VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

VERMONT COMMUNITY CLIMATE CHANGE GRANT PROGRAM APPLICATION

Applications will be evaluated on the project's ability to successfully address the five review criteria; the qualifications of the project personnel; the clarity of the project plan; and a sound and reasonable budget. The project review criteria and the general terms and conditions of the grant are described in greater detail in the Climate Change Grant Program guidance. All applicants are responsible for reading the guidance and, if awarded a grant, complying with the general terms and conditions.

Please respond to all sections below and attach all documentation that you are relying on to support your grant application.

Due Dates:
February 2, 2009 (Funding Round One)
April 1, 2009 (Funding Round Two)

Contact and Mailing Address:
Don Einhorn
Department of Environmental Conservation
103 South Main Street, West Office Building
Waterbury, VT 05671
802-241-1093
anr.VTClimateChangeGrant@state.vt.us

A. APPLICANT INFORMATION AND PROJECT SUMMARY

1. Project Title: Bristol Elementary Lighting Project

2. Applicant Name (include all partners): Bristol School Board
Bristol Energy Committee

3. Primary Applicant Address: Bristol School Board
15 Orchard Terrace, Suite 10
Bristol, VT 05443

3. Authorized Contact Name, Phone and Email:

Greg Burdick, Business Manager
802-453-3657
gburdick@anesu.org

4. Project Location: Bristol Elementary School
57 Mountain Street
Bristol, VT 05443

5. Brief Project Description (fifty words or less): The Bristol Elementary Lighting Project, one of several initiatives in a long-range plan to conserve energy, proposes to replace all T-12 lighting in the 30 classrooms, 3 hallways, and 2 office areas within the school with more efficient High Performance ST8 tubes/bulbs and ballasts. The project is a product of an energy audit last spring followed by a partnership with the Bristol Energy Committee, a detailed analysis of the conversion requirements and options, and the commitment of the school board to begin a conversion process. The grant offers an opportunity to fund the project within a year's time rather than a three-year incremental process based solely on a very limited budget and very limited in-house labor availability. The grant offers 3.1 year payback.

B. PROJECT WORK PLAN AND BUDGET

1. Describe the project work plan. Include in the work plan, your plan for project oversight and quality assurance. Identify the number of hours dedicated to each task and identify who will complete the tasks. Provide a project timeline. If applicable, identify all permitting requirements, include permitting in your project timeline, and indicate which permits have already been obtained.

The project emerged from a multi-prong approach that includes two phases to address light conversion. The first phase, the subject of this proposal, addresses the conversion of classrooms, hallways, library and offices. A second phase to address lighting conversion for the gymnasium and cafeteria at Bristol Elementary School awaits it turn in the long-range plan of affordability. The first phase to address the conversion of all classrooms was chosen for its most timely payback.

The first phase, described in this grant proposal, is designed to utilize time spans when students are not present and the services of a master electrician under the supervision of the building head custodian to complete the conversion of all lighting fixtures, and a state inspector to review the work completed. An electrician will be contracted to work during the following times to accomplish the conversion:

June 22 – July 22, 2009—

-- 5 Classrooms in A Wing – 24 hours
– 4 Classrooms and Hallway in A Wing – 24 hours
– 5 Classrooms in B Wing –24 hours

– 5 Classrooms in B Wing – 24 hours
-- 1 Classroom, Hallway, and 2 Office areas in B Wing—20 hrs
– 6 Classrooms in D Wing – 25 hours
-- C Wing hallway, C Wing classrooms, library, Offices – 30 hrs

2. Provide the name, title and contact information for project implementation personnel. Describe their role and qualifications. Identify all subcontractors that will be involved in this project. Provide the name, title and contact information for primary subcontractor personnel and describe their role and qualifications.

Greg Burdick, Business Manager, ANESU Offices, 15 Orchard Terrace Park, Bristol, VT 05443 802-452-3657 gburdick@anesu.org
The Business Manage will oversee all bidding and be responsible for all financial oversight, documentation, and reporting.

Allen Kimball, Head Custodian, Bristol Elementary School, 802-453-3227, akimball@anesu.org
Head Custodian Allen Kimball, a twenty-six year veteran and cited by Mr. Etkind in his SEMP energy assessment report as "one of the best managers in the state," will oversee and manage the project.

The school has collected written bids for electrician pay rates and concludes that $50/hr is most economical, utilizes the contracted services of a licensed electrician, Tom Adams, who has a long history of better than satisfactory performance, and allows reinvestment in the local economy.

3. Complete the project budget table and provide a narrative description of the project budget. The budget must include a minimum 10% cash match. Cash spent before the start of the contractual grant period cannot be used as a cash match. Cash matches of greater than 10% are encouraged. In-kind services are not eligible as a match.

a. Budget Table:

	Grant Share	**Match Share**	**Total Cost**
Personnel	$ 7,500	$ 833	$ 8,333
Materials	$ 4,500	$6,570	$11,070
Equipment	NA	NA	NA
Other	NA	NA	NA
Total Budget	**$12,000**	**$7,403**	**$19,403 EVT Rebate TBD**

EVT – Efficiency Vermont

b. Budget Narrative:

The decision to hire an electrician as seen in the personnel line was based on the recognition that the conversion effort involved far exceeded available time from the custodial staff to accomplish this task in addition to a full summer schedule of cleaning.

Personnel or Labor Costs are estimated to be:

166.7 Hrs – Assumes 20 minutes per fixture, or three per hour
$50/hr -- Based on collected hourly bids
$8333.33 – Estimated labor costs

Materials are estimated to be:

Cost per fixture = $ 22.14 (one ballast and three lamps)
Number of fixtures = 500
Total for materials = $11,070

These estimates were taken from a Wesco Distribution quote off the state purchasing contract for a 3 lamp ballast at $14.22, and each lamp at $2.64 (x3) for a total of $22.14. Three bids for the materials are due to be received by mid February.

In addition, EVT rebate estimates were based on general estimates taken from the Wesco list by George Lawrence at Efficiency Vermont.

C. PROJECT REVIEW CRITERIA

Describe how your project addresses the following criteria. Note that the five criteria applied to an application are described only generally below. Please refer to the Climate Change Grant Program guidance for a more detailed discussion of these criteria.

1. Measurable reductions in energy consumption and/or greenhouse gas emissions (30 points).

Classroom light conversion savings are estimated to be 38,610 kWh/hr or $4,633.20/year based on the following calculations:

T12 3 lamp fixture (actual may be as high as 130) = 108 watts
T8 3 lamp fixture = 72 watts
Difference in watts for a 3 lamp T12 fixture to T8 = 36 watts
Annual run hours = 2145 hours
Annual savings in KWh per fixture = 77.22 kWh
Total number of fixtures = 500
Annual savings in kWh all fixtures = 38,610
Assumed cost per KWh = $ 0.12
Projected estimated savings = $ 4,633.20

With these projections, the payback is under 2 years.

A history of usage will be maintained to measure differences gained in the reduction of kilowatt hours. This project is specifically referenced in the SEMP site assessment report provided to the school.

2. Transferability (20 points).

The transferability of information and conversion approach to more efficient lighting and lower energy consumption is a highly visible model immediately within the five towns and six schools within the Addison Northeast Supervisory Union and beyond through the media to thirteen additional Addison County schools. Each school is dependent on the initiative of independently operating custodians. This is an opportunity to pool experience and expertise and pool bids for better pricing in service to the larger community. It has the potential to showcase the viability of individual town energy committees, the support of Efficiency Vermont in support of municipalities, the role of students in being active contributors to the distribution of information about the reduction of energy consumption to the public, and the power of shared responsibility within a community. By modeling what and how information is collected and analyzed, how local service provider's experience can better predict labor and materials investment, and collective bidding, the sister schools can put their conversion plans on a faster track.

3. Viability of project approach (30 points).

The project was scaled back from the original concern for conversion to exclude the cafeteria and gym due to significant pressures to maintain level funding in the current year. The cafeteria and gym are still in the long-range plan and can be moved up in the timeline if the first phase of classroom conversion is grant supported. The classroom conversion project was chosen to ensure greater viability within the specified timeline. This kind of work can only be accomplished during summer breaks so to avoid teaching disruptions. This project does not involve any structural changes and minimal replacement of ceiling tiles.

4. Cost-effectiveness (10 points).

The electrician's rate of $50/hour as well as pooling the bids for materials with sister schools is very economical and ensures investment in the local economy. Starting with the part of the long-range plan that provides a less than two (2) year payback will ensure public support and demonstrate the school board's and the Energy Committee's commitment to cost-effective measures. The payback may actually be much shorter given the conservative estimate of watt usage in the current T12 fixtures.

5. **Public Education and Involvement (10 points).**

The meetings of the Bristol School Board are broadcast on the local TV channel on a monthly basis. In the spring of 2008, when the Board first

received the SEMP site assessment report, the Bristol School Board deliberately focused on the report publicly. The Board was then approached by the Bristol Energy Committee and a second conversation with a representative of the Committee was planned for the public. A task force was organized and specific plans to address multiple items in the report were put into place. Those actions, with monthly update reports to the school board, included replacement of 23 small refrigerators with 3 high-energy efficient refrigerators and teachers attending to the turning off of lights when vacating a room in addition to the annual fall recalculation of pneumatic controls and cleaning of boilers. The second phase of the project also includes eighteen (18) lighting conversions from current T12 fixtures to new T5 high output, low energy consumption fixtures in the cafeteria as well as the conversion of 12 fixtures in the gym from T12 fluorescent on the sides and 400-watt metal halite fixtures to 2HB-654-T5 High Bay T5 high output fixtures.

D. ATTACHMENTS

1. For municipal entities, attach a resolution of the governing body authorizing the application.

2. For non-profit entities, attach proof of non-profit status.

3. In the space below, list all other attachments that are being submitted in support of this application.

School Energy Management Program Site Assessment Report
School Board Minutes Authorizing the Application
Non-Profit Certificate
Letter of Support from the Bristol Energy Committee

E. APPLICANT REPRESENTATIONS AND SIGNATURE

The applicant(s), by signing and submitting this application, make(s) the following representations with the understanding that the Department of Environmental Conservation will rely on these representations for the purpose of evaluating this application. The applicant(s) understand(s) and acknowledge(s) that should any of these representations be untrue, the Department may rescind any award of assistance and, in the Department's sole discretion, pursue any other appropriate remedy or relief:

1. All information contained in this application, including attachments, is true and complete to the best of the applicant's knowledge and belief;
2. The applicant(s) has read and understands the grant background and guidance and grant terms and conditions and agrees to comply with them;
3. The primary applicant is a Vermont municipal entity or a non-profit organization, and if a non-profit, is in compliance with all requirements for maintaining its non-profit status; and

4. The applicant(s) will be ready to proceed with the project within 60 days of notification of the award.

NAME OF PRIMARY APPLICANT: ____Bristol School Board_____

NAME OF PARTNER: ____Bristol Energy Committee_____

AUTHORIZED SIGNATURES

PRIMARY APPLICANT: __Evelyn Howard, Superintendent____

PARTNER: __Email letter of support included_____

Vermont Superintendents Association
School Energy Management Program

Site Assessment Report

School: Bristol Elementary School

Date of Site Visit: March 12, 2008

Present at Site Visit: Allen Kimball, Supervisor of Buildings and Grounds
Norm Etkind, SEMP

Purpose of Visit: Walk-thru Energy Assessment

It was my pleasure meeting Mr. Kimball and seeing how this building is managed. Having seen over 200 school buildings now, I can say with some authority that Mr. Kimball is one of the best managers in the state!

1) **Basic Building Description** - - the Bristol Elementary School is a one and two-story brick building probably built originally in 1960's and 70's. Building size is estimated at 67,000 square feet. The building serves 308 K- 6 students.
2) **Building Energy Use** –
   a) Fuel Oil - -
      i) The building uses 15-18,000 gallons of #2 fuel oil a year or a maximum of .27 gallons per square foot per year. The average use is about .44 gallons per square foot.
   b) Electricity
      i) The school used 301,664 kWh of electricity for the last twelve months, or 4.5 kWh per square foot compared to an average of 6 kWh per square foot.
      ii) A printout was distributed that showed energy use and demand for the last several years.
      iii) Maximum demand for the past twelve months was 105 kW or 1.6 kW per square foot.
      iv) Power factor during the summer months were 85 and 87%.
   c) Domestic hot water is produced by a stand-alone oil fired hot water heater.
   d) Kitchen appliances use propane.
3) **Site Visit Observations**
   a) HVAC Systems –
      i) Heat –
         (1) The building is heated with two Bryan 960 MBtu oil fired boilers.
         (2) There is an outside temperature reset.
         (3) There is an automatic stack damper.
      ii) Ventilation system
         (1) There are central air handlers for ventilation located in the penthouse.
         (2) Carbon dioxide levels were tested and were found to be in an acceptable range.

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iii) Controls
(1) There is a central pneumatic control system for the building.
(2) There are time clock controls for all heating and ventilation functions.
(3) Occupied cycle is 6 AM to 4 PM for ventilation and 5 AM to 4 PM for heat.
(4) Setback temperature is 10 degrees.

b) Electrical –
i) Lighting –
(1) General lighting is with T-12 fluorescent fixtures.
(2) Classrooms have only one switching option.
(3) Library light level was at 72 foot candles.
(4) Exit lights are LEDs.
ii) Plug loads
(1) There is a vending machine that dispenses non-perishable items.
(2) There are some small refrigerators in use.

c) Building Envelope - no problems were reported with the building envelope.
(1) Windows
(a) Some window areas in the old section have been infilled and windows replaced with insulated units.
(b) Remaining windows in the old section are single pane with storms.

d) Kitchen
i) Gas range.
ii) Dedicated oil fired Buderus boiler to supply hot water to the dishwasher.

4) **Suggested Changes to Operations and Maintenance** – These items are important because many small changes in the way the building is managed can add up to big energy savings. Schools tend to have good operational savings because they are only active for a portion of the day. A good operating strategy takes advantage of this fact to turn off energy using devices when the building is not occupied. In order to realize the benefits of proper energy management, all parties need to be on board with the program. This starts with administration from principals to teachers to students to staff.

a) HVAC Systems –
i) Heat –
(1) The boilers are equipped with an outside temperature reset. It is a good idea to post a chart in the boiler room that shows what the boiler temperature should be at different outside air temperatures. This helps to ensure that this system is working correctly.
(2) Some pipe insulation is missing or damaged and should be installed or repaired on all exposed hot water or heating pipes.
ii) Ventilation system
(1) Putting streamers on the supply air registers is a way to easily determine that the ventilation is operating when it should. Without these, it can be hard to tell if the system is on and shuts down correctly during the un-occupied cycle.
iii) Controls
(1) Tweaking of controls for optimum performance of the heating and ventilation systems is an important conservation strategy. The goal is to provide all the heat and ventilation necessary but no more than that. It is best to make incremental adjustments to make sure no problems are created. Lowering the setback temperatures for nights and weekends and reducing the on-time for ventilation to match occupied times will reduce energy use. Most schools have the

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ventilation come on when children arrive and shut off when they leave, generally from about 7 AM to 3 PM. Heating systems usually set back around 3 PM and come on around 6 AM. Some schools may need a longer pre-heat period, especially after a week-end or vacation period. The control schedule at Bristol is very good. It may be possible to go to unoccupied at 3PM instead of 4 and to start ventilation at 7 instead of 6.

b) Electrical –
   i) Lighting –
      (1) While its easy to say that lights should be turned off when not in use, it is harder to get people to do it. Some schools have appointed students to be lighting monitors that prowl the school to make sure unused lights are turned off.
      (2) When repainting hallways, use of lighter colors will allow for reduced need for light from fixtures.
      (3) I have attached an Excel spreadsheet that shows your electrical energy use. Use the tab at the bottom to access the graph. It is a good idea to keep this spreadsheet updated with new bills to keep track of electrical use trends and to determine if there are unusual events that may need attention.
   ii) Plug loads
      (1) Small refrigerators in classrooms – schools have used a variety of strategies to address the issue of refrigerators in classrooms. These small units can use as much electricity as a full sized efficient unit. Sometimes they are necessary for student health reasons. However, very often, non-refrigerated options exist (such as packaged juices that don't require refrigeration). This can be a sensitive subject with teachers so discretion as to whether it is worth addressing is an important issue. Here is a range of strategies that other schools have used:
         (a) Simply ban the use of them and provide a central energy efficient refrigerator that teachers can use. This may be a good strategy if people aren't already used to having "their own" unit.
         (b) Allow teachers to have them but charge them a monthly fee to cover the electrical cost.
         (c) Require teachers to take them home for the summer and long breaks. This avoids usage during those months and prevents the school from having to clean them out.
         (d) Require that the small refrigerators be Energy Star rated (this ensures that they are energy efficient).
         (e) Require written permission from the principal after demonstrating the need for the unit. The unit itself must be approved by maintenance after checking its condition.
      (2) Computers - -
         (a) Computers should have their software activated to allow them to enter their "sleep" modes when not used for a short period of time. Most computers have this software as part of their basic systems. If they do not, free software can be downloaded from the Energy Star website http://www.energystar.gov/index.cfm?c=power_mgt.pr_pm_wizard .
         (b) Computers and their related equipment should be shut down at night and if not used for extended periods of time (an exception may be a server that may be needed in off hours). A power strip that shuts down the computer and all related equipment makes sense. This saves energy and also helps to protect the equipment from power spikes and lightning.

c) Kitchen
   i) Range hoods can usually be placed on a timer so that they are not inadvertently left running when not needed.
   ii) All refrigeration condenser coils should be cleaned periodically.

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iii) Pilot lights often use about a third of the energy use of the gas stoves and ovens. The main gas line should be shut down during summer months or during vacation periods.

d) It is a good idea for the building manager to visit the building after midnight to see what building systems are still operating. Almost all systems should be shut off at this time of night.

5) **Potential Energy Conservation Measures**

a) Electrical –

i) Lighting -

(1) All older fixtures that use T-12 fluorescent tubes should be converted to high performance T-8 ballasts and lamps (with the exception of those fixtures with minimal on times). This provides for improved lighting quality and energy savings. The school has obtained an estimate of costs and savings from Efficiency VT. This project would replace all T-12s with high performance T-8s. This project is estimated to cost only $1,435 after the EVT rebate. Savings are estimated at $3,864 per year. It is hard to imagine a better, more cost effective project. I understand that the school board decided against allocating the money in this years budget. However, due to the fast payback (0.4 years) the cost of the project can be taken directly out of the operating budget and still have money left over. Consideration should be given to approaching the board with this plan.

(2) Areas that receive intermittent use such as teacher prep areas and bathrooms can benefit by the use of occupancy sensors to control the lighting.

(3) Classrooms have only one switching option. I recommend that you consider allowing alternative switching for different light levels in the classrooms. With the three tube fixtures, you can use two switches, one controlling one lamp and the other switch the other two lamps. You will then be able to use one, two, or three lamps depending on the light level needed.

(4) Some miscellaneous lighting using incandescent bulbs should be replaced with compact fluorescents (CFL). Use only brand name CFLs to ensure savings and longevity.

(5) The library was overlit. When changing to T-8s the lighting level will increase if the same number of luminaries is used. You may be able to reduce the number of fixtures or bulbs per fixture.

ii) Power factor - - this is a measure of how efficiently the building electrical systems utilize power. In inductive loads like motors and transformers the voltage leads the current. This can result in inefficient use of the electrical distribution system both within the facility and for the power company. Due to this dynamic, power companies penalize building owners if the power factor is outside a certain range. Power factor correction will have a quick payback depending on how it is done. CVPS is raising the cutoff for power factor penalty to 90% on April 1, 2008 so this issue deserves immediate attention. There are several ways to do power factor correction ranging from automated devices to simple capacitors. Some checking to see the source of the power factor problem makes sense especially because it is best for the building's electrical system if the power factor correction is placed closest to the source of the problem. The low power factor here is probably due to motors that have light loads during summer.

b) Plug Loads

i) Vending Machines – "vending misers" act as occupancy sensors for vending machines that put them in a sleep mode when the area is not occupied. They typically save about half the energy that the machine uses and has a little more than a year payback. They can only be used on machines that dispense non-perishable items like water, soda, etc. Incentives are available from Efficiency Vermont for this device and some venders will provide them at no charge if requested.

c) Building Envelope

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i) New energy efficient windows will save about a half gallon of oil a square foot a year over the existing ones with storms at the school. There will also be maintenance cost savings. However, window replacement can be quite costly. I suggest that you obtain an estimate on the cost of window replacement to determine if this is a good investment for the school.

6) As you already know, Efficiency Vermont can provide incentives for the electrical measures discussed above. If you want to proceed with some of these measures please contact me and I will help get an EVT project manager assigned.
7) If you are proceeding piecemeal with some measurers, EVT has prescriptive forms on their website (www.efficiencyvermont.com) that cover lighting, occupancy sensors, vending misers, efficient three phase motors, HVAC equipment, and refrigeration equipment. You can use these forms to get rebates on projects you are executing yourself.
8) Facility Operating Plan– a written plan that lays out the key modes of building operation would be helpful for administrators and staff. This plan should include maintenance schedules for key building systems, operating schedules for ventilation and setback temperatures and other important information about the building's systems.
9) A school-wide program to improve energy efficiency and conservation can be both educational and pay significant monetary dividends. An incentive (maybe a school party with a band or other such inducement) based on achieving a percentage reduction in energy use can be an effective inducement to participate in this kind of program. With students engaged, they will help evaluate potential energy saving measures and help ensure lights are turned of when not needed etc.
10) Other Resources
   a) An excellent manual entitled "School Operations and Maintenance: Best Practices for Controlling Energy Costs - - A Guidebook for K-12 School System Business Officers and Facilities Managers" can be obtained as a free download at http://www.ase.org/uploaded_files/greenschools/School%20Energy%20Guidebook_9-04.pdf
   b) Vermont School Board Insurance Trust (VSBIT) - Tim Pedrotty will visit schools and advise them on a whole range of facility management issues including cleaning programs, indoor air quality, playground safety, work order systems, managing contractors, grounds maintenance etc. Contact VSBIT at 223-5040 and/or check out their website at www.vsbit.org .
   c) The Vermont Energy Education Program (VEEP) offers a variety of hands-on/minds-on learning experiences about energy and our environment for Vermont teachers and their students in grades 3 - 12. For an overview of VEEP's programs and mini grants for teachers, visit www.veep.org. For further information contact Fran Barhydt, VEEP Director of Curriculum and Development at franbarhydt@hughes.net or 748-8917.
   d) The Association of VT Recyclers (AVR) works with school custodial staff to evaluate and assess cleaning products/practices regarding environmental health and indoor air quality. The resulting report is reviewed with custodial staff and administration. Technical and policy recommendations are made to improve indoor air quality. AVR works with the Vermont Department of Health's voluntary ENVISION Healthy Schools Program. AVR can be reached at 454-8400.

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