"increase quality of life through programs of conservation and education"*. Board members identified potential conflicts with this mission, if:

- Cabins were foremost providing lodging. The BCCB had no desire to compete with local motels, beds & breakfasts, or other cabin providers**.**
- Cabins were facilities that promoted staying indoors at the park. To the contrary, Board members want facilities to be obvious instruments to promote use and understanding of conservation and nature in the outdoors.
- Cabins were costly, with no other public benefit than to provide lodging. **Additional benefits were desired**.

3. Description of the program

Objectives

The BCCB began forming objectives for a successful cabins project in 2006. A study was undertaken with detailed surveys sent throughout the county conservation board system, and to neighboring state parks. The survey provided good information about the types of amenities and cabin sizes park administrators felt were most desirable. Information also was collected on perceived payback periods to recoup construction costs, maintenance and utility costs, and other considerations for operating cabins. Cabins also were addressed in the Conservation Board's 2005 and 2010 public opinion surveys conducted in cooperation with Iowa State University. Board members and the Director visited many cabins, and toured energy efficient and alternative energy buildings. The result of this period of assessment and research led to a project with the following objectives.

- Construct two cabins that provide the space and amenities that allow for overnight comfort and enjoyment.
- Construct cabins with design features that use alternative energy, energy efficiencies, water conservation, and use local natural and human resources.
- Sustainable Living Cabins would be live-in displays for those who rent the facilities, and walk-through displays for park visitors and participants in education programs.
- Sustainable Living Cabins would contain information and amenities that encourage users to experience the park's natural areas and facilities.
- Sustainable Living Cabins would only incorporate construction techniques that are affordable enough so an average person might consider them as financially viable. Therefore, the cabins would serve to model components of sustainable living that could be readily replicated.

Description

The BCCB designed and constructed two sustainable living cabins in the County's most popular park – Fontana Park. Each cabin is 24' x 24' with an 8' x 24' porch shaded by the roof. Cabin amenities include a living/dining area, kitchenette (refrigerator, microwave, and coffee pot), full bathroom with shower, two separate bedrooms (one with a queen bed and the other with a full/twin bunk), fire ring, picnic table, and grill. Ceiling fans exist in every room. Cabin interiors feature beautiful custom woodwork, including interior (maple) and exterior (oak) siding, furniture and cabinetry. Quality water supply is provided through a rural water provider. Sustainable living features include the following:

- **Off-grid Solar Energy System**: The cabins are off-grid, meaning they are not hooked to any power utility company. All electricity needs are provided through the solar energy system (see Use of Technology).
- **Energy Efficient Construction**: (see Use of Technology)..
- **Energy Efficient Appliances**: (see Use of Technology).
- **Water Conservation**: (see Use of Technology).
- **Interpretive kiosks, displays, brochures, and other media spread the word**.
- **Use of Local Resources**: Nearly all materials and labor for sustainable living cabins came from within 80 miles, and most are from within county. Exterior wood siding is from trees harvested in a county park, milled in-county, and installed by BCCB staff. Maple flooring remnants from an in-county lumber company were used for interior siding, and installed by BCCB staff. General construction of the SIP exterior structure, windows and doors was done by a local, in-county contractor. The SIPs are manufactured in Graettinger, Iowa – about 50 miles away. The solar energy system

was designed and installed by GoSolar! – an Iowa business in Decorah – about 70 miles away. Batteries in the solar energy system were purchased at a discount from East-Penn, a battery manufacturer located in Oelwein, Iowa – about six miles away. Furnishings were custom made by an Amish carpenter and local cabinet maker – both in-county. Use of local natural and human resources are sometimes overlooked as sustainable living practices. However, there are great energy and material savings to be had, and the sustainable living concept extends to promoting a sustainable local community!

County's Role in Devising and Implementing the Program

The BCCB managed every aspect of this project, but did so with important input from various experts. Conceptually, the project was solely the result of imagination and communication among Board members. A lot of study went into finding the right system to meet solar energy demands, preferred construction techniques, energy efficient appliances, furnishings, etc. In the end, board members and the director developed floor plans and approved construction designs presented by local contractors. A smaller committee of the director, a board member, and local contractors met to discuss different options. Local contractors provided a lot of helpful suggestions. During the process, the BCCB rejected several plans as not meeting the objective of financially viable for an average person. Solar water heating and space heating were thus rejected. Wind power was not an option.

The BCCB communicated with the Buchanan County Board of Supervisors prior to, and during, facets of this project. Construction and materials were budgeted from the BCCB's reserve account, and from its Resource Enhance and Protection (REAP) account. The project therefore used very little local property tax dollars. Revenues from cabin rentals are being deposited into the BCCB's reserve fund, and are planned to be used for future maintenance, replacement, or additional construction. Construction costs are planned to be recouped within 15 years.

Time frame for development and implementation

The project had a long study phase, as board members were provided information from surveys and toured other structures. Once the Board settled on the concept of sustainable living cabins, development moved rather quickly. The director and an appointed board member began meeting with contractors and experts in environmental efficiency and alternative energy, and funding sources were explored. Once the bid process began, the project was completed within a year. Below is a general timeline for the project:

- 2006-2008: Concept discussions
- 2009-2010: Meetings and discussions with construction and energy experts
- Fall, 2010 to March, 2011: Bid solicitation and acceptance
- April, 2011 to September, 2012: Construction
- September 13, 2011: Cabins open for public use

Clientel being served

Those being served by this project may fit into three categories: Active participants, passive learners, and indirect beneficiaries.

- Active participants may spend two or more days experiencing sustainable living components of the cabins. Cabins are reserved nearly every weekend and many weekdays by these active users. A digital display in each cabin allows users to monitor their energy use (amps), the amount of energy being generated through the panels

(amps), the stored energy in the batteries (volts), and the percent stored energy remaining available for use. Users watch this monitor as they turn on electrical devices and plug in appliances. Active participants get a good feel for the effect of the energy-efficient construction benefits as they note relatively moderate temperature changes in the cabins. Active participants use the water-conserving sinks and toilets, as well as the beautiful and functional furnishings. Interpretive signs bring attention to all features inside the cabins. Cabin tours facilitate some day-use active participation, and tours are provided upon request whenever the cabins are not in use. Tours also are provided to youth and adults who attend field trips, camps, and public programs related to sustainable living.

- Passive learners largely are park visitors. A 2' x 4' interpretive kiosk explains the cabin project to passers by. The kiosk is located in a popular picnic area adjacent to the cabin access lane, at a circle turnaround. Tens of thousands of park visitors likely pass this display each year. More than 10,000 people also enter the nature center, which contains a display about the cabins and a cabins brochure. In addition to these opportunities at Fontana Park, cabin information exists on the BCCB's web site, and has been featured many times in local newspapers.

- Indirect beneficiaries are those interested in replicating the sustainable living cabins concept. The cabins were featured during the Iowa Association of County Conservation Boards 2011 Annual Conference, and representatives from several counties requested more information for purposes of replication for similar construction projects. Similarly, private landowners have requested information and contractor contacts for pursuing off-grid cabins for their use. Practical cost considerations and readily available information make this project ideally suited to benefit those who are planning sustainable construction. There also are societal benefits. We all benefit from practices that reduce pollution, save scarce resources, reduce greenhouse gases, and make use of local human and natural resources.

Important Partners

- **Buchanan County Board of Supervisors** were supportive of the project from its inception, agreed to allow revenues from cabin rentals to be saved for future repairs and construction, and attended the public open house.
- **GoSolar!,** owned by Dennis Pottratz, provided technical support. After meeting with several other contractors who could provide solar and wind energy, Pottratz brought to light much more affordable options. Pottratz eventually designed and installed a solar energy system specially to meet energy demands identified by the BCCB. Pottratz walked the Conservation Director through the process.
- **EPS** (Energy Panel Systems), manufacturer of the SIPs used in cabin construction. provided great information, and donated $1,000 to the project. The company also provided the Energy Star testing that certified the cabins as Energy Star Homes. Similarly, **Parco Windows** provided triple pane windows at a discount price. Bob Griswold of **B&B Construction** in Winthrop was the contractor who installed the SIPs and windows, and helped with the design..
- **East-Penn Manufacturing** in Oelwein, provided the large capacity L16 batteries at a significant cost savings to the county.
- Iowa's **Resource Enhancement and Protection (REAP)** provides funding assistance to counties, and REAP funds received by Buchanan County were used to help fund cabin construction.

4. Use of technology

Solar Energy System: Each cabin uses 600-watt solar energy **panels** to collect solar energy. The energy flows (amps) from the panels through a wire to an **energy control** device that regulates flow going into the batteries. The **battery pack** consists of four, large L-16 6-volt batteries, which are cabled together to make a 24-volt battery pack. The batteries store the energy. Direct current (DC power) runs from the batteries through a fuse box and directly to the ultra-efficient DC ceiling fans. DC power then goes through an **inverter** where it is transformed into alternating current (AC) power, which supplies the lights and appliances. This process is shown on interpretive signs in the cabins. The system is designed to discharge 50 percent in three days with no sunlight under normal use. Should the batteries fall below this level, an outside outlet is available for plugging in a **generator** for a quick recharge. During the first year of operation, the system never fully discharged, but a generator has been used to test the ability of the system to recharge and provide a full supply to users. A **meter display** shows real-time changes in the system, including net amps being produced/used, voltage of the battery pack, and percent of stored energy remaining in the batteries.

Structural Insulated Panels (SIPs)

Walls (6-inch) and ceilings (10-inch) use SIP panels, constructed by Energy Panel Systems in Graettinger, Iowa. These panels consist of high performance rigid foam insulation joined and sandwiched between wood oriented strand board (OSB). The panels are strong, durable, and ultra-efficient, with R values that surpass conventional fiberglass insulation, and are 15 times better than standard walls at stopping air infiltration. The product also is 100 percent recyclable.

Triple Pane Windows

These windows provide insulation, reduce air infiltration, and provide UV protection. The space between panes is filled with argon gas. They are 30 percent more efficient than double pane windows. These are Parco windows, manufactured in Eau Claire, Wisconsin.

Water Conservation

Faucets are motion sensitive and turn off automatically after use. Shower heads are low-flow. Toilets are dual flush (less water used for liquid waste than solid waste).

Direct-vent Heating

Both the wall-mounted LP Empire space heater and stand-up A.O. Smith LP water heater are direct-vent units, in which air in-take and exhaust use the same vent opening in the wall. This eliminates the need for roof vents and reduces air infiltration. Appliances are Energy Star certified. The water heater has an energy factor of 0.62.

DC Ceiling Fans

Ceiling fans are specially designed to run off DC power, and are much more energy-efficient than any AC-powered fans on the market.

Interpretive Media – Explaining Technology to Users

Information about the cabins is shown on a kiosk near the cabin lane, on brochures, and on the Conservation Board's web site. A touch-screen display in the BCCB Nature Center is being considered, along with interactive capabilities on the web site. This display could include a model of the cabins, in which users can remotely turn appliances and other devices on and off, and view electricital, water, and LP use and impacts.

5. The cost of the program

The cost to construct and furnish each cabin was $62,000. Included in this cost is the solar energy system, at a cost of $7,200 per cabin. A detailed cost spreadsheet is available upon request to anyone wishing to replicate this project, in part or in whole, and shows costs of all contracted labor and materials (not included here do to page constraint requirement). In addition to these costs, BCCB staff provided substantial labor to piece together maple flooring for interior siding and home-grown oak board siding for exterior siding.

Operating costs have been very low. There are no electric bills. Rural water use has been less than the basic charge of $27.27/month (both cabins combined!). LP use also has been low (approximately 70 gallons/cabin for the winter season). Other minor operating costs include approximately 30 minutes of staff time after each extended use to do light cleaning and check for damage. There also is secretarial time needed for taking reservations, returning deposit money, etc. (approximately 20 minutes per rental), and some time by park rangers visiting with users and monitoring the solare energy system. Although the Conservation Board does charge a damage deposit, this deposit has never been held back. Users seem to respect the beauty and efficiency of the cabins, and leave them in great condition. Rental revenues ($55/night on weekdays and $65/night on weekends) are being deposited into a special reserve account, and will be used for future maintenance and updates).

6. The results/success of the program

The project definitely meets the Conservation Board's objectives as listed in Section 3.

- *"Cabin space allows for basic overnight comfort and enjoyment".* Cabins are very popular, with most weekends reserved for the year. See testimonials (below).
- *"The Board constructed cabins with design features that use alternative energy, energy efficiencies, water conservation, and sustainable living practices that make use of local natural and human resources".* The cabins have been certified to meet **Energy Star** guidelines for energy efficiency as established by the U.S. Environmental Protection Agency. The cabins have a Home Energy Ratings System **(HERS) Index of 47**. The HERS index rates living structures in comparison to a standard home built in 2007 (HERS Index of 100), meaning the cabins are 53 percent more efficient than the standard home. The BCCB also recently was presented with a **Governor's Environmental Excellence Award** for this project!
- *"Sustainable Living Cabins are live-in displays for those who rent the facilities, and walk-through displays for participants in education programs and general park visitors".* Interpretive signs, kiosk, meter display, brochures, web sites, and guided tours reach a variety of people. See testimonials (below).
- *"Sustainable Living Cabins contain information and amenities that encourage users to experience the park's natural areas and facilities".* People still enjoy the waters, woods, and facilities. See testimonials (below).
- *"Sustainable Living Cabins incorporate construction techniques that are affordable enough so an average person would be likely to consider them as financially viable. Therefore, the cabins serve to model components of sustainable living that could readily be replicated".* Several people have already asked for plans, and for contractor information, for their own projects. Other counties (most recently Story County) also are requesting information.

Testimonials from Cabin Users (taken from Cabin Journal entries)

- *"Had a beautiful campfire and stargazed for hours. Didn't use much energy at all. I think the lowest* [remaining battery supply] *was 87% for us."* - Raymond, IA
- *"It was fun to keep checking the meter. The lowest we ever had was 81%* [remaining battery supply]*! Watching the deer in the early morning while sipping our coffee was a favorite. Kayaking was fun. The carp sure do swirl the mud! To say we loved the cabin and our time here would be an understatement! We hope to come back many times."* – Lamont, IA.
- *"We enjoyed living in the sustainable cabin – makes us more conscious of the energy we use/save. Enjoyed hiking the trails in this beautiful setting and seeing 32 species of birds."* – Grundy Center, IA
- *"We were really excited to find this place because we love sustainable living. Having lived in Oregon and Colorado, we have seen/experienced many great moves toward sustainability… We love that these cabins are the first of their kind in this area and hope the idea spreads."* – Fort Bliss, TX.
- *"How nice to have a comfortable and eco-friendly place stay.* – Pleasant Hill, IA
- *"What a wonderful place and just what we needed. The sustainability concept is perfect for this place, and a good reminder of what we can do at home. We all commented on how we could live here."* – Monmouth, IL
- *"A night sky filled with sparkling stars, the rustling of leaves in the wind, birds and animals surrounding the cabin, and the patter of raindrops on the roof."* – Corralville, IA
- *"The added benefit of creating [the cabins] as 'green' and educational is genius."* – Aurora, IA

7. Worthiness of an Award

This project meets many aspects important to the ISAC Excellence in Action Award.

- The project met each of the objectives of the Conservation Board, and is a shining example of how objectives for facilities development can meet a mission of conservation and education, while providing quality and comfortable park experiences.
- The entire program, from early brainstorming to research and development, was implemented by county staff and board members.
- The project provides a new service to county residents, and brings new tourist attention to the county. Services go beyond the physical structure of cabin lodging, to include educational opportunities and providing a model for replication.
- The project is cost-effective, with construction costs likely to be recouped in less than 15 years, and very little operational cost due to extreme efficiency and use of alternative energy.
- Results are clear: The Cabins are Energy Star Rated and highly efficient. Meters demonstrate the workings of the facility. Water bills are low. User testimonials and popularity provide qualitative assurance.
- The program is incredibly innovative. These are the first cabins of their type in the county or state parks system. The innovative concept is to combine overnight comfort, nature enjoyment, and a hands-on, live-in, educational display of sustainability. In recognition of the innovative nature of the cabins, Governor Terry Branstad recently presented the Conservation Board with an Iowa Environmental Excellence Award.
- The project was budgeted consistent with acceptable governmental and financial management practices, and was completed with little use of taxpayer funds. The project is expected to generate enough revenue to be cost neutral.