PROPOSAL FOR FUNDING UNDER THE GREENHOUSE GAS EMISSIONS REDUCTION FUND

1.1 ENERGY AUDITS OF THE MUNICIPAL BUILDINGS OF THE TOWN OF HANCOCK, NH

1.2 A proposal for funding energy audits in seven of Hancock's municipal buildings. Energy audits are eligible for funding under this program per page three of the GGERF RFP issued on February 23, 2009

1.3 The Town of Hancock's Energy Advisory Team (HEAT) formed in the fall of 2007 as an advisory committee to the Town's Select Board. It was tasked with making recommendations for lowering the Town's energy use and associated carbon emissions. Its first accomplishment was to quantify Hancock's energy use from 2001- 2007, along with its associated costs and carbon dioxide emissions. The Town would now like to hire an energy auditor to complete audits in each of Hancock's eight municipal buildings in order to identify ways to improve energy efficiency, lower heating fuel use, electricity used for cooling, and other electricity use, and improve occupant comfort. Once the audits are complete, the Town can then implement the recommendations for improving building efficiency as part of a formal greenhouse gas reduction plan.

1.4 This program does not serve low-income residential customers.

1.5 Organization: The Town of Hancock, New Hampshire
50 Main St.
Hancock, NH 03449

1.6 Energy Auditor associated with this program: TBD

1.7 Authorized negotiators:
Kurt Grassett, Town of Hancock Public Works Director
Address: 79 Bennington Road, Hancock, NH 03449
Phone: 525-4087
e-mail: hwydept@hancock.org

Nancy Gamble, Chair, Hancock Energy Advisory Team
Address: 4 Bennington Road, Hancock, NH 03449
Phone: 525-4687
e-mail: nfgamble@abian.com

1.8 Projected energy savings *directly from this program:* none
Projected energy savings from this program *after implementation of recommended energy-saving measures:* 20% or more

1.9 Projected Greenhouse Gas Emissions Reductions *after implementation of recommended energy-saving measures*: 60,600 lbs. (estimate)

1.10 Length of Program: It is projected that these audits will all take place during the 2009-2010 heating season. All audits should be complete by January 31, 2010.

1.11 Total Program costs: eight audits are being planned, at an estimated total cost of $9,000.

1.12 Total amount of funding requested: $8,500

2) **Executive Summary**

The Opportunity

The Town of Hancock, NH, has eight municipal buildings. Two energy audits have been performed on the Town's energy use and associated carbon dioxide emissions, one by Cool Monadnock, encompassing only data from 2005, and one by the Town's energy committee, HEAT, encompassing data from 2001-2007. Both audits identified opportunities for energy use reduction in the Town's buildings.

From the Cool Monadnock report (appendix I, page 6), summarizing 2005 data using the EPA's Portfolio software, 43% of energy use in the town came from buildings. Of the eight buildings included in the report, three had site and source energy intensities higher than average values for their building type: the Highway Office/Tool House, the Town Hall/Police Department, and the Pre-school (Town Meeting House.)

The HEAT energy audit report (appendix II) compiled from energy use data was helpful in identifying energy use trends, as the data was collected for a seven-year period. During this period, several demand-side energy reduction projects had been completed in some of these buildings. Even so, No. 2 fuel oil and propane use for heating has increased in nearly all buildings for the time period covered in the audit (Tables 2 and 5.) The Firehouse in particular shows a trend of increasing propane use without adequate explanation. The audit also revealed significant electricity use in the Town Office building, the library, and the Highway Office building. These areas all present opportunities for energy conservation, both for heating in winter and cooling in the summer.

Finally, an informal walk-through of the town meeting house used for the pre-school, to identify potential weatherization projects, revealed a very leaky building. In some cases, daylight was visible around door jams, windows, and even exterior walls. This building was originally constructed in 1820 and has never been analyzed, or retrofitted/weatherized for significant energy savings.

The Proposed Solution

Hancock's local energy committee, the Hancock Energy Advisory Team, or HEAT, formed in the fall of 2007 to advise the town's Select Board on energy saving measures for the town. The first task accomplished by HEAT was to complete the energy audit referenced above, which found significant opportunities for energy savings. HEAT then

recommended, and the town agreed, that Hancock join the EPA's Community Energy Challenge, which commits the town to at least a 10% reduction in energy use.

In order to accomplish this goal, the Town of Hancock needs a thorough assessment of each of its municipal buildings for energy savings. The most accurate way to do this is to contract with a certified energy auditor to perform energy audits in all eight municipal buildings, with recommendations for weatherization, retrofits, or other energy saving measures. Once these audits are complete, HEAT plans to take the results and develop a formal greenhouse gas reduction plan, with target dates and costs for completion. Implementation of significant energy saving measures in Hancock's building cannot be accomplished without such a plan.

Time period and sources of matching funds or leverage
The audits will be completed during the next heating season, from December 2009 to January 2010. It is estimated that the audits will cost about $9,000, with $500 covered by the Town of Hancock's budget. The total amount requested in this proposal is $8,500. Volunteer hours for oversight and administration of the program will be donated by HEAT members and the Town's Director of Public Works, Kurt Grassett, who serves on HEAT.

3) Proposed Work Scope and Schedule:
The project scope includes energy audits of all eight of Hancock's municipal buildings: the Town Office building, Police Station, Highway Office/tool house, Highway Department garage, library, Town Meeting House (preschool), Firehouse, and Recycling/Transfer Station. All audits will include

- Blower door and infra-red camera inspections to diagnose building shell weaknesses
- Thorough testing of the heat plant or HVAC system for operation efficiency.
- A formal report of findings and recommendations for each building, including costs and projected cost savings

HEAT is in the process of collecting competitive bids for these energy audits. Three firms, S.E.E.D.S., GDS Associates, Inc. and Energy Audits Unlimited, LLC, have been chosen to bid on the project. At the time of this proposal, Energy Audits Unlimited, LLC, and GDS Associates, Inc., have provided a written estimate for the work (appendix III.) It is expected that all bid results will be received by April 15th, with a final decision and scheduling of the audits made by May 14th. Each audit will take up to a day, with more time allowed to complete each audit report.

All audits are currently planned to take place between December 1, 2009 and January 31, 2010. Full audit reports are expected to be received by the end of February 2010. All oversight, quality assurance, and financial management of the audits will be accomplished by either Kurt Grassett, Public Works Director, or members of HEAT.

4) Project Benefits:
The benefits of energy audits in Hancock's eight municipal buildings cannot be precisely quantified because the results of the audits are not known at this time.

Recommendations for energy savings in each building will vary, and can consist of relatively low-cost improvements, such as weatherization, or large-scale improvements, such as replacement of an entire heating or HVAC system, with a wide variation in energy savings. In this section, reasonable estimations are made and justifications for those figures are provided.

4.1 Reduction of greenhouse gas emissions.

For this estimation, New Hampshire building efficiency experts at *The Jordan Institute* were consulted (appendix IV.) In its experience, the Jordan Institute has found that "reasonable attention to reducing a building's energy requirements can usually result in savings of at least 20%. And careful, detailed attention to tightening and insulating the 'shell' of the building can easily result in much greater savings, in the 40% to 60% range." In addition, nationwide studies have shown that the Department of Energy's Weatherization Assistance Program typically saves 10% to 30% of total household energy consumption. [1] Based on these estimates, this proposal assumes that implementing audit recommendations will save the Town at least 20% of current energy use.

Applying this statistic to the heating oil and propane gas expenses experienced in Hancock in 2007 (our most current audit data), and using the carbon dioxide emission factors in the RFP document, the savings we can expect, conservatively estimated, will be:

Energy Source	**2007 Fuel Use (gallons)**	**20% Reduction (gallons)**	**CO2 Reduction (lbs.)**
No. 2 Heating Oil	7,408	1,482	33,197
Propane (bldgs. only)	4,223	845	10,732

Total Reduction: 43, 929 lbs.

The energy audits are expected to identify ways to decrease electricity use for cooling, as well as to identify ways that electricity use in general can be reduced, either through purchase of high-efficiency appliances and computers, through behavior changes of the building occupants, or by other means. Therefore, this proposal assumes that Hancock's municipal electricity use can also be cut by at least 20% through implementation of the recommendations of the planned energy audits.

Energy Source	**2007 Energy Use (bldgs. only, (MWH)**	**20% Reduction (MWH)**	**CO2 (lbs.)**
Electricity	76.690	15.338	16,672

Total estimation of greenhouse gas reduction: 43,929 lbs. + 16,672 lbs. = 60,601 lbs. per year

Alternatively, an estimation of energy savings can be made by assuming that implementing the findings of the energy audits in Hancock's least efficient buildings (the

[1] John Krigger and Chris Dorsi, *Residential Energy*,(Helena, Montana: Thompson-Shore, Inc., 2004), 17.

Highway Office/Tool House, the Town Meeting House (preschool), and the Town Hall/Police Department) will aim to lower each building's energy intensity to the average value for its type. From Table 3 of Cool Monadnock's Baseline Energy Report (pg. 6):

Name of Building	**Type heating fuel used**	**Site energy intensity (kBtu/sq. ft.)**	**Avg. Site energy intensity for building type**	**Estimated energy intensity reduction (%)**
Highway Office/Tool House	No. 2 fuel oil	159	77	52%
Town Meeting House (pre-school)	No. 2 fuel	252	75	30%
Town Hall/Police Dept.	No. 2 fuel	164	77	53%

Greenhouse gas reduction will mirror the degree of energy use reduction obtained in these buildings.

4.2 Cost effectiveness

It is not possible to quantify exact cost/benefit ratios for the building audits, as it is not yet known what energy-saving recommendations will be made. Qualitative benefits, after implementation of audit recommendations, include:

- Improved performance, as measured by energy intensity, of all buildings audited
- Reduced energy costs and greenhouse gas emissions
- Improved comfort of building occupants

In addition, the cost effectiveness of energy audits in the Town of Hancock's buildings is improved by accomplishing them all at once. All efficiency measures can be considered together, making implementation cheaper by taking advantage of bulk purchasing of materials. If two or more buildings require the same efficiency measure, the same vendor or installer can be used for all buildings, resulting in faster installation and lower costs. Finally, performing all the audits at one time helps the Town of Hancock to understand the full scope of the project at hand, with its associated costs and benefits. Total return on investment can be calculated and used to justify approved expenditures by the town, or to obtain further grants or loans.

4.3 Reduce New Hampshire's peak electric load:

The results of the audits, once implemented, are expected to reduce summer electricity demand for cooling Hancock's municipal buildings. Hancock's Town Office building is cooled by an HVAC system (1st and 2nd floors) and a window air conditioner (3rd floor.) The police station is cooled by two window air conditioners, and the Town Meeting House by one on the first floor. The town library is also cooled by a central HVAC system.
It is not possible to exactly quantify the reduction in New Hampshire's peak electric load that will be achieved by implementing the recommendations of the energy audits.

However, tightening the building envelope will decrease heat gain in summer as effectively as it will decrease heat loss in winter. The audit will also identify ways to increase the efficiency of Hancock's cooling units, whether they are window air conditioners or HVAC systems. Therefore, peak electric load will be reduced.

4.4 Promote market transformation

The Town of Hancock hopes to increase the adoption rate of building high efficiency products, practices, and services by serving as a model to other towns in New Hampshire and to the residents of Hancock. The Town of Hancock will help increase the adoption of whole-town energy audits and building efficiency retrofits in other towns by widely communicating our efforts and their results through established communication channels, including

- The Local Energy Committee newsletter, produced by Clean Air, Cool Planet
- The Local Energy Committee conference, currently planned to take place annually
- The New Hampshire Community Energy Project Wikipedia page (Town of Hancock's site)
- Networking among other NH town Local Energy Committees and among the regional "Cool Monadnock" initiative towns

HEAT also plans to increase awareness and use of energy audits and building energy efficiency retrofits among the residents of Hancock by widely publicizing the activities covered by this proposal, the recommended upgrades or retrofits and building use changes as they are implemented, and the resulting energy savings. This will be accomplished through articles in the town newsletter and anticipated informational presentations or workshops sponsored by HEAT.

4.5 Promote innovative technologies

Energy audits are the second step in Hancock's greenhouse gas reduction plan, now that an overall energy audit of the town has been completed. Once the audits' recommendations have been implemented, and buildings are made as efficient as possible, Hancock hopes to replace non-renewable energy sources, like heating oil and propane, with renewable sources. HEAT will take care to research options that include cutting edge renewable energy technologies, and will serve as a model for their use.

4.6 Promote economic development

The energy audits to be enabled by this plan, if approved, will positively impact the local economy in five ways:

1. It provides a substantial amount of work for a local certified Energy Auditor
2. Local contractors in the Monadnock region will do all the work, installing materials or retrofits needed to improve the energy efficiency of Hancock's town buildings. Both their families and their suppliers will benefit directly from the funds.
3. As we publicize these audits as described in 4.4, above, Hancock residents, other New Hampshire towns, and their residents, will use this project and those that stem from it as a model for a greenhouse gas reduction plan, engaging in energy audits and reduction projects in their own homes.

4. HEAT plans to take any savings the town realizes from reduced energy use to invest in other worthwhile municipal projects that will also stimulate the local economy
5. The local "multiplier effect" will result in funds paid to local contractors and suppliers becoming "recycled" within New Hampshire.

4.7 Promote energy cost savings

As stated in section 4.1, this proposal assumes at least a 20% reduction in energy expenses following audit recommendation implementation. From Tables 2, 5 and 6 of Hancock's Energy Audit (appendix II):

	2007 Cost	20% Reduction Savings
No. 2 Heating Oil	$17,742	$3,548
Propane	$ 6,933	$1,387
Electricity	$12,376	$2,475
Total Annual Cost Savings (2007 rates)		$7,410

Our estimation is that the invested funds of the audit alone will be paid back in energy savings in a little over one year. These figures are based on 2007 prices; the cost of the fuels in the future can be expected to increase, resulting in even more savings than reported here.

4.8 Promote collaboration and provide useful information for future program evaluation and improvement.

Hancock plans to collaborate with other towns and initiatives and provide a model for planning and implementing a greenhouse gas reduction plan as described in 4.4 and 4.5.

4.9 Otherwise be consistent with the public interest and the purposes of RSA 125-0:19.

Completing the audits early in the winter of 2009-2010 will enable Hancock to act immediately with our own town staff and volunteers to implement at least some of the recommended actions right away. Larger or more expensive measures, however, will require approval by Hancock's Select Board and possibly approval of a town warrant. Completing the audits by early 2010 will provide adequate time to seek approval of a warrant at Town Meeting in March, 2010.

5) Measurement and Verification

Quality of the building energy audits will be verified by

1. Contracting with a certified energy auditor
2. Reviewing sample audit reports provided by bidding contractors to ensure desired building performance information and recommendations for improving energy efficiency will be provided.
3. Receiving bids from at least three contractors
4. Checking references for bidding contractors
5. Close supervision and direction for all audits will be provided by HEAT members working together with Hancock's Public Works Director

6) Budget

All energy audits currently are planned to be completed from December 1, 2009 to January 31, 2010. Therefore, all funds will be utilized in either Q4 2009 or Q1 2010. The two bids that HEAT has received (appendix III) for the audits vary considerably in cost. Energy Audits Unlimited, LLC, has quoted $565 for each building up to 4000 sq. ft., and $665 for the library, which is over 4000 sq. ft. Mileage is also included, for a total quote of $3,611.50.

GDS Associates, Inc. has quoted $7,000 for a walk-through type site visit to each building and an 8-10 page report with recommendations for energy savings. Blower door testing and infra-red camera analysis would cost an additional $5,000, and a more detailed analysis of savings and costs for recommended actions would cost an additional $4,000, for a total cost of $16,000 dollars, or $2,000 dollars per building.

HEAT believes that these two bids represent low and high-end extremes for building energy audits. Therefore, HEAT estimates that thorough energy audits, with reports containing audit findings and recommendations for retrofits, with associated costs and energy savings, will cost approximately $1,200 for buildings 4,000 square feet and under, and $1, 500 for buildings larger than this. Based on this estimate, the total cost for the audits will be $9,000.

Building	**Size (sq. feet)**	**Estimated audit cost**	**Funding Source**	
			GGERF	**Town of Hancock**
Highway Office	864	$1200	$700	$500
Town Offices[1]	3,000	$1200	$1200	
Police Station[1]	1,000	$1200	$1200	
Library	5142	$1500	$1500	
Fire House	3229	$1200	$1200	
Recycling Center	1162	$1200	$1200	
Town Meeting House	5,200[2]	$1500	$1500	
Total		**$9000**	**$8500**	**$500**

[1] These two buildings are mistakenly combined in the quotes

[2] The Pre-school is on the first floor of this building, which is 1,200 sq. feet. The larger area reflects the size of the entire building to be audited

The Town of Hancock has appropriated $500 in its 2009 budget toward these audits. In addition, HEAT members are donating in-kind volunteer hours for project oversight.

7) Applicant Qualifications

The Town of Hancock has demonstrated the will and ability to take on an aggressive program of energy conservation and greenhouse gas reduction. Hancock has instituted many energy saving measures in its municipal buildings in the last several years, initiated by its Public Works Director, Kurt Grassett. Performance contracting with PSNH allowed Hancock to swap old, inefficient lighting and fixtures for more efficient ones. Compact fluorescent light bulbs have replaced incandescent ones wherever possible. In 2005, programmable thermostats were installed in both the

Highway and Town Office Buildings. In the same year, plastic coverings were placed on the outside of the first floor of the Town Meeting House windows. During the following heating season, passive solar doors replaced old ones on the Highway garage, and ceiling fans were installed in the Firehouse to circulate the rising hot air. All of these measures demonstrated energy savings as revealed by the town audit.

Although a small committee, HEAT is comprised of talented, dedicated people with pertinent knowledge and skills. Its members include two environmental educators, a "green" architect with 30 years experience designing energy-saving buildings, an engineer, an EPA employee, and a forward-thinking Public Works Director, whose accomplishments are elucidated above. Kurt Grassett, the Town of Hancock's Public Works Director, and other members of HEAT will supervise the audits. As Chair of HEAT, Nancy Gamble will assume primary responsibility for project oversight and administration of funds. Both Kurt's and Nancy's resumes are appended to this proposal (appendix V.) The energy audits, if funded, would allow HEAT to accomplish the next phase of a thoughtfully conceived and competently managed greenhouse gas reduction plan for the Town of Hancock.

APPENDICES

I. Cool Monadnock's Municipal Greenhouse Gas and Energy Use Baseline Report for Hancock, New Hampshire
II. Town of Hancock Energy Audit Report, 2001-2007
III. Estimates of Contracted Auditing Services
    - GDS Associates, Inc.
    - Energy Audits Unlimited, LLC
IV. E-mail communication, Kirk Stone of The Jordan Institute to Nancy Gamble, Chair, HEAT
V. Resumes

    - Kurt Grassett, Town of Hancock Public Works Director
    - Nancy Gamble, Chair, Hancock Energy Advisory Team