

STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION

GREENHOUSE GAS EMISSIONS REDUCTION FUND

PROPOSAL
for funding for

1.1 WEATHERIZATION, THERMAL and ELECTRIC ENERGY EFFICIENCY IMPROVEMENTS, and an ENERGY EDUCATIONAL EXHIBIT at the GREAT STONE DWELLING of the ENFIELD SHAKER MUSEUM.

NOTE: The Enfield Shaker Museum is submitting the GHGERF Cost Effectiveness Worksheet. As a consequence of completing the worksheet we have determined that two components of the application - for re-glazing and renovation and painting of the original historic windows - will substantially increase costs of the program with only a small improvement in energy efficiency. The full energy saving benefit of the renovation of the historic windows will only be achieved when the window frames can be renovated and caulked to the granite walls. For technical reasons that cannot be undertaken until next year. We therefore concluded that the window renovation should be delayed until next year when we may apply for funding for the combined window and frame improvement. Therefore we have submitted a revised budget and reduced the request to \$51,354. We have modified those sections and attachments to reflect this. This amended proposal should be used in place of the version submitted on 3/23/2009.

1.2 This is a Type 2, 8 and 10. Program

1.3 Program Summary. This proposal seeks funding for weatherization and insulation, and installation of a ventilation heat recovery system to improve the thermal performance of the Great Stone Dwelling at the Enfield Shaker Museum in Enfield, NH. It also includes requests for conversion of most of the lighting from incandescent to CFLs, replacement of older inefficient appliances with Energy Star models to reduce electric power consumption, and creation of an educational exhibit for museum visitors and schoolchildren to show how energy and GHGs have been reduced in this landmark historic building. The 30,000 square foot building, built in 1841, is the center of historic preservation education and cultural activities for the Enfield Shaker Museum. The building is a commercial structure within the definition of the RFP. .

1.4 Low Income Residential Customer Qualification - Not applicable

1.5 Identification of Applicant Organization

Chosen Vale, Inc. dba Enfield Shaker Museum
447 NH Route 4A
Enfield, NH 03748
Enfield Shaker Museum, LLC
501 (c) (3) Educational Nonprofit – Museum
Federal ID # 02-0427596
Registered Trade Name Enfield Shaker Museum

Registered to do business in New Hampshire
DUNS#194530853

1.6 Identification of Subcontractors and Partners

Paul Morin, Building Contractor, Morin Contracting Services, 270 Amory St. Manchester, NH 03102.

Colin High, Energy and Environmental Consultant, 96 Lewin Rd Enfield NH, 03748

Tom Boswell, Property Manager, c/o Enfield Shaker Museum, 447 Route 4A, Enfield, NH 03748.

Mariann P. Shaffer, Grant and Proposal Consultant, PO Box 299, Enfield, NH 03748.

Howard Shaffer, Engineer and Energy Specialist, PO.Box 299, Enfield, NH 03748.

Wayne Eshelman, Building Contractor , 69 Gilford Avenue, Laconia, NH 03748.

Chey Insulation, PO Box 500, Enfield, NH 03748.

M. J. Hayward, Mechanical Electrical Services, Inc. 12 Commerce Av, W Lebanon, NH 03784

Dave Stewart, Painting contractor, 394 George Hill Road, Enfield, NH 03748.

Auger and Sons Plastering, 93 Bedford Road, New Boston NH, 03070,

Dave's Glass Barn, 12 Main St. Enfield, NH, 03748

1.7 Authorized Negotiators

Paul Mirski, Trustee, Enfield Shaker Museum

(603) 632-5555; pmirski@mindspring.com

Mary Boswell, Executive Director, Enfield Shaker Museum

(603) 632-4346; maryboswell@shakermuseum.org

1.8 Project Energy Savings -

The project is estimated to save 2,264 gallons of #2 oil per year when complete and 16,960 kWh of electricity per year.

1.9 Project Greenhouse Gas Emissions Reductions -

The projected carbon dioxide emission reductions based on factors provided in the RFP are 50,713 lbs per year from savings in heating oil and 18,435 lbs per year from savings in electricity.

1.10 Length of Program - from receipt of funds (May 2009 assumed) to January 2010

1.11 Total Program Costs - \$ 75,332

1.12 GHGER Funds Requested - \$51,354

Submitted

Douglas A. Smith, President Board of Trustees, Enfield Shaker Museum

2. Executive Summary

Chosen Vale, Inc., dba Enfield Shaker Museum, is a nonprofit 501 (c) (3) educational organization with a mission to protect, enhance and utilize its eight historical structures, landscape and Shaker cultural heritage. Its most important building is the Great Stone Dwelling, for many years the largest building north of Boston. It was designed by Ammi Burnham Young, who later became the first Supervising Architect for the U.S., constructing Federal buildings across the U.S. The Great Stone Dwelling was originally used by the Shakers as a dwelling house, to accommodate up to 100 people for sleeping, dining, baking and having religious dances and marches. The structure was one of the first buildings in the area to be made of granite and to have a slate roof. Tradesmen had to be brought up from Boston to do the work. The building reflects the Shakers' respect for healthy living, with spacious rooms, 152 windows for light and air circulation, and built-in cabinets to increase efficiency. The Shaker site is listed on the National Register of Historic Places, and the NH Division of Historic Places believes it should be a National Landmark.

Today, the Great Stone Dwelling is the Museum's most heavily used building. Year-round, on a daily basis, adults and children take tours and experience hands-on educational programs, lectures, musical performances, Shaker-inspired dinners, workshops, festivals and conferences. Visitors may stay overnight for educational programs that last a week-end or as much as two weeks at a time.

The Museum has recognized the critical importance of energy efficiency improvements to successfully carrying out its educational and historic preservation mission, while controlling costs and protecting the environment. It has already conducted an energy audit and thermal scan, installed new storm windows to reduce air infiltration and protect the historic original sashes, and replaced the old oil boiler with a more efficient model. Based on the energy audit, we have now planned the next stage of energy efficiency improvements for which we are requesting funds. This phase of the improvement will make it possible to extend residential programs and fully utilize the building during the winter months. As the Museum is one of the principal visitor destinations in Enfield, this will also contribute to economic development.

3. Proposed Work Scope and Schedule

The building currently has no insulation and uncontrolled ventilation. It has 156 windows of which 152 are leaking air and heat. Of these 72 are seriously deteriorated and most urgently need attention. The proposed scope of work, which is based on the recommendations our energy consultant and the energy audit conducted in 2007 includes ventilation control and heat recovery, insulation, and repair to 152 windows in two phases. We have now determined that the repair of 152 windows can more effectively undertaken next year and will therefore be delayed. A limited section of the 4th floor ceiling has been insulated to demonstrate the viability of the approach to task 2 and a section of the existing ventilation system has been exposed to enable the ventilation contractor to properly assess the job.

Tasks: Tasks 1 and 2 will be coordinated in schedule

1a) Supply and install two 300 CFM energy recovery ventilation units on the fifth floor to exhaust bathrooms on the fourth floor and other spaces on the lower floors. This includes duct work insulation and controls and exterior caps. This will reduce heat loss from the present uncontrolled ventilation of the space and will also remove moisture vapor from bathrooms which would otherwise compromise the cellulose insulation. By M. J. Hayward estimated \$16,500.

1b) Preparation of space by opening ceiling and walls and follow up by Boswell and Eshelman, estimated \$15,858. Restoration of the ceilings and painted vapor barrier included in sub-task 2d below. Scheduled all Task 1 Sept - Nov 2009

2a) Insulation of the 4th floor ceiling with 14 in. of dense pack cellulose (R-55) to place a thermal cap on the main occupied space of the Great Stone Dwelling. There is no insulation at present. The insulation estimated cost is \$9,375 by Chey Insulation.

2b) Preparation of space by opening the ceiling by Boswell and Eshelman, estimated as part of task 1b above.

2c) Closing and restoration of the 4th floor plaster ceiling openings by Auger and Sons. estimated \$10,000.

2d) Caulking, priming and painting plaster and edges with vapor resistant paints to seal the insulation from water vapor by David Stewart estimated \$3,250. Scheduled all Task 2 Sept - Nov 2009

3a) Option 1: Minimum repair and glaze 72 windows by Dave's Glass Barn estimated total \$ 20,160. Remove old paint, prime and paint sash on 72 windows by David Stewart Painting \$10,800. **This option has been removed from the budget.**

3b) Option 2: Requested repair and glaze 152 windows by Dave's Glass Barn estimated total \$ 42,560. Remove old paint, prime and paint sash on 152 windows by David Stewart Painting \$22,800. Scheduled all Task 3 June – September 2009. **This option has been removed from the budget**

4a) Replace 240 candle base incandescent bulbs with GE 3w Flicker Flame CFL and 25, 60W incandescent with 14W spiral CFLs. Total cost at Home Depot \$1003. 4b) Replace Clothes Washers (2), Freezer (1) Refrigerators (2), Total Cost at Sears Commercial \$3,866 Scheduled all Task 4 May –June 2009

5) Create an Educational Exhibit on Saving Energy and GHGs at the Enfield Shaker Museum. Total Cost \$2,360. Scheduled Oct-Nov 2009.

6) Thermo Scan IR Scan and blower door test and report by Building Envelope Solutions Total Cost \$1,810. Scheduled December 2009

7) Measurement and Verification: This will be accomplished by a program described in section 5 below. The work will be directed by Dr. Colin High who will donate his time to this project. No funds are requested for this work.

4. Project Benefits

- 4.1 This project will reduce greenhouse gas emissions (GHG) from and estimated reductions of 2,264 gallons #2 distillate oil used for heating the building. Based on an annual estimated reduction of 2,264 gallons per year at 22.4 lbs CO₂ per gallon the annual CO₂ reduction will equal 23 tons. The project will also reduce GHGs from estimated savings in electricity use from the installation of CFLs and Energy Star appliances. Based on an estimated annual reduction of 16.96 MWh per at 1,087 lbs/MWh the project will reduce GHG emissions by 8.36 tons.
- 4.2 We intend to submit the GHGERF Cost Effectiveness Worksheet by Friday March 27th 2009 with any other modifications that may be required by the use of the worksheet.
- 4.3 This project will result in small reductions in peak demand on hot summer days as the result of the use of Energy Star appliances and CFLs. We do not have time specific data on the use of existing appliances to estimate this more accurately. We will consider options to measure and verify this as part of our project evaluation program.
- 4.4 We cannot identify any market transformation benefits associated with this project.
- 4.5 This project does not directly promote innovative technologies but it will demonstrate the application of innovative technologies, such energy recovery systems, in historic buildings.
- 4.6 This project will promote economic development by employing New Hampshire small businesses. It will also enable the Museum to reduce its costs and expand its colder seasons programming. This will lead to an increase in employment opportunities at the Museum and in Enfield and surrounding towns.
- 4.7 This project will promote energy cost savings estimated to be about \$ 5,435 for oil and \$1,815 for electricity.
- 4.8 This project will provide a demonstration of how to incorporate energy efficiency into historic buildings. Mary Boswell and Paul Mirski are well know and respected experts in the field of historic preservation in New England they will be able collaborate with others in this field.
- 4.9 The project is consistent with the public interest and the purposes of RSA 125-O:19 by providing the ability for the Museum to apply the funds saved to its educational programs.

5. Measurement and Verification

The Museum will establish and implement a detailed plan to measure and verify the changes in energy use. This will include weekly electric meter reading and oil use measurement. For this purpose we will install a more accurate gauge on the oil tanks. In addition we will keep a daily log of museum activities - visitors, conferences, overnight accommodations etc. With this we will be able to calculate not only absolute changes in electricity and oil use but also to correlate them with the implementation of the energy projects described in this application. The objective will be to measure not only the savings but savings adjusted to occupancy and use of the building. This is important because we anticipate that the effect of a better heated building will be to increase the number of programs and activities in the colder months.

We will develop and test a correlation model which relates energy use occupancy and utilization before and after specific programs and is adjusted by heating degree days. The building is not air conditioned. We propose to begin keeping these detailed records in April 2009. We will also attempt to reconstruct building utilization records for the past year from existing records.

The museum keeps a record of all oil and electric power purchases for the Great Stone Dwelling and these, combined with the enhanced record keeping described above, will be used to verify the changes in electricity and oil consumption.

This measurement and verification program will be under the direction of Dr. Colin High who is an experienced professional in the field of energy and greenhouse gas measurement. He is a Lead Verifier for Climate Registry GHG reporting programs and he led his company, Resource Systems Group Inc. to become one of the founding Reporters in the Climate Registry. His resume is attached to this application.

6. Budget

The budget for this project is included below.

Project Budget Enfield Shaker Museum NH PUC Proposal

| Activity | ESM Match | Request |
|--|------------------|-----------------|
| Insulation 4th Floor - Chey Insulation | | \$9,375 |
| Plastering and Finishing Ceiling Insulation 4th Floor - Auger and Sons | | \$10,000 |
| Paint with vapor resistant paint 4th Floor Ceiling - Stewart Painting | | \$3,250 |
| Install ventilation and heat recovery system - M. J. Hayward | | \$16,500 |
| Replace Clothes Washers (2), Freezer (1) Refrigerators (2), | | \$3,866 |
| Replace Incandescent Lights with CFLs 265 Bulbs | | \$1,003 |
| Energy Efficiency Exhibit Installation | | \$2,360 |
| Preparation and Follow Up for Insulation and Plastering | | |
| Wayne Eshelman 250 hours at \$40.00 per hour (50% time donated) | \$5,000 | \$5,000 |
| Tom Boswell 250 hr @ 23.43/hr including supervision of contractors | \$5,857 | |
| Office, Reporting, Exhibits and Outreach | | |
| Mary Boswell 8 weeks 20% of time | \$2,496 | |
| Marianne Shaffer 10 hours @ \$50 per hour | \$500 | |
| Technical Assistance, Quality Control, Measurement and Verification | | |
| Paul Mirski, Architect 15 hours @ \$275/hr | \$4,125 | |
| Colin High PhD. 30 hours @ \$175/hr | \$5,250 | |
| Howard Shaffer PE. 15 hours @ \$50/hr | \$750 | |
| Totals | \$23,978 | \$51,354 |
| Total Program Cost (PUC Request and ESM in kind contribution) | \$75,332 | |
| Project Budget Enfield Shaker Museum NH PUC Proposal | | |

7. Applicant Qualifications

The people who planned this project are:

Mary Boswell, Enfield Shaker Museum Executive Director has 30 years of museum management experience, and has monitored many federal and state grants. She has an M.A. in history museum studies and an M.B.A. She will oversee the NH-PUC project paperwork and will oversee the exhibition planning, design and installation.

Tom Boswell, Enfield Shaker Museum Property Manager has 40 years of historic building experience, including restoration of nationally known structures in NH and VA. He will serve as the project manager, oversee the contractors on a day-to-day basis. He will also work with Wayne Eshelman on the wall and ceiling preparation for the contractors.

Dr. Colin High is an experienced professional in the field of energy and greenhouse gas measurement. He is a Lead Verifier for the Climate Registry GHG reporting programs and he is a

contractor to the US Department of Energy and the Metropolitan Washington Council of Governments for energy efficiency and GHG measurements. He will assist in quality control of the measures being implemented and he will lead the measurement and verification program. His resume is attached to this application. He assisted with preparation of this proposal. He will donate his time.

Others involved with this project are:

Paul Mirski, Architect and Enfield Shaker Museum Trustee specialized in energy saving structures for many years. In 1984 he received the National Trust for Historic Preservation first award for adapting a 19th century mill for cultural use. His projects include the Lewis & Saunders factories – one was an 80,000SF structure – renovation and energy retrofit, and an 8,000SF structure, a passive solar and energy conservation retrofit. The Museum's board of trustees has given him the authority to review the contracts and to ensure that the project meets national historic preservation standards. He will donate his time.

Wayne Eshelman, building contractor is the former Building Committee chair of the Historic Belknap Mill, a nonprofit museum and cultural center in Laconia, NH and has worked on several capital campaign projects in the Great Stone Dwelling. He will donate nearly ½ of his actual costs.

Chey Insulation is a widely respected local contractor. He is familiar with the unusual characteristics of the Great Stone Dwelling. Costs are reasonable. This contractor is recommended by Paul Mirksi.

Dave Stewart is a respected local painting contractor who has done prior work at the Museum. He does high quality work, finishes projects on time, with reasonable costs and within budget.

Auger and Sons Plasterers were recommended by several people, including Paul Morin. He is considered to be among the best plasterers in the state.

Paul Morin, Building Contractor has experience dating back to 1970. He specializes in projects that are unusual in the commercial market. Historic projects include renovations to the Currier Gallery of Art (1980-1982), restoration of the 1823 historic Belknap Mill cupola/bell tower and reconstruction of the south entrance (1999, 2006).

Mariann Shaffer is experienced in Grant preparation for cultural organizations. A National Endowment for the Arts Fellowship recipient. She is a member of the Capital Campaign Committee for the Museum, and contributor in its programs. She assisted with the proposal preparation. She will donate her time.

Howard Shaffer has much experience with energy systems and energy issues. A 2001 Congressional Fellow, now consulting. Assisted with Proposal scoping and preparation. He will donate his time.

Additional Information

This project will require that the original wood frames of the windows be sealed at the point of contact with the granite walls of the building to reduce infiltration. This cannot be done until research on the problem of protecting the original structure from moisture damage is resolved. When this is complete we will propose a final stage of the project to complete the weatherization of the envelope that will include the re-glazing and renovation of the original windows.

7 Letters of Interest or Commitment – none**Attachments****Contractor Bids****Budget Spread Sheets****Resumes****Non-profit status sheet****Picture of Great Stone Dwelling**