LETTERS OF COMMITMENT AND SUPPORT

TOWN OF
TEMPLE, NEW HAMPSHIRE
03084
OFFICE OF THE SELECTMEN

P.O. Box
Phone: 603-878-2536
FAX: 603-878-5067

Board of Selectmen

March 23, 2009

Mr. Jack Ruderman
Director, Sustainable Energy Division
Public Utilities Commission
21 S. Fruit Street, Suite 10
Concord, NH 03301-2429

Dear Mr. Ruderman:

As Chairman of the Board of Selectmen of the Town of Temple, I want to express the Board's complete support for the work of the Temple Economical Energy Committee, including its grant proposal that would fund the construction costs to reduce the energy use and the greenhouse gases emitted by our public buildings. We are proud of its work today and know that its town-wide program will help many families and improve the quality of our environment.

Sincerely,

John Kieley, Chairman

The New Hampshire Carbon Challenge™

Helping New England Households Meet the Challenge of Our Changing Climate

Jack Ruderman
Director, Sustainable Energy Division
Public Utilities Commission

March 19, 2009

Dear Jack,

It is my pleasure to write this letter in support of the Temple Energy Committee's application for GHGER funding.

The Temple Energy Committee has been a model of forward-thinking local action about climate change and energy issues. Their early, concise assessment of municipal energy consumption and compilation of findings in an Inventory Report (with implementation suggestions) is the example we hope to use across the state.

As part of their continuing work, Temple plans to expand their outreach to the community at large utilizing the NH Carbon Challenge. We look forward to the opportunity to assist the Temple Energy Committee in residential action and public engagement on energy reductions and climate change mitigation. Temple's example of prioritizing municipal energy measurement, evaluation and energy planning followed by community outreach is a message the NHCC wishes to spread across the region.

Regards,

Julia B. Dundorf
Co-Director

Phone: 603-862-3128
Cell: 603-978-2482
Email: julia@nhcc.unh.edu

OFFICE OF THE PRESIDENT

ANTIOCH UNIVERSITY
NEW ENGLAND

40 Avon Street
Keene, New Hampshire 03431-3516
603.357.3122 www.antiochne.edu

March 18, 2009

To the Public Utilities Commission:

Antioch New England Institute (ANEI) affirms its continuing support of the Temple Economical Energy Committee (TEEC) in their greenhouse gas emissions reduction program. ANEI has been a partner with Temple for over one year through our collaborative Cool Monadnock project. We are committed to sustaining our work with Temple throughout the course of this project as they achieve greenhouse gas emissions reductions and many of the same community building goals that are central to ANEI's mission.

Antioch New England Institute is a consulting and community outreach department Antioch University New England. Working with local, state and national government agencies, ANEI promotes a vibrant and sustainable environment, economy, and society by encouraging informed civic engagement. Our mission is to engage people in the process of creating environmentally healthy, culturally rich, and economically strong schools and communities through leadership training, environmental education, and applied research.

Antioch New England Institute plays a key role in Cool Monadnock project initiatives by providing access to the professional graduate student staff, office and conference space and equipment for project work, as well as professional and technical expertise in community building, outreach and environmental education. These resources will continue to be at the disposal of TEEC as they accomplish the various facets of their community-wide greenhouse gas emissions reduction program.

We commend TEEC and their program as a leading example of how civic engagement can result in environmental and economic sustainability at the community level. The program seeks not only to reduce greenhouse gas emissions through technological upgrades to municipal buildings and building weatherization, but also provides for local employment to accomplish these upgrades. It also contains valuable educational components for adults as well as elementary school students, engaging various generations in creating a culture of sustainability that will have far-reaching implications for a better future in New Hampshire.

The Temple Economic Energy Committee has been one of the most active and successful energy committees in the Monadnock region. They have already accomplished community education and outreach goals through participation at community events such as Harvest Festival and Town Meeting in Temple. They were also the first town to complete a baseline greenhouse gas emissions and energy use municipal assessment with the Cool Monadnock project.

Antioch New England Institute foresees the TEEC's greenhouse gas emissions reduction program as having positive impacts not only within the town of Temple, but also among neighboring communities and in any small town that sets out to build environmental sustainability along with community and civic engagement. Because of the consistency of this project with ANEI's goals and the demonstrated capability of TEEC to accomplish real work, ANEI fully endorses the TEEC proposal and commits itself to continued technical support of the Temple greenhouse gas emissions reduction program.

Sincerely,

David A. Caruso
President

COOL MONADNOCK

Supporting Local Energy Committees in Their Efforts to Save Energy Costs

March 19, 2009

Dear Greenhouse Gas Emissions Reduction Fund selection committee:

The Cool Monadnock project wishes to convey our highest recommendation and support for the Temple Economical Energy Committee's (TEEC) greenhouse gas emissions reduction program. The Cool Monadnock project is a joint initiative between Clean Air-Cool Planet, Antioch New England Institute and the Southwest Region Planning Commission with the goal of achieving significant greenhouse gas emissions reductions by providing technical support and education to Local Energy Committees. We have partnered with the TEEC since 2007, and we are committed to support TEEC throughout the implementation of their comprehensive municipal greenhouse gas reduction program.

While there are many energy program models for larger cities across the globe, small town models are only beginning to emerge through initiatives like the Cool Monadnock project. Every example of successful greenhouse gas emissions reduction achieved in towns like Temple will serve as a guidepost for citizens of similar municipalities. With 1500 residents, Temple is the same size or larger than 19 of the 34 towns served by Cool Monadnock. The municipal resources are representative of many towns across the region and the state of New Hampshire. Temple's energy committee also has unique qualities that recommend it for special and early support. TEEC members have already combined hundreds of hours of volunteer work with high levels of individual expertise, personal persistence, and research, to accomplish a wide range of goals toward reducing energy usage in the town government and among residents. Cool Monadnock is confident that an investment in the TEEC's program will be paid off with real, achieved greenhouse gas emissions reductions within the town, and with models for achieving the same goals across the region and the state.

Cool Monadnock will support TEEC's program by providing program evaluation and publicity for the accomplishments and models developed through TEEC's program. We will complete a follow-up assessment of municipal energy use that compares data to our previous baseline report and demonstrates reductions in emissions. We will publicize the accomplishments of all aspects of the TEEC program through the Cool Monadnock website, the Clean Air-Cool Planet Community Tool Kit, public events, and through media press releases. Cool Monadnock will continue to provide support to TEEC through our regular activities, including periodic regional informational meetings and trainings. The project will also continue to support TEEC by providing it with all of our newsletters, mailings and publications. Cool Monadnock will send a staff liaison to regular meetings of TEEC on a quarterly basis or as requested by TEEC, and will attend meetings between TEEC and municipal decision makers as requested by TEEC.

Sincerely,

James S Gruber
Antioch New England Institute
Co-Director, Cool Monadnock Project

Christa Koehler
Clean Air-Cool Planet
Co-Director, Cool Monadnock Project

The Congregational Church of Temple
Senator Tobey Highway (Route 45)
Temple, NH 03084
(603) 878-4177

Beverly Edwards, *Chair*
Temple Economical Energy Committee
Town of Temple
PO Box 191, 423 Rt. 45
Temple, NH 03084

March 20, 2009

Dear Beverley,

The Congregational Church of Temple welcomes the opportunity to support the *Temple Economical Energy Committee* its request for a grant from New Hampshire's Greenhouse Gas Emissions Reduction Fund.

From the very beginning, the Bible tells us to take care of the earth:

> *The Lord God took the man and put him in the Garden of Eden to work it and take care of it.*
> *(Genesis 2:15)*

Our Church has supported the work of the Temple Energy Committee in the past, and plans to continue its support in the future.

In particular, in the past, we have offered our Friendship Hall for the use of the Committee, without charge, and also provided a grant (from our Benevolent Committee) for energy education and weatherization activities.

Sincerely,

Rev. David E. Congdon

Rev. David Congdon
Pastor
Congregational Church of Temple

BUDGET DETAILS

NH PUC Greenhouse Gas Emissions Reduction Fund

REQUESTED AMOUNTS FOR TARGETED PROGRAM SIZE

Program Title:	**TEMPLE CLIMATE PROTECTION AND ENERGY REDUCTION INITIATIVE**							
Applicant Name:	**Temple Economical Energy Committee**							
	2009			2010				
USE OF FUNDS	Q3	Q4	Total CY09	Q1	Q2	Q3	Q4	Total CY10
EXPENSES								
Retrofit of Municipal Building	$293,500		$293,500					$0
Retrofit of Town Library	$34,600		$34,600					$0
Verification Fees	$2,000		$2,000					$0
Educational Outreach Program	$2,430		$2,430					$0
Recycling Program	$570		$570					$0
TOTAL EXPENSES	$333,100	$0	$333,100	$0	$0	$0	$0	$0
TOTAL USE OF FUNDS	$333,100	$0	$333,100	$0	$0	$0	$0	$0
				2010				
SOURCES OF FUNDS	Q3	Q4	Total CY09	Q1	Q2	Q3	Q4	Total CY10
Applicant Cash Contribution			$0					$0
Applicant In-kind Contribution*	$2,500	$2,500	$5,000	$2,500	$2,500			$5,000
Program Participant Contribution			$0					$0
Loans & Other Financing			$0					$0
Forward Capacity Market Payments			$0					$0
Other Grants			$0					$0
GHGER Fund (this proposal)			**$333,100**					**$0**
TOTAL SOURCES OF FUNDS	$2,500	$2,500	$338,100	$2,500	$2,500	$0	$0	$5,000
GHGER Funds as a % of TOTAL			99%					0%

* In-kind contribution calculated as 500 hours at $20/hour. See supporting material.

NH PUC Greenhouse Gas Emissions Reduction Fund					MINIMUM FEASIBLE PROGRAM SIZE				
Program Title:	**TEMPLE CLIMATE PROTECTION AND ENERGY REDUCTION INITIATIVE**								
Applicant Name:	**Temple Economical Energy Committee**								
					2010				
USE OF FUNDS	Q3	Q4	Total CY09		Q1	Q2	Q3	Q4	Total CY10
EXPENSES									
Retrofit of Municipal Building	$293,500		$293,500		$1	$2	$3	$4	$10
Retrofit of Town Library	$34,600		$34,600						$0
Verification Fees	$2,000		$2,000						$0
Educational Outreach Program	$2,430		$2,430						$0
Recycling Program	$570		$570						$0
TOTAL EXPENSES	$333,100	$0	$333,100		$1	$2	$3	$4	$10
TOTAL USE OF FUNDS	$333,100	$0	$333,100		$1	$2	$3	$4	$10
					2010				
SOURCES OF FUNDS	Q3	Q4	Total CY09		Q1	Q2	Q3	Q4	Total CY10
Applicant Cash Contribution			$0						$0
Applicant In-kind Contribution	$2,500	$2,500	$5,000		$2,500	$2,500			$5,000
Program Participant Contribution			$0						$0
Loans & Other Financing			$0						$0
Forward Capacity Market Payments			$0						$0
Other Grants			$0						$0
GHGER Fund (this proposal)			**$333,100**						**$0**
TOTAL SOURCES OF FUNDS	$2,500	$2,500	$338,100		$2,500	$2,500	$0	$0	$5,000
GHGER Funds as a % of TOTAL			99%						0%
Note: for General Overhead & Profit, please indicate to what extent any amounts are proposed to be contingent on program performance.									

NH PUC Greenhouse Gas Emissions Reduction Fund					MAXIMUM FEASIBLE PROGRAM SIZE				
Program Title:	**TEMPLE CLIMATE PROTECTION AND ENERGY REDUCTION INITIATIVE**								
Applicant Name:	**Temple Economical Energy Committee**								
					2010				
USE OF FUNDS	Q3	Q4	Total CY09		Q1	Q2	Q3	Q4	Total CY10
EXPENSES									
Retrofit of Municipal Building	$293,500		$293,500		$1	$2	$3	$4	$10
Retrofit of Town Library	$34,600		$34,600						$0
Verification Fees	$2,000		$2,000						$0
Educational Outreach Program	$10,000		$10,000						$0
Recycling Program	$570		$570						$0
TOTAL EXPENSES	$340,670	$0	$340,670		$1	$2	$3	$4	$10
TOTAL USE OF FUNDS	$340,670	$0	$340,670		$1	$2	$3	$4	$10
					2010				
SOURCES OF FUNDS	Q3	Q4	Total CY09		Q1	Q2	Q3	Q4	Total CY10
Applicant Cash Contribution			$0						$0
Applicant In-kind Contribution	$3,500	$3,500	$3,500		$3,500	$3,500			$7,000
Program Participant Contribution			$0						$0
Loans & Other Financing			$0						$0
Forward Capacity Market Payments			$0						$0
Other Grants			$0						$0
GHGER Fund (this proposal)			**$340,670**						**$0**
TOTAL SOURCES OF FUNDS	$3,500	$3,500	$344,170		$3,500	$3,500	$0	$0	$7,000
GHGER Funds as a % of TOTAL			99%						0%
Note: for General Overhead & Profit, please indicate to what extent any amounts are proposed to be contingent on program performance.									

NH PUC Greenhouse Gas Emissions Reduction Fund 2/23/09 RFP Proposed Budget Worksheet

DEFAULT VALUES FOR ESTIMATING GHG EMISSIONS REDUCTIONS BASED ON ENERGY SAVINGS

Program Title: **TEMPLE CLIMATE PROTECTION AND ENERGY REDUCTION INITIATIVE**

Applicant Name: **Temple Economical Energy Committee**

Method # 1, using MWH (Megawatt Hours), Cubic Feet (natural gas), & Gallons of fuel

Reductions from	Enter Reductions in Units shown in next	Units	CO_2 Emission Factors in lbs/unit	Estimated CO_2 Emission Reductions in pounds (lbs.)	Estimated CO_2 Emission Reductions in Metric Tons
Electricity	**266**	**MWH**	1,087	289,142	**131**
Distillate Fuel Oil (#2)	**10200**	**Gallons**	22.4	228,480	**104**
Propane	**1300**	**Gallons**	12.7	16,510	**7**
TOTAL					**242**

Fuel	Amount	Units	Conversion MBTU/Gal	Annual Energy MMBTU
Distillate Fuel Oil (#2)	**10,200**	**Gallons**	**139**	**1,418**
Propane	**1,300**	**Gallons**	**92**	**120**

Fuel	Amount	Units	Cost ($) / Unit	Annual Cost
Electricity	**266**	**MWH**	**$164**	**$43,624**
Distillate Fuel Oil (#2)	**10200**	**Gallons**	**$2.16**	**$22,032**
Propane	**1300**	**Gallons**	**$2.75**	**$3,575**
			Total	**$69,231**

Source: NH OEP Average Fuel Price Monitoring Program
Data from March 16, 2009

BUDGET DETAIL – EXPENSES

2009 Retrofitting Program

1. Retrofitting of Municipal Building/FD		$293,500
2. Retrofitting of Mansfield Library		$34,600
3. Fee for energy auditor meetings with contractor and verifications on retrofits.		$2,000.
	Sub total	$330,100

2009 Educational Outreach Program

1. Construction and management of web site		$180
2. Filming of retrofits		$200
3. Carbon Challenge project - $50 fee and supplies		$100
4. Computer for library		$1000
5. Harvest Festival Booth –kick off Carbon Challenge, plus supplies & printing signs		$400
6. Fee for Steve Whitman, auditor of Master Plan/Zoning Ordinance to participate in forum		$300
7. Printing and mailing for forum notice		$250
	Sub total $	2,430

Recycling Program

1. Recycling Clear Stream bins (2)		$40
2. Set of 20 bags for bins		$9
3. 10. Recycling containers		$30
4. Printing of materials, purchases of supplies for recycling club		$500
	Sub total	$570
	TOTAL	$333,100

BUDGET DETAIL - TEMPLE'S IN-KIND CONTRIBUTION

	Hours
Harvest Festival	48
Carbon Challenge	45
Planning at monthly meetings	110
Weatherization for low- income residents	95
Good Roads Day recycling program	24
Recycling Club for Elementary School	86
Forum for Public Discussion of audit for Temple's Master Plan/Ordinances	90

(involves 7 Planning board & 8 Energy Committee (TEEC) Members).

Total Volunteer Hrs. 500

The cash value of this in-kind labor was calculated as $10,000 at a nominal rate of $20 per hour.

SAVINGS DETAILS

SAVINGS DETAILS

The program will generate the following energy savings:

- Municipal Building/Fire Department Retrofit: 2,200 gallons of fuel oil per year replaced with 875 gallons of propane. Electricity consumption is reduced by 500 kWh/year.
- Library Retrofit: 3,313 gallons of propane reduced to 1150 gallons per year. Electricity consumption is reduced by 500 kWh/year.
- Residential energy use reduced by an estimated 265,000 kWh of electricity and from an estimated 206,000 gallons to 198,000 gallons of fuel oil per year (a reduction of about 8,000 gallons per year).

Overall, we expect to save 10,200 gallons of fuel oil, 1,300 gallons of propane, and 266 MWh of electricity. Projected energy savings are estimated as follows:

For the Municipal Building Complex, the energy audit estimated that total building heat load could be reduced from 154 MBTU/hr to 38 MBTU/hr, and also recommended changing from fuel oil to propane fuel (and a high-efficiency condensing propane boiler).

Current Fuel Oil Use (2005)	2,200 Gallons per Year
Equivalent Energy (at 139 MBTU/gal)	306 MMBTU/yr
Energy with conservation measures	76.5 MMBTU/yr
Expected Propane Use (at 92 MBTU/gal & 95% efficiency)	875 gallons per year

Electricity use is estimated to drop by 500 kWh/year based on reducing cooling load in the municipal offices by 50% for 100 days of summer, and a base 2 kW air conditioning load, 5 hours per day.

For the Temple Library, the energy audit estimated that total building heat load could be reduced from 55 MBTU/hr to 21 MBTU/hr. It also recommended changing the existing gas fireplace to a sealed unit with no pilot light.

Current Propane Use (2005)	3,313 Gallons per Year
Equivalent Energy (at 92 MBTU/gal, allowing 300 gallons/year for gas pilot)	277 MMBTU/yr
Energy with conservation measures	106 MMBTU/yr
Expected Propane Use (at 92 MBTU/gal)	1,150 gallons per year

Electricity use is estimated to drop by 500 kWh/year based on reducing cooling load in the library by 50% for 100 days of the year, and a base 2 kW air conditioning load, 5 hours per day.
(Air conditioning and has been used outside of the cooling season to control moisture. Addressing the moisture issue will eliminate this need).

For residential heating, we estimate a reduction in fuel oil use (the predominant heating fuel in the North East) of 20%, with a penetration of 20 percent in Temple's 500 residential homes. This is based on similar results obtained in Maine:
"Under the current weatherization program, MaineHousing works with the regional Community Action Agencies (CAPs) and oversees the weatherization of approximately 1,000 homes a year. Data on the weatherized homes have been collected for 30 years. These data show that each weatherized home has an average energy reduction of 20 percent. It is this reduction in fuel use, combined with the increased air quality, comfort, and durability of the home that makes weatherization such an effective tool to reduce the burden of high energy costs[1]."
Average fuel oil use is estimated at 750 gallons per year based on information from the U.S. Energy Information Administration[2]. We further estimate that 50% of households responding to our weatherization program heat with oil.

Average Oil Usage	750 Gallons
Fuel Usage Reduction	20%
Fuel Reduction per Home	150 Gallons
Program Penetration	20%
Percent of Homes using Oil	50%
Fuel Reduction, Total (550 homes)	8,250 Gallons

Total residential heating oil use in Temple, using the same methodology, is estimated at approximately 206,000 gallons per year. A further benefit of this program is that it will give and indication as to how we can increase penetration and performance to all Temple' houses.

For residential electricity consumption, we estimate a peak power reduction of 1 kW and an energy reduction of 5 kWh/day. This is based solely on lighting retrofits again with a 20% program penetration:

Present Lighting Energy	11 kWh/day
Energy Reduction	60%
Energy Reduction per home	6.6 kWh/day
Program Penetration	20%
Energy Reduction, Total (550 homes)	265 MWh/year

COST EFFECTIVENESS ANALYSIS

NH Greenhouse Gas Emissions Reduction Fund (GHGERF) 3/09 RFP Cost Effectiveness Analysis

This worksheet uses default Total Resource Cost (TRC) Test values to calculate Benefit-Cost Ratios for proposed programs.

Instructions: Enter relevant values in yellow highlighted cells. Then watch for results in green highlighted cells.

Line #	Assumptions		Name of Applicant or Proposal:	Town of T
1	Program Type		**Select** residential, commercial or industrial:	commer
2	Principal Type of Measures		**Select** type of program or measures:	He
3	Average Measure Life (weighted by CO2 savings)		**Enter** average life** of measures in group here:	20
4	Assumed Load Reduction Factor*		See **Note near bottom of page for more measure life info.	0.000643
5	Assumed Summer Annual Demand Coincidence*		See *Note below (right of lines 22-25) and FN 9 of the RFP.	0%
6	Nominal Annual Discount Rate			5.000%
7	Annual Inflation Rate			2.700%

	Program Costs			% of Total
8	Non-GHGER Funds (from applicant, participants and other sources)		$ 10,000	3%
9	GHGER Funds (amount requested in this proposal)		$ 333,100	97%
10	**Total Program Costs**	(sum lines 8 and 9)	$ 343,100	

Line #	***Estimated Annual Energy Savings (or increased Use as a negative #)***		**2010**
11	**Annual kWh Savings (kWh)**	*See *Note below right (@ lines 23-26)*	266,000
12	kW demand Savings-Summer Coincident	(line 11*line4*line5)	0.00
13	**Annual Natural Gas Savings (MMBTU)**		-
14	**Annual Propane Savings (MMBTU)**	Conversions from gallons and other	120
15	**Annual Heating Oil Savings (MMBTU)**	units to MMBTU are available at:	1,418
16	**Annual Kerosene Savings (MMBTU)**	www.think-energy.net/energy_units.htm	-
17	**Annual Coal Savings (MMBTU)**		-
18	**Annual Wood Savings (MMBTU)**		-
19	**Annual Water Savings (Gallons)**		-
20	**Net value of Operations & Maintenance Savings or (increased Costs) in $.**		-
21	Electric CO2 Savings (short tons)	((line 11*CO2/kWh)/2000, from GHG Reductions tab)	144.6
22	Other Fuel CO2 Savings (short tons)	((lines 13-17*CO2/mmBTU)/2000)	122.8

23	**Benefit/Cost Ratio for Full Program Costs, reg. TRC**	(line 43 / line 10)	**2.26**
24	**B/C ratio with GHGER Fund Costs only, reg. TRC**	(line 43 / line 9)	**2.33**
25	**B/C ratio, Full Progam Cost, $60/ton CO2 value**	(line 46 / line 10)	**2.74**
26	**B/C ratio, GHGERF share only, $60/ton CO2 value**	(line 46 / line 9)	**2.82**

COST ESTIMATES

[Company Name Removed]

Town of Temple
Energy & Weatherization Improvements
For Municipal Buildings

March 20, 2009

We are pleased to submit the following proposal for use in preparing a Budget Estimate for the scope of work as listed below. We used the following information in preparing this proposal:

- The Energy Performance Assessment Report as prepared by Margaret Dillon of Sustainable Energy Education Demonstration Services
- Information obtained from our site visit and meeting
- Information from past projects of similar scope

Please note that this proposal is for budget informational purposes only.
The Item numbers listed coincide with our "Scope of Work" outlines (dated 3/6/09)

Item #1

- Air Sealing
- Install Icynene Spray Foam at the soffits of the Fire Station Wing to the inside of the exterior walls

Item #1 - Opinion of Probable Cost is $4,295.00

Item #2 (Enlarge Gable End Vents) is combined with Items #7 – 9 listed below

Item #3

- Complete Air Sealing of Existing Penetrations with Spray Foam
- Install 8" of Blown-in Cellulose Insulation on top of the existing blown in fiberglass and over the Entire "Fire Station Wing" – this includes the addition where the Antique Engines are located.

Item #3 - Opinion of Probable Cost is $10,850.00

Item #4 - This scope was eliminated

This scope was eliminated per phone conversation with Bev Edwards on 3/20/09

Items #5 & #6

Selective Demolition of the 2nd Floor of the Office Wing including the Meeting Room of the Fire Station in order to expose the roof rafters to install Icynene Spray Foam Insulation. This includes the following:

- Removal / storage/replacing furnishings,
- Removal of temporary wall partitions
- Removal of drywall and all fiberglass insulation at sloped ceilings, gable ends, and knee-walls
- Installing Icynene Spray Foam at sloped ceiling (should result in a R Value of 27-28)
- Install 2" Rigid Insulation Board over Icynene – (resulting in a R Value of 41-42 for the new assembly)
- Install 1x3 Strapping over rigid insulation
- New 5/8" Drywall
- Paint and Electrical Allowances (allowances at 5,000 and 3,500 respectively)

Items #5 & 6 –Opinion of Probable Cost is $71,350.00

OPTIONAL SCOPE FOR ITEMS #5 & #6 (6-A)

Similar Scope with the exception of using DensPak Cellulose Insulation on the underside of the existing roof deck, Air Sealing existing penetrations, and installing 4" Rigid Foam Insulation board (4" of foam insulation with a 7/16" OSB plywood nailing board)
**This option would require installation of Item #14 -the new roof shingles – which is NOT including in Opinion of Probable Cost for this scope.*

Optional Items #5 & 6- Opinion of Probable Cost is $62,566.00.

Revised Scope for Items #5 & 6 (6-B)
Per Phone Conversation with Bev Edwards on 3/20/09)
Eliminate all work associated with the interior demolition, insulation, finishes, electrical etc.

Revised Scope:

- *Remove existing fascia roof trim*
- *Install (3) 2x4 roof edge blocking*
- *Install 4" Rigid Insulation Nailing Board*
- *Install New 1x Roof Fascia board*

**See Item #14 for new asphalt roof shingle proposal*

Revised Item #6-B Opinion of Probable Cost is $21,384.00

Items #2 and # 7 thru #9

Install 2" Rigid Insulation Board and 1x3 strapping on all exterior walls. This scope includes replacing existing siding, windows, exterior entrance doors and 4 of the Overhead Doors and associated trim (the 2 smaller doors on the added bay appear to be new and we are under the impression that will meet the energy efficiency requirements).
This also includes modifying the existing openings in order to accommodate the added depth of the exterior wall assembly. If it is decided that the insulation board is not to be done, we can supply separate proposals for window and door replacement.

Items #2,& 7-9 Opinion of Probable Cost is $196,250.00

Items #10-#13

- Replace existing Boiler with a Boderus GB142-60 Propone Fired Boiler, utilizing existing piping and heating units
- New Circulator
- (2) Programmable Thermostats
- New Zone Componenets
- New Circulator
- New Outdoor Reset Control
- New 1,000 gallon buried propane tank (some of the cost for the tank may be negotiated with the Town's propane supplier)
- Install Pipe Insulation in Boiler Room (by allowance of 1,000.)
- Install Humidistat in Bathroom (by allowance of 1,000.)

Items #10-#13 - Opinion of Probable Cost is $28,760.00

Item #14

Replace existing roof shingles with new architectural grade asphalt shingles (includes stripping existing shingles)

Item #14 – Opinion of Probable Cost is $31,875.00

[Company Name Removed]

Town of Temple
Energy & Weatherization Improvements
For the Town Library

March 13, 2009

We are please to submit the following proposal for your use in preparing a Budget Estimate for the scope of work as listed below. We used the following information in preparing this proposal:

- The Energy Performance Assessment Report as prepared by Margaret Dillon of Sustainable Energy Education Demonstration Services
- Information obtained from our site visit and meeting
- Information from past projects of similar scope

Please note that this proposal is for budget informational purposes only.

The Item numbers listed below coincide with our "Scope of Work" document (dated 3/6/09)

Library Item #1 – Crawlspace

- Seal off dirt floor with Stego Wrap Vapor Barrier
- Spray Foam foundation walls, plates and rim joist with 2" of Icynene Spray Foam
- Air Sealing at wall penetrations
- Create a larger access opening into the crawlspace for work

*Please note that another option would be to install 6" of Icynene Spray Foam at the Rim board and between the floor joists. This could be done for the same cost as for the scope described above.

Library Item #1 – Opinion of Probable Cost is $8,622.00

Library Item #2- Fireplace

- Install a new fireplace gas insert unit with electronic ignition (the cost for the unit was supplied to us by Bev)

Library Item #2 – Opinion of Probable Cost is $7,026.00

Library Item #3 – Windows and Doors

- Replace 7ea Double Hung Windows with new high performance units

- Air Seal Openings
- Install Weather-stripping at exterior doors
- Remove interior casing at exterior door locations and air seal openings with spray foam and re-install casing

Library Item #3 – Opinion of Probable Cost is $11,998.00

Library Item #4 - Ductwork

- Install Duct Insulation on existing duct
- Please note that this is strictly an allowance figure

Library Item #4 –Allowance of $5,000.00

Library Item #5 - Attic

- Air Seal Existing Attic Space
- Install an additional 12" Blown in cellulose insulation
- Insulate / Seal Attic Hatch

Library Item #5 – Opinion of Probable Cost is $7,767.00

Library Items #7 (#6 was omitted) - Exterior Brick Walls

Per phone conversation with and with input form a spray foam insulating vendor who had also visited the site on a separate occasion, we have proposed to install liquid based minimal expanding foam to fill the exterior wall cavity between finished interior wall and the brick. At our site visit we tested one location and found the cavity to be approximately ¾" in depth. (More test holes would be needed to verify wall cavity depths). The liquid foam would be injected into the walls from the interior through small holes that would be patched when completed.
Although the total R-Value gained may not be substantial, it is sure to have a significant impact on the Air Sealing of the current exterior wall assembly. This process would also have the least impact of the daily operations of the Library.
The other option would require the removal of existing woodwork, bookshelves and books, remove existing exterior wall finish and furring, frame a new 2x4 perimeter walls and install spray foam insulation. Electrical will need to be reworked. Provide new gypsum wall board finish, modify openings for added wall depth, paint, and reinstall trim and bookshelves.

Library Item #7 (Liquid Foam Method) – Opinion of Probable Cost is $8,051.00

Library Item #7 (2x4 Wall Method) – Opinion of Probable Cost is $41,754.00

Library Item #8 – Will be addressed in Item #7 above

Library Item #9- Replace existing water heater with tank-less type unit

Library Item #9 – Opinion of Probable Cost is $

Library Item #10 – Install Electronic Programmable Thermostats

Library Item #10 – Opinion of Probable Cost is $

Library Item #11- Partial Roof Replacement

- Strip and replace shingles on the East and South Facing Roofs

Library Item #114 – Opinion of Probable Cost is $6,342.00

EXECUTIVE REPORT OF MUNICIPAL COMPLEX AUDIT

BUILDING STRATEGIES FOR AN AFFORDABLE FUTURE
S.E.E.D.S.
SUSTAINABLE ENERGY EDUCATION DEMONSTRATION SERVICES
Margaret B. Dillon • Jaffrey NH • 603.532.8979 • mdillon@wildblue.net

Temple Town Offices and Fire Station
Energy Performance Assessment

Executive Summary

Please refer to the Power Point Presentation for Discussion and Visual Images
In addition, this summary is intended to compliment, rather than duplicate, the draft report of Dr. Rob Wills in April of 2008 and to offer specific building recommendations to the overview of town energy use offered by Cool Monadnock. While some opinions may respectfully diverge at specific points, these three efforts provide a collaboration of individual efforts and a package which is greater than the sum of the three parts.

I. Goals of an Energy Assessment

1. Define and assess the envelope thorough blower door testing, thermography, and physical inspection.
2. Identify opportunities to improve the performance of the envelope.
3. Evaluate existing heating and ventilation equipment and recommend upgrades where appropriate.
4. Address other specific concerns or questions of the building owners

II. Blower Door Results

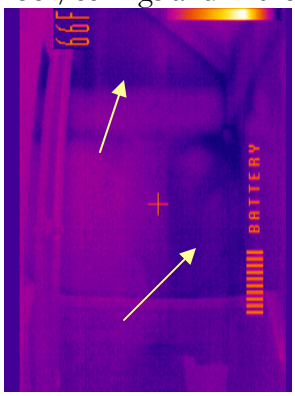
1. Three separate blower tests were conducted: The offices and meeting room; garage bays; and the whole building. None of the tests were able to achieve a depressurization to the standard of -50pascals with respect to outside which means that there is a lot of uncontrolled air leakage and subsequent winter heat loss and summer heat and humidity gain. Calculated whole building infiltration was 14,364 cfm50 or 15ach50. That means that the air in the building changes over one time every hour in the winter time.

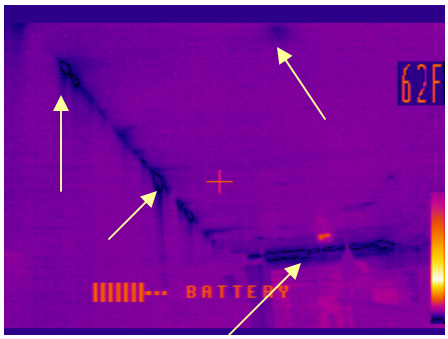
2. Areas of air leakage are distributed throughout the building – around windows, doors, and other wall penetrations. The most significant leakage came from the ceiling planes, crawlspace and attic storage, and the garage bay doors.

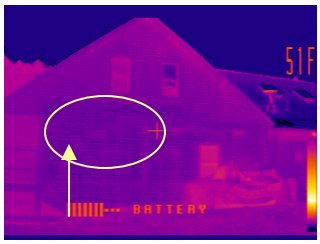
III. 'Thermography Under Pressure' Results

1. A full thermographic scan was conducted. The IR images appear next to regular photos in the power point presentation. Most wall cavities appear to be insulated – presumably with 2x4 fg batts. IR under pressure shows substantial air leakage near the top plates, particularly in the fire station bay walls. This is not uncommon when there is not a continuous air barrier at the top plate nor between insulation and soffit vents.

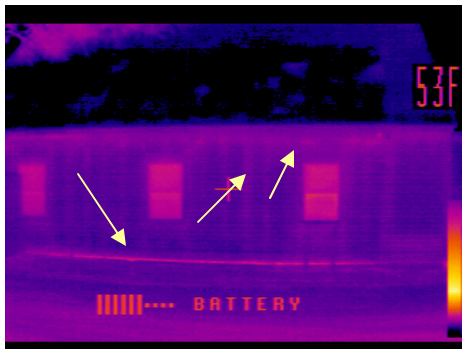
2. There are a number of cavities void of insulation, most especially in the sloped roof/ceilings and in the walls and ceilings of both office stairwells.







3. Foundation wall heat loss is evident around the fire station building, especially on the western corner of the bays near a door which has been sealed off and around the slab of the office building, especially at a gap between the perimeter rigid foam and the siding.



Also note, on the above exterior images, the heat loss along the soffit(s) and thorough thermal bridging of top plates and vertical wall studs.

IV. Envelope Components and Estimated Btu/hr Load – 154K Btu/hr

In order from greatest heat transfer to least:

Convective Losses

#1 – Air Infiltration – 68K Btu/hr - based on 15ACH50

Conductive Losses (based on estimated R Value, measured surface area, and a 66 degree temperature difference between inside and outside)

#2 – Garage Doors – 44K Btu/hr – based on ASSUMPTION of R2-3
#3 – Walls – 20K Btu/hr – based on estimated effective R7
#4 – Fire Station Bay ceilings – 8K Btu/hr - estimated effective R25
#5 – Slopes and Storage Attic – 5K Btu/hr – very approx as insulation varies
#6 – Windows – 4K Btu/hr – based on estimated R2.1
#7 – Office Flat Ceiling – 3K Btu/hr – estimated effective R25
#8 – Exposed Foundations – 2K Btu/hr R10 with gap of R0

Air Infiltration could account for between 400 and 600 gallons of the 1700 gallons used annually for space heating. While it represents the greatest single opportunity, air leaks exist throughout all the components, but mostly thorough ceilings, attics, and garage doors. So while #5 Slopes and Attics lose a relatively small amount of energy because of their

relative small surface area, air sealing them at least will have a far greater impact to reducing demand.

V. Recommendations for Improving the Envelope

PHASE I – Reduce oil consumption and carbon emissions between 50-60% to a Building Heat Peak Load of 63,000K and improve comfort in both summer and winter.

1. Air Seal attic over garage bays and access area over historic fire engine. For greatest impact, seal off any soffits and use spray foam to assure continuous air and thermal barriers over top plate. Enlarge gable vents and add ridge vent during re-roofing.

2. Add a minimum of 8-10" blown cellulose on top of white fiberglass for effective R Value of 60.

3. Create an effective air barrier on all slopes and flats of a well defined and continuous thermal envelope barrier. The PP presentation attempts to describe what makes a high performing envelope and how to achieve it. It would be nearly impossible to describe in detail how to accomplish that on paper, given the ambivalence of the existing ceiling envelope. Use foam insulation or rigid products to establish the air barrier, then remove all fiberglass in the slopes and add dense pack cellulose. On the vertical 2x4 wall outside the meeting room, install rigid foam as an air barrier and added R-Value. Do the same for the walls of the 2nd floor office space. Seal ALL penetrations. Seek to create minimum effective R-40 to R 60. Do not use fiberglass in any form.

Also, or but, if you follow the suggestion of Rob Wills and basically gut the 2nd floor finished space, then I think it would be advantageous to define the envelope at the roof, spray foam the interior rafter cavities and use 2-4" rigid foam exterior to the decking prior to re-roofing. This would create an unvented but cold roof and allow for the highest performance as well as the greatest flexibility for useable and conditioned storage space. A clear boundary between the garage bay attic and the rest of the building would need to be established.

4. IF my assumption that the Garage Doors are less than an effective R3, then I recommend replacing all doors with R10 Thermacore units with maximum air sealing.

Phase II – Reduce energy consumption an additional 50% for a Building Peak Heat Load of 38,000K..

5. Remove siding and increase effective wall insulation levels to R23, - foam seal to existing perimeter foam, and install new siding on vertical firring strips creating a vented drainage plane.

6. Replace all windows and exterior entrance doors to High Performance R-4 window units.

VI. Heating and Ventilation

1. Boiler for office is an old, 355MBU, Weil-McClain. Most recent combustion analysis recorded stated its operating at 83.5% efficiency. New oil boilers can have up to 88% efficiency and propane, sealed combustion and condensing boilers can have efficiencies up to 98%. Note that oil has approximately 135-140,000 Btu's per gallon while propane has only 91,000 Btu/gallon. Propane emits less than half the carbon and sealed combustion is a far safer and healthier for the indoor environment.

Boiler replacement would be best considered following Item 4 of Envelope Upgrades. If Phase II is planned, then select a modulating boiler so that the boiler will not be oversized by further upgrades.

An alternate heating system such as Hallowell's air to air heat pump, at an efficiency of 240-280% is worth consideration at that time!

2. Distribution losses from uninsulated pipes has not been calculated as all or most of the pipes are in conditioned space. However, the boiler room has a hole in the wall for combustion make up air, so insulating the pipes in that room should reduce amount of heat loss to that outdoors and improve comfort.

3. In concurrence with Rob Wills' report, I recommend replacing thermostats with electronic and programmable units.

4. Bathroom exhaust fan should be put on a humidistat to operate whenever humidity levels warrant.

5. Following Item 3 above, Install an HRV for the office area. Again, installing ducts for ventilation, or distribution of heat and coolth, in an insulated attic is easier and less expensive to operate than installing in an unconditioned attic area.

VII. Other Concerns

1. A primary concern involved the question of whether to add insulation under the roof slated for replacement or to maintain a vented attic. This issue has been discussed in the power point presentation.
2. The structural integrity of the building surfaced as a question during the presentation. I am not a structural engineer so cannot offer a professional opinion. My personal opinion is that the building(s) represent fairly standard construction practices – neither high nor low end. Design limitations include 2x4 walls in the offices which limit cavity depth for insulation.
   However, if the size of the building can be expected to meet town needs over the next 10-15 years, it would seem to me that the building is worth upgrading for Town use or even eventual sale. Generally speaking from a 'green perspective', retrofitting existing buildings to far higher performance standards is the best practice.
3. Combustion safety – Boiler is mentioned above. The other issue is in the station bays from vehicle combustion and the gas stove.

MANSFIELD LIBRARY
SUMMARY

MANSFIELD LIBRARY SUMMARY

Blower Door Test Results
The standard blower door test is to draw enough air thorough the fan to depressurize a building to -50pascals. At that point, the pressure and flow gauge will display how many cubic feet of air per minute are being pulled from all the cracks and gaps in the envelope thorough the fan. This number is recorded as the CFM50 number.

The Library achieved -50pa with one blower door fan by pulling 3735 cubic feet of air per minute (**3735CFM50**). That means that when depressurized to -50pascals with respect to outside, (which is similar to a 20mph wind on all sides of the building at once) 3735 cubic feet of air per minute would be pulled from all the air gaps and leaks in the envelope. Therefore, at 3735CFM50, and based on calculations of the volume of the Library, the air exchange rate at -50pa is 15.65 (**15.65ACH50**), which is considered very leaky but not uncommon for an older building.

In other words, a total air change of almost 16 times an hour – OR, estimated under normal conditions – the air in the Library exchanges over an **annual average of .74 air changes/hour**. The estimated average air exchange under natural winter conditions is **1.09ACHnat** or over one full air exchange per hour. This indicates very high heat losses due to uncontrolled air infiltration.

By comparison, a building designed and constructed to today high performance standards would likely test under 400 CFM50 and 1.25ACH50
The estimated total leakage area is **202 square inches** – that is the cumulative size that the hole would be if you added up all the small cracks and gaps.
Based on that information, air leakage could account for up to 35-40% of the heating bill.
The IR images in later slides depict air leakage as ‘wind-washing’. The areas which contributed the most to the 3735CFM are:

1. The older windows and doors
2. The chimney
3. New windows and doors
4. Ducts and wall outlets
5. Building “seams” – between additions; walls and roofs and between slab/crawlspace and floors

Summary of Existing Envelope
Window glazing occupy a relatively small proportion of envelope surface area, and yet because of direct air infiltration, have a more significant impact on the envelope performance. Bringing the basement into the envelope will not be inexpensive, but is described as a relatively important element because the basement air is so closely connected with the conditioned space and, more importantly for energy conservation, the boiler and equipment are all in the basement. Air sealing and insulating will reduce distribution losses and help manage moisture. All doors would benefit from weather-stripping.

The uninsulated brick walls are by far the largest source of conductive heat loss (over 18,000 Btu/hr) – even beyond that of overall convective losses through air infiltration. (under 13,000 Btu/hr). Then uninsulated crawl space/floor (approx 6,000 Btu/hr) closely followed by old windows (>5,000 Btu/hr). Air sealing old windows reduces air infiltration losses – not conductive losses in the latter figure.

Ceilings are under insulated, and the relatively easiest to address, though there is so much more wall surface area, that the relative reduction in fuel use in upgrading ceilings is disappointing. Still worth doing! But pale in comparison to walls and air infiltration.

Recommended Improvement Steps

1. Crawlspace

The crawlspace is well connected to both the outside and inside conditioned space through the floor and rim joists/walls and is a significant source of heat loss, air infiltration and moisture. Sealing this area from the outside or the conditioned library space is strongly recommended to reduce heat loss, improve comfort, air quality, as well as establish a drier environment for the books.
The preferred strategy is to seal off the dirt floor with a rat slab or layer of polyethylene which is sealed to the walls and then spray a minimum of 2” closed cell urethane foam on the foundation walls, sill plate and on rim joists and floor decking joint. Air seal and insulation all window penetrations or access. This will effectively bring the crawlspace “into” the envelope thereby reducing the influence of cold air in the winter and moist air in the summer – thereby reducing heat loss and the practice of turning on the AC for its drying effect.
Because of its impact on air quality, this is the number one recommendation.

2. The Fireplace

According to the folks at Fireplace Village in P’Boro – one could expect a standing pilot to consume 300 gallons of propane or gas in a year. In addition, the damper needs to be left open – and the chimney was the single greatest source of air infiltration during the blower door test. Gas warmed air literally rises out all the time and far more when the fire is lit…and in doing so, draws even more cold air in from the old windows. For these reasons, the number one recommendation is to install a direct vented, sealed combustion,

fireplace insert or even gas stove with glass front. Further, I recommend considering an electronic ignition. There are pros and cons – the pilot allows for back up heat during a power shortage, though one can install a battery back up for electronic starters – but the pilot also reduces condensation in the line. The electronic starter is easier to deal with – but more complicated and costly to install. BUT, it won't use 300 gallons of propane every year just waiting to be turned on. Whatever the device, while the fireplace is a highly valued amenity in the library, open fires and chimneys waste tremendous amount of energy. A sealed unit with glass door will create far more comfort and better air quality for far less fuel because of its own efficiency and because it won't be drawing in cold air. And when not in use, will not be leaking warmed air outside.

3. Windows and Doors

Large amounts of air infiltrate around window sashes, trim, and pulley runs. One option is to replace all storms with Harvey Storms and do extensive retrofit and caulking to existing frames. Good air sealing and a more effective second window pane will improve the performance of these windows a lot. At some point – perhaps after insulating the brick walls which is by far the largest source of conductive losses, it would make sense to replace the 7 windows with very high performing windows. Window technology is advancing rapidly – with R10 units now on the market. Expensive, but effectively reducing the energy 'penalty' which has come with the desire for light, fresh air, and views.

4. Attic and Ducts

While labor intensive, air sealing and adding insulation to the ducts in the attic, will be a measurable improvement.. Air sealing the ceiling – most especially the 'seams' between building additions and light fixtures – and adding additional cellulose on top and burying ducts – will also reduce conductive heat losses. Perhaps of equal value would be to bring the wall duct runs into the building envelope! Either along the wall, or at the ceiling. This will also allow to fill those wall cavity voids with dense pack cellulose.

5. Brick Walls

Listed as #5 because of cost, but if willing to insulate from outside, this would become #1 and incorporate all other strategies!

As mentioned elsewhere, the uninsulated brick walls represent the single largest heat loss component of the envelope in large part due to the fact that they represent the largest surface area. One of the challenges in insulating brick walls is due to the large amounts of water than can move through them. Unless constructed with a air gap/drainage plane in the middle, moisture needs to be able to dry to the interior. Walls can be insulated on the inside to a limited degree and with the proper material. If palatable, however, the most effective way to insulate a masonry wall is from the outside. Applying 2-3" of rigid XPS foam directly to the bricks, then re- siding – even with a brick veneer – establishes an effective air, moisture and thermal barrier separate from the structural function of the

brick. Adding to the expense are jamb extensions and trim for windows ect – but this may be the best *Energy* Strategy for the Library. Reinstalling windows and other trim details would also best reduce air infiltration. Foam could also be installed below grade as a preferred way to insulate and seal the crawl space.

MUNICIPAL INVENTORY REPORT

COOL MONADNOCK

Municipal Greenhouse Gas and Energy Use Baseline Report for Temple

This report is a summary of greenhouse gas emissions and energy use for the town of Temple, NH for the year 2005. The focus of this report is the municipal operations of the town, with special emphasis on town-owned buildings. It does not encompass residential, commercial, or industrial energy use. It has been prepared by the Cool Monadnock Project,[1] a collaborative project of Clean Air-Cool Planet, Antioch New England Institute, and the Southwest Regional Planning Commission. Data was gathered through the volunteer efforts of the Cool Monadnock Town Representative and analyzed by the Cool Monadnock team, using EPA Portfolio Manager software and Clean Air and Climate Protection software provided by ICLEI.[2]

Cool Monadnock Town Representative: Beverly Edwards.
Town Representative phone/e-mail: 603-878-3227/nadesha@msn.com.
This report was prepared by Kenold Moreau & Sarah Harpster.

Municipal overview

Town population: 1,554 (U.S. Census Bureau, 2006)
Area of Municipality: 22.5 sq. mi.
Population Density: 69.8/sq. mi.
Number of municipal buildings: 4.
Total area of municipal building space: 10,108 sq. ft.
Average energy intensity of all municipal buildings: 43 kBtu/sq. ft.
Number of street lights: 1 (library, town hall parking lot)
Number of vehicles in fleet: 13
Number of municipal employees: 10
Total cost of municipal energy use in 2005: $31,991
Total municipal energy use in 2005: 2,163 MMBtu
Total municipal CO_2 emissions in 2005: 159 tons

[1] www.coolmonadnock.org.
[2] For more information on EPA Portfolio Manager Software, see www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager. Information on CACP software is at www.cacpsoftware.org.

Municipal Sector Analysis

For each participating municipality, data was gathered on the operations of several sectors under the jurisdiction of the municipal government: the buildings, vehicle fleet, employee travel (how much municipal employees travel to work and other travel for municipal business), street lights, water and sewage, and waste. Different types of energy use were considered depending on the sectors, such as electricity use, heating fuel use, fuel for vehicles, and tons of waste. Where records were available, the costs of purchasing these energy sources were factored in to the analysis. The ICLEI software was used for the analysis of the aggregate data on all municipal sectors.

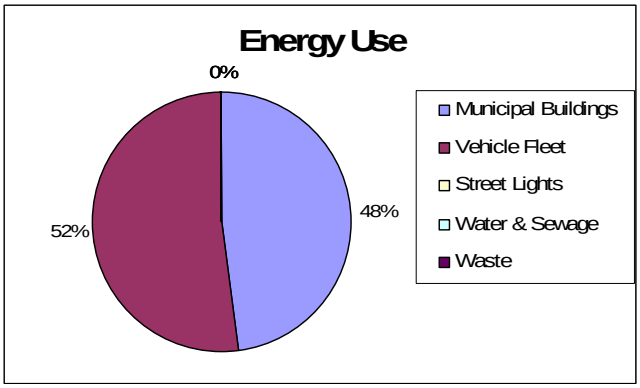
Table 1. Energy use, equivalent carbon emissions[3], and costs, by municipal sector

Municipal Sector	Energy Use (MMBtu)[4]	Energy Use (%)	Equiva-lent CO_2 (tons)	Equiva-lent CO_2 (%)	Energy Cost (US$)	Energy Cost %
Municipal Buildings	1,033	48	59	37	13,046	41
Vehicle Fleet	1,129	52	98	62	18,219	57
Street Lights	1	0	0	0	96	0
Water & Sewage	0	0	0	0	0	0
Waste	0	0	2	1	630	2
Total	**2,163**	**100**	**159**	**100**	**31,991**	**100**

Source: Cool Monadnock inventory, 2008
Generated by CACP Software

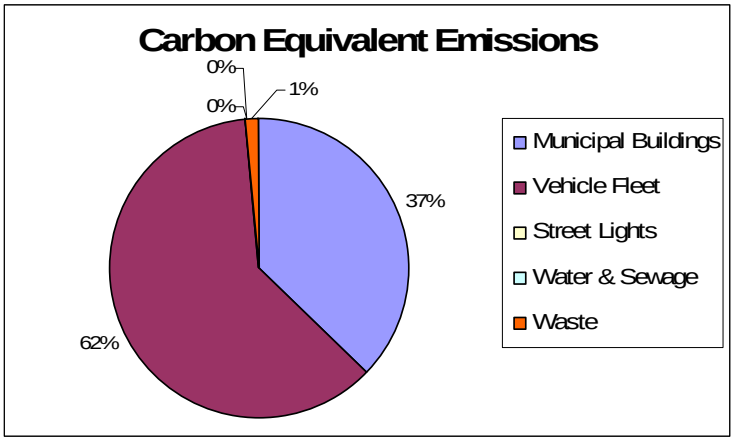
Snapshot of 2005 Municipal Energy Use, Emissions, and Costs by Sector

Graph 1a. Municipal Energy Use (MMBtu)

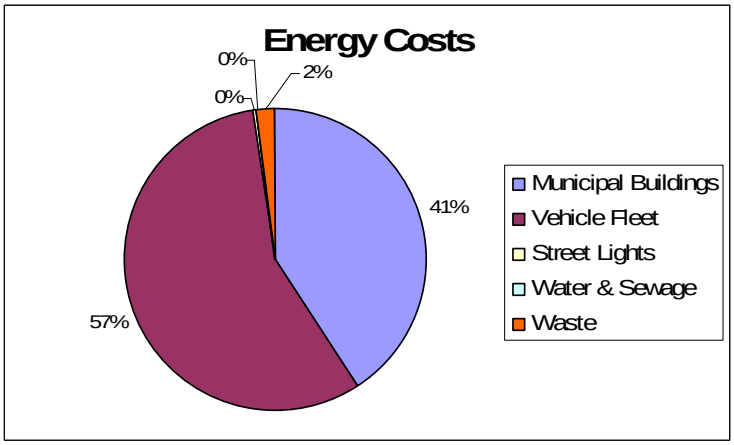


[3] According to the Clean Air and Climate Protection software, "Equivalent CO2 (eCO2) is a common unit that allows emissions of greenhouse gases of different strengths to be added together. For carbon dioxide itself, emissions in tons of CO2 and tons of eCO2 are the same thing, whereas for nitrous oxide, an example of a stronger greenhouse gas, one ton of emissions is equal to 310 tons eCO2."
[4] The Clean Air and Climate Protection software presents energy use in MMBtus, which is one million British Thermal Units, a common measure of energy consumption (see www.energyvortex.com/energydictionary/british_thermal_unit_(btu)_mbtu_mmbtu.html).

Graph 1b. Municipal Carbon Equivalent Emissions (tons)



Graph 1c. Energy Costs by Municipal Sector ($)



The three graphs illustrate the fact that the vehicle sector is the most significant sector in Temple in terms of energy use and energy cost, and especially in terms of carbon equivalent emissions. The vehicle sector comprised 52% of energy use and 57% of energy costs, but a full 62% of emissions. The building sector is the only other significant energy sector in Temple, using 48% of the energy and comprising 41% of the energy costs, as well as contributing 37% of the carbon equivalent emissions. While the waste sector does not generally contribute to energy use in towns, it did register as 1% of the town's emissions and 2% of its energy costs. In Temple, the town's four buildings and thirteen vehicles offer the greatest opportunities for energy savings. The Cool Monadnock project performed specific analysis on municipal buildings that is outlined in the following section. This information should be helpful in identifying which buildings within the building sector present the greatest opportunities for savings.

Building Performance: Energy Use, Emissions, Costs

Data was gathered for each individual building managed by the municipality. The following table combines data from EPA Portfolio Manager software (energy intensity, CO2 emissions) and CACP software (energy use). Data on costs were entered into the

Portfolio Manager software. Graphs below illustrate the relative intensity of energy use and their costs among the buildings under the municipal jurisdiction.

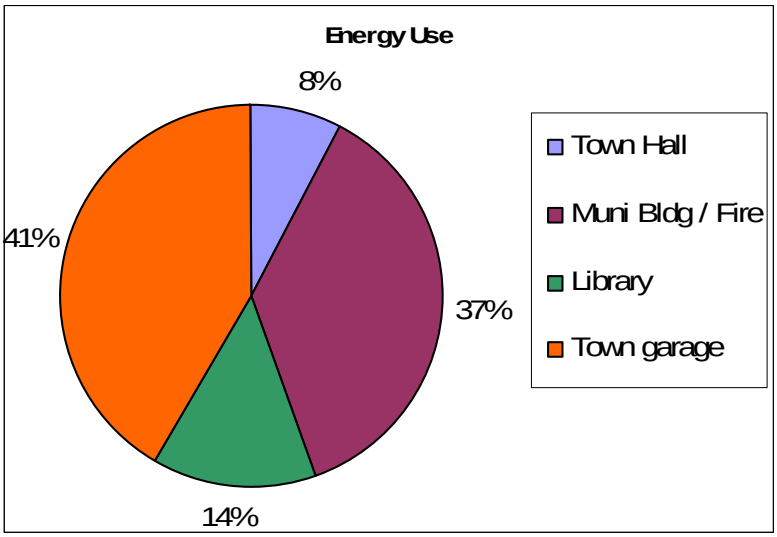
Table 2. Carbon emissions, energy use, and costs, by municipal building

Name of Building	Energy Use (MMBtu)	Energy %	CO2 emissions (tons)[5]	CO2 %	Energy Cost (US$)	Energy Cost %
Town Hall	80	8	8	15	2,058	16
Muni Bldg - Fire	379	37	30	58	6,898	52
Library	143	14	11	21	3,215	25
Town garage	430	41	3	6	876	7
Total	**1032**	**100**	**52**	**100**	**13,047**	**100**

Source: Cool Monadnock inventory, 2008
Carbon data generated by EPA Portfolio Manager Program; energy use generated by CACP software

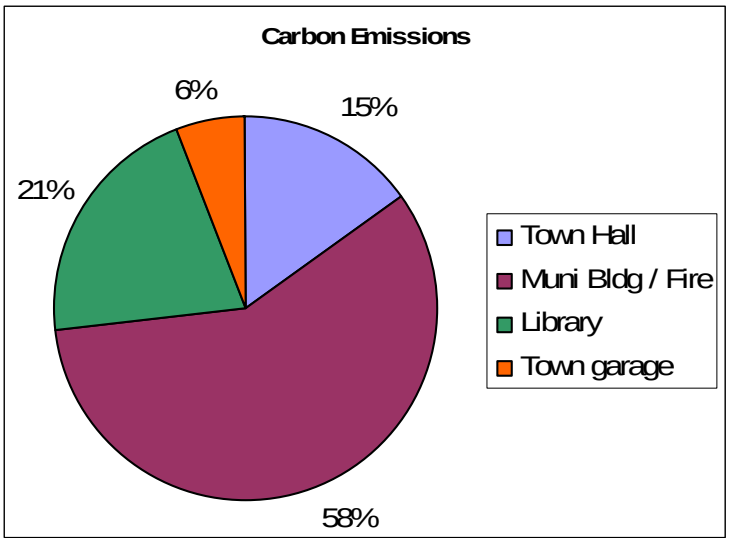
Snapshot of 2005 Energy Use, Emissions, and Costs, by Building

Graph 2a. Energy Use by Building (MMBtu)

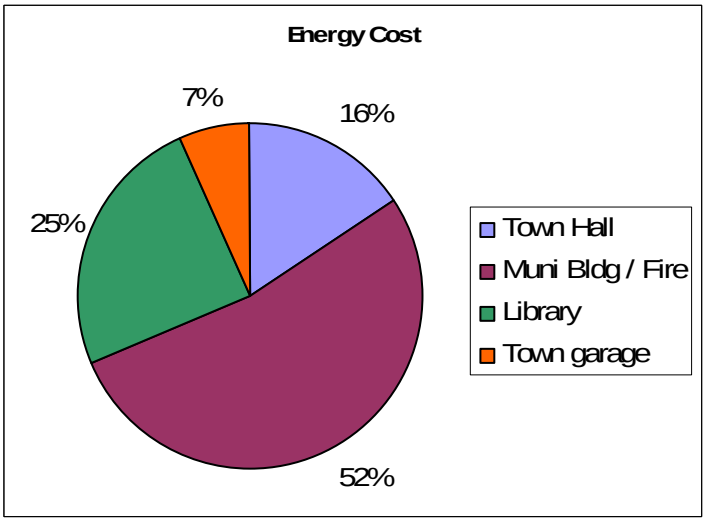


Graph 2b. Carbon Dioxide Emissions by Building (tons)

[5] Carbon emissions on the EPA Portfolio Manager software are measured as carbon dioxide emissions only and do not include equivalents for other types of greenhouse gas emissions.



Graph 2c. Energy Costs by Building ($)



Graph 2a illustrates that two buildings – the highway department garage and the municipal building/fire department – used the most energy at 41% and 37% respectively. The library and town hall used less energy at 14% and 8% respectively. However, the town garage appears to have had very low carbon emissions relative to the amount of energy used, as it only accounts for 6% of carbon emissions (and 7% of the energy costs) despite occupying 41% of the energy use. The municipal building/fire department, on the other hand, accounted for a full 58% of the carbon emissions and 52% of the energy costs despite occupying only 37% of the energy use. The library, with 14% of the energy use, occupied 21% of the carbon emissions and 25% of the energy costs. The town hall, with the relatively small 8% of energy use, accounted for 15% of carbon emissions and 16% of costs. The library, town hall, and fire department have higher proportions of carbon emissions compared to their share of energy use. A closer look at the data would explain that the proportions of energy use, emissions, and costs are affected by the fact that the

town garage used primarily wood heat[6] which was obtained cost free to the town. Wood heat appears to provide a larger amount of energy with lower carbon equivalent emissions as well.

Building Performance: Energy Intensity

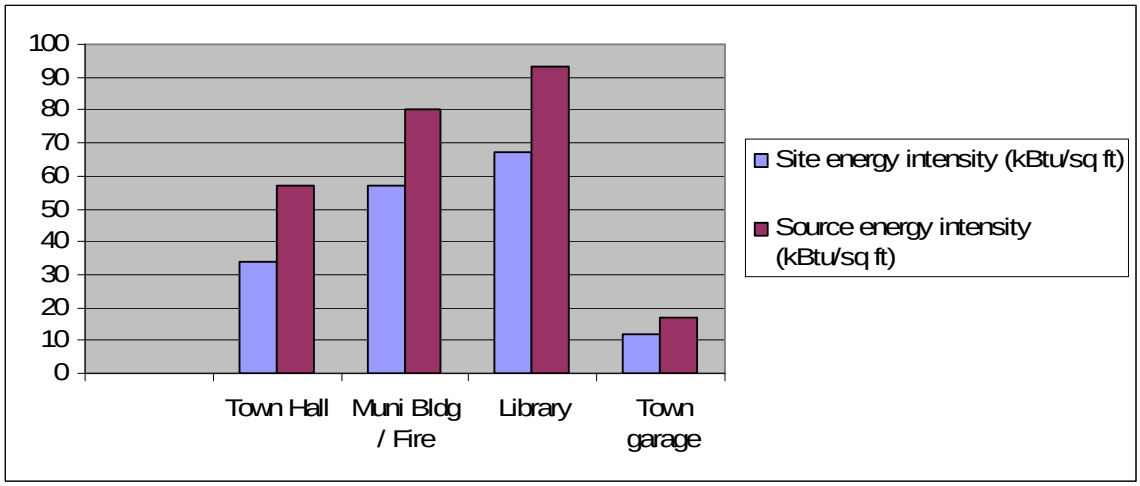
Table 3. Energy Intensity, by municipal building

Name of Building	Type(s) heating fuel used	Area (Sq. Ft.)	Site energy intensity (kBtu/sq ft)[7]	Average Site kBtu/sq ft for building type	Source energy intensity (kBtu/sq ft)[8]	Average source kBtu/sq. ft for building type
Town Hall	#2	2,196	34	77	57	182
Muni Bldg - Fire	#2	3,312	57	77	80	182
Library	propane	1,800	67	104	93	246
Town garage	wood, propane	2,800	12	77	17	150
Total		**10,108**				

Source: Cool Monadnock inventory, 2008
Energy intensity data generated by EPA Portfolio Manager Program

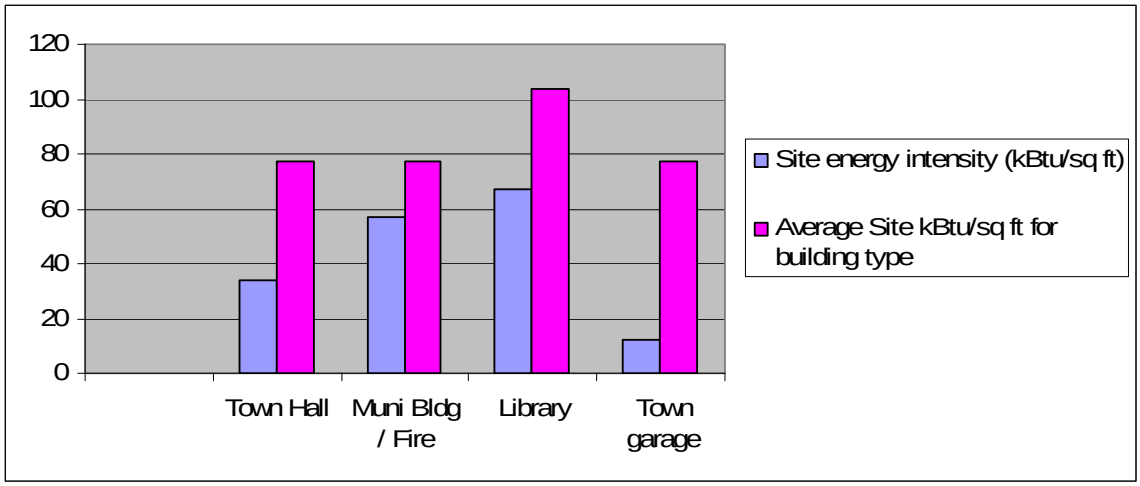
Snapshot of 2005 Energy Intensity by Building

Graph 3a. Site and Source Energy Intensity by Building (kBtu/sq.ft.)

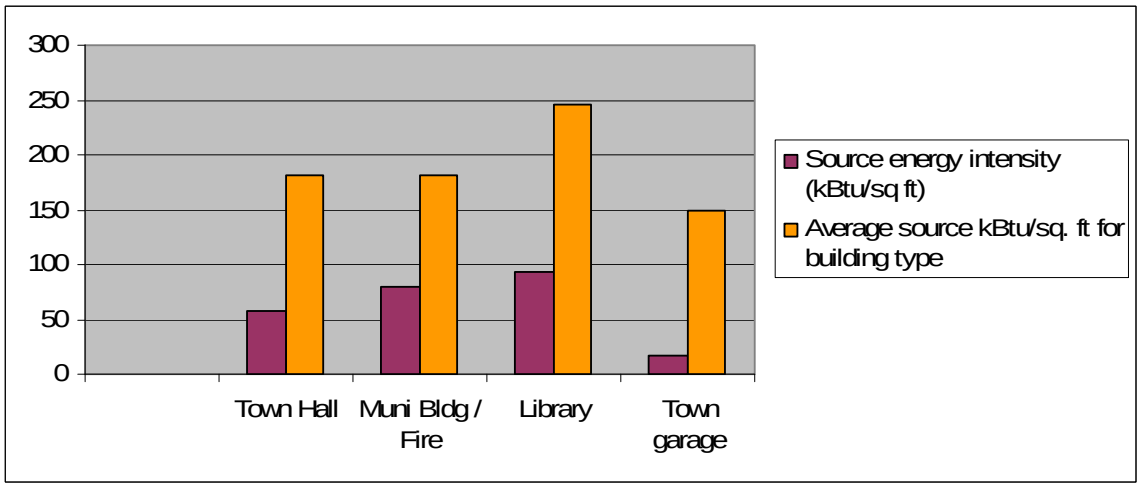


Graph 3b. Site Energy Intensity and Average Site Energy Intensity for Type of Building (kBtu/sq.ft.)

[6] The highway garage also shares a propane tank with the library. For the purposes of this study, we have estimated that 20% of the propane was used by the highway garage and the rest was used by the library. This estimate was made by the lead employee of the town garage.
[7] Site energy intensity = amount of energy expended per square foot *on site* to heat, cool, and electrify the area. This measure relates to how much is being used on site and fluctuates directly with how much lighting is being used, how thermostats are kept, etc.
[8] Source energy intensity = amount of energy expended per square foot based on the source of energy (hydropower, nuclear, coal, fuel oil, etc) and the efficiency of that fuel type.



Graph 3c. Source Energy Intensity and Average Source Energy Intensity for Type of Building (kBtu/sq.ft.)



Energy intensity is the most powerful tool that the Cool Monadnock Project has available for measuring the relative energy efficiency of particular buildings. Site energy intensity can be addressed through behavioral and energy conservation measures whereas source energy intensity would require alterations in the type of energy being used to power, heat, or cool a space. The best opportunities for saving energy on site would involve behavioral changes (such as keeping lights and computers turned off; turning down thermostats) and energy conserving technologies (such as motion sensor lighting). Measures to save source energy would include switching the type of fuel being used to heat or cool a space and asking your electricity provider to use green sources of energy.

In Temple, the building with the highest energy intensity in both categories is the library. The town garage has extremely low energy intensity numbers. All buildings in Temple have lower energy intensities than the average for buildings measured by Portfolio Manager. Nevertheless, there are opportunities to further reduce the energy intensities of the buildings and save energy and money in the municipal buildings in Temple. The relative efficiency of the town garage illustrates the possibilities available for further energy savings. The graphs also show that site energy intensity in the buildings is higher

than source energy intensities, so the opportunities for savings can be found in behavioral changes on on-site updates that conserve energy.

Analysis: Priorities and Custom Recommendations

1. Review existing Master Plan, Zoning Ordinances, and other town policies for inconsistencies with the goal to reduce energy usage
2. Focus on the Municipal Building and Library for: Implementation of a behavioral change program based on the CA-CP guide. Then expand the program to all other buildings. See attached guide.
3. Focus on the Library, Town Hall and Municipal buildings for increased energy conservation through weatherization, insulation and recommendations from Energy Audit on Municipal Building.
4. Implement buying strategy of Energy Star equipment and Products and environmentally sensitive office products, and implement awareness campaigns to encourage “thoughtful” consumption of equipment and products.
5. Evaluate ways to reduce fuel usage with vehicle fleet. This can be done by analyzing routes, usage, and a strict anti-idling policy.
6. Find alternative energy sources to reduce escalating fossil fuel prices and emissions. Investigate payback for possibly installing: a small CHP unit, biomass heating system or geothermal heat pump.
7. Create an Energy Savings Trust Fund to be used in the future for energy saving initiatives within a 5 year payback. Submit this Fund for majority vote at 2009 Town Meeting. Work with CA-CP to create this fund.
8. Encourage recycling and composting to the extent possible, in order to divert the amount of municipal solid waste (organic matter) going to landfill.

Next Steps

As members of the Southwest Regional Planning Commission and the Cool Monadnock project, your municipality has access to support and guidance as you plan for the most effective and targeted energy saving measures. It is recommended that each town have a Local Energy Committee that will meet with the Cool Monadnock staff to review the findings of this report. The Carbon CO2alition's New Hampshire Handbook on Energy Efficiency and Climate Change can be a resource on energy committee formation and energy efficiency options.[9] Through collaboration and consultation between the Local Energy Committee, the Board of Selectpersons or City Council, and Cool Monadnock, the town may identify the most effective and feasible projects that are likely to save energy and costs in the shorter and longer terms. With further collaborative research, the committee, with the assistance of the Cool Monadnock staff, can then identify any sources of financial support that will facilitate energy saving projects.

Methods

Greenhouse gas inventory approach

Data collection for this inventory involved collaborative efforts between the Cool Monadnock staff, which organized the data collection process over all, and the local town representative volunteers. With personal connections to their home towns, volunteers were better able to ascertain where to access certain data and to spend time at local offices sorting through bills and records. To collect the data in each town, data sheets were developed based on the software/program that was used for data processing. We used 2005 as a baseline year to collect the fuel and energy consumption information. Data sheets were sent to the town representative, who then collected and/or accessed the data. Follow-ups were done on a regular basis to make sure that the inventory progressed, the data collection process was effective, and the data needed was more or less accurately collected.

Data processing and data analysis

To process the data collected, we used two types of fuel and energy assessment software. The first was the Clean Air and Climate Protection (CACP) software used to quantify and estimate the amount of energy used and the greenhouse gases (GHG) generated from the energy usage. The CACP software allowed us to make community and government analysis of the GHG inventory. The second was the EPA Portfolio Manager Benchmarking Program, used to assess the energy consumption and GHG generated in specific buildings, based on square footage.

List of Acronyms

CACP	Clean Air and Climate Protection (software)
CA-CP	Clean Air-Cool Planet

[9] http://www.anei.org/download/238_energy_handbook_carbon_version_final_draft.pdf.

EPA	Environmental Protection Agency
GHG	Greenhouse Gas
kBtu	Kilo British Thermal Units
MMBtu	Million British Thermal Units
SWRPC	Southwest Region Planning Commission

MASTER PLAN AUDIT

Temple, New Hampshire

Master Plan and Land Use Regulation Audit

December 14, 2008

Prepared by:

Jeffrey H. Taylor & Associates, Inc.

CLEAN AIR COOL PLANET

Introduction

This land use audit process is designed to identify the energy implications of land use planning and regulations in Temple, New Hampshire. Clean Air-Cool Planet (CA-CP) and Antioch New England Institute (ANEI), in coordination with the Southwest Region Planning Commission (SWRPC), are undertaking an initiative to assist the communities in the southwest region in implementing energy action. This project is called Cool Monadnock. This audit is one of the first pilot projects associated with the Cool Monadnock initiative.

This energy focused land use audit has a great deal of overlap with the goals for smart growth and other natural resource oriented efforts. The intent is to find ways to foster development patterns that use land in Temple efficiently, while protecting both local and global natural resources, and which reduce residents' reliance on energy from fossil fuels. Although this form of energy has been cheap and plentiful in the past, we now realize that the costs will be higher and the supplies much more sporadic in the future, that the emissions associated with their use contribute to climate change, and that the lifestyle of sprawl is fragile and unsustainable because of its reliance on goods and materials from far away. Energy and climate change issues must now be considered as factors limiting development, in a manner similar to natural resource constraints. The Community should be taking this long range view as it engages in its planning efforts.

Energy and climate change issues must now be considered as factors limiting development, in a manner similar to other natural resource constraints. This audit process will identify the inconsistencies, from an energy perspective, between the Master Plan and the Zoning Ordinance, and the Site Plan and Subdivision Regulations.

This audit process will identify the inconsistencies, from an energy perspective, between the Master Plan and the Zoning Ordinance, and the Site Plan, and Subdivision Regulations. The purpose of conducting an audit of a community's planning documents and land use regulations is to ensure that the Future Land Use Plan and associated recommendations in the Master Plan can actually be implemented under the existing regulations. If there are inconsistencies in these relationships, it is important to address them before it is too late and the community is no longer able to achieve its stated vision. This audit goes a step further and identifies energy and land use related issues that should be addressed in a future Master Plan update.

As part of the Cool Monadnock project, Jeffrey H. Taylor and Associates conducted a review and comparison of the 2003 Temple Master Plan with the existing Temple Land Use Regulations. Temple was selected as the recipient of this service because of Temple's leadership role in the Cool Monadnock project. Thanks to the assistance of the Temple Local Energy Committee and municipal officials and staff, Temple was the first town in the region to complete a comprehensive energy and greenhouse gas emission inventory on all municipal buildings and operations. Temple's inventory report is attached as Appendix A.

The overall finding of the review by Jeffrey H. Taylor and Associates is that there are some topics where the specifics of the land use regulations do not serve the policy statements of the Master Plan. This is a critical point. **If the regulations do not assist with the implementation of the Vision in the Master Plan, that Vision is not likely to be achieved.** There are also policy elements of the Master Plan that actively promote energy consumptive patterns of development, and must be addressed if Temple, as a community, is intent on conserving energy and reducing greenhouse gas emissions.

The following items cannot all be addressed at once, and will need to be reviewed and prioritized by representatives of the community as part of this process. This is an issue for the entire community. Every Temple resident pays a significant amount to power their home and vehicles, and a share of the expense required to power and heat community facilities and equipment.

Section 1.0 Major Audit Findings

Temple is an idyllic rural community in southern New Hampshire. This landscape of natural resources, including farm and forest lands, is critical to the community's long term sustainability. Many of these resources ensure clean drinking water, a sustainable fuel source, and the potential for locally produced food. Although the rate of growth in Temple is fairly low, the community is currently promoting a pattern of low density residential sprawl that is very auto-dependent, and which relies largely on the surrounding communities for services. This suburban pattern of development could change Temple in significant (and costly) ways over time, and eliminate many of the natural resources residents treasure now and will need in the future.

Although the rate of growth in Temple is fairly low, the community is currently promoting a pattern of low density residential sprawl that is very auto-dependent, and which relies largely on the surrounding communities for services.

If Temple decides to pursue a more energy efficient and sustainable land use pattern, a clear vision of that must be articulated in the Master Plan and implemented by the appropriate land use regulations. This is not to say that the community has not taken some steps in the right direction already. The creation of the Mountain District Conservation Development requirement is significant, and compliments the land conservation efforts in the town and the region.

Some of the major items that appear to need attention in the near future are:

-***Land Use Patterns*** – Nodes of mixed use development (residential, commercial, and civic uses) surrounded by lower density clusters of residential development and natural resources would allow for reduced travel requirements.

-***Mix of Uses*** – A greater mix of uses at key locations (like the Village) would allow for a reduction in vehicles trips, and would encourage walking and biking. It would also create a greater density of activity that might warrant a transit stop (or a simple park and ride) in the future.

-***Diversity of Residential Units*** – If a more diverse range of unit types were allowed in the community, there would be an opportunity to use developed parcels more efficiently, and provides housing options for a wider range of residents.

-***Transportation Infrastructure*** – There is a need to consider the direct relationship between the land use pattern in Temple, and the travel and transportation needs of the community. Nodes of greater density (think village crossroads) would provide for some transportation alternatives.

Section 2.0 Temple Master Plan - 2003

The current Master Plan (2003) recognizes the importance of the rural landscape and the village, but focuses largely on the development of single family homes. If this is not the future land use pattern Temple wishes to promote, then these issues must be addressed. Once the community has a clear vision, it needs to ensure that the larger policy recommendations are reinforced by appropriate land use regulations.

Although one specific vision was not stated for Temple in the 2003 Master Plan, a series of policies and objectives were identified. These objectives are intended to guide the land use pattern in Temple as development takes place.

2.1 Key Objectives from the 2003 Master Plan

The Master Plan recommendations below were considered most relevant to this audit process, and have been organized under their primary subject area. **It is important to remember that most of these also have implications for other aspects of the community.** These recommendations are the identified action items related to the broader policies identified in this Master Plan.

Land use

- Assess each subdivision and site plan proposal regarding the scale and location of the proposed development in order to evaluate impacts on the Town.

- Review the Zoning Ordinance on an annual basis, in conjunction with the other Town Boards, to ensure that it reflects goals and objectives of the Master Plan and meets the needs of current local conditions.

- Review and amend the Zoning Ordinance as necessary to ensure that "sprawl development" is minimized and mitigated.

- Promote innovative development concepts such as conservation subdivision design, planned residential and/or open space (cluster) developments which encourage variety in residential architecture and landscape design, in conjunction with the preservation of open space and critical resource areas.

- Amend the Subdivision and Site Plan Review Regulations to require the use of Best Management Practices (BMPs) for storm water runoff.

- Amend the Subdivision and Site Plan Review Regulations to include provisions for shared driveways and interconnecting driveways between developments.

- Amend the Subdivision and Site Plan Review Regulations to require Site Specific Soil Mapping Standards.

- Amend the Subdivision and Site Plan Review Regulations with criteria for Developments of Regional Impact.

Community Facilities

- Conduct an annual review of municipal operations.

- Develop and implement annual and long-range plans for all departments of municipal government regarding the administration and duties of each department.

- Routinely analyze the need and opportunities for the future addition and/or expansion of municipal services and facilities with public input.

- Establish and maintain a municipal Capital Improvements Program with a minimum planning horizon of six years.

Economic Development

- Continually monitor the Zoning Ordinance to ensure that it reflects the changing nature of home occupations and businesses.

- Investigate establishing an agricultural/forestry overlay district that would favor agricultural and forestry uses over other land uses, through the regulation of lot sizes, buffering, sales of agricultural and forestry products, etc.

- Encourage formal municipal-level participation in regional economic development organizations, such as Monadnock Business Ventures, Inc.

- Evaluate parcels town-wide to identify sites suitable for future industrial and/or commercial development. Consider any rezoning, as necessary.

- Review zoning and other land use regulations of neighboring towns periodically to assess Temple's industrial/commercial uses.

Traffic and Transportation

- Provide for pedestrian walkways wherever warranted by traffic and development.

- Create a pedestrian-friendly Village Center area, through the development of pedestrian and bicycle facilities and the management of motorized-traffic behavior.

- Ensure, through site plan review, that adequate off-street parking is provided for in all future developments.

- Use the State of New Hampshire’s Transportation Enhancement Program (through the auspices of the Southwest Region Planning Commission) to fund future Downtown improvements.

- Ensure long-range planning for the maintenance of all town roads and bridges by preparing a schedule of road and bridge maintenance improvement projects.

- Establish standards of design and operating procedures for the maintenance, improvement and construction of municipal roads to protect the rural character of Temple while providing a safe and efficient road network, including protection of roadside trees, preventing destruction of stone walls and minimizing roadway width, and changes in radius of vertical and horizontal curves.

- Consider the adoption of an Access Management Plan for NH Route 101 through

Temple.

- Evaluate the use of the Scenic Road designation for certain roads in Temple, pursuant to RSA 231:158, II.

- Support the continued participation by the town in the Transportation Improvement Program planning process carried out by the Southwest Region Planning Commission and State of New Hampshire.

Housing

- Periodically conduct a housing inventory within Temple, including characteristics such as the number of single and multi-family houses; the age and condition of houses; trends in the area real estate market; and rental versus ownership rates.

- Assess the impact of regional development and land use regulations in neighboring towns on housing demands for Temple.

- Amend the Zoning Ordinance to allow congregate housing for the elderly in residential areas.

Conservation and Preservation

- Develop and maintain a Natural Resource Inventory.

- Promote the connection of the publicly owned trail system to the regional trail network.

- Explore the use of an Aquifer Protection District Ordinance**,** or a Groundwater Protection Health Ordinance.

- Explore the use of a Shoreland Protection District Ordinance, or Surface Water Resources Protection Overlay District.

- Develop and maintain an Open Space Plan for the Town of Temple.

- Establish a Conservation Reserve Fund to support public activities such as the acquisition of easements for land conservation or trail access and the acquisition of real property for conservation or multiple uses.

- Adopt Conservation Subdivision regulations.

- Consider the adoption of a Steep Slopes Ordinance.

- Consider the adoption of a Scenic Viewshed Protection Ordinance.

- Conduct a critical review the town's existing Sign Ordinance.

- Amend the Temple Subdivision and Site Plan Review Regulations to require the underground placement of utilities where practical; and when underground placement is not practical, utilize design and landscaping techniques to blend such facilities with the natural environment to minimize their obtrusiveness.

- Consider the adoption of a Noise Ordinance.

2.3 Key Issues to Address in Future Master Plan Updates

Like many communities, Temple did not consider the significant energy implications related to land use as the 2003 Master Plan was created. Fortunately it is not too late, and future amendments to the Master Plan can address the following issues in a manner that is appropriate for Temple.

- Consider adding energy efficiency and conservation to the guiding principles of the Master Plan.

- Articulate a clear vision statement that is specific to Temple, and will guide the future land use plan for the community.

- Address the conflicting goals of remaining largely a residential community with little active agriculture, and the concern in the Future Land Use Section over sprawl patterns of development.

- Consider supporting agriculture in the community using new regulatory and non-regulatory approaches.

- Create and adopt an Energy Chapter including any data on energy audits and green house gas inventories involving Temple. This chapter should also be used to:

    - Develop energy conservation objectives for municipal structures and vehicles;
    - Address the potential for relocalization and greater sustainability within the region as an alternative to energy consumption and reliance on resources from outside the region;
    - Consider the role/possibility of new opportunities such as distributed energy generation from renewable sources, transportation alternatives, food production, and other sustainability efforts;
    - Encourage energy conservation along with design aesthetics in new structures; and
    - Identify opportunities for the Energy Committee to assist Town Boards and Departments with energy conservation efforts.

- Identify the importance of natural resources in Temple for future energy and sustainability.

- Clarify the connection between the increased occurrence/intensity of natural hazards, and the need for climate adaption efforts.

- Identify the need for regional public transportation initiatives that provide rural transit options for Temple residents. This will provide residents of Temple transportation fuel cost relief in the future.

- Promote the maintenance and use of recreational trails and facilities as opportunities close to home.

- Address the need for more diverse housing stock that can address the needs of all ages and income levels.

-Identify implementation actions at the end of each chapter, and in an implementation chapter.

Section 3.0 Identified Regulatory Inconsistencies and Opportunities

The following findings have been organized under the regulation they relate to, and specifically address existing disconnections identified in the Temple Land Use Regulations to date. Some of these policy related issues may also need to be addressed in the Master Plan to provide the foundation for new regulations.

3.1 Zoning Ordinance:

Jeffrey H. Taylor & Associates conducted an independent review of the Zoning Ordinance, and our comments are identified below.

- In the authority and purpose – consider adding "promote energy conservation, and an energy efficient land use pattern"

- *Zoning Districts:*
  -Promote land use patterns that create opportunities for public transportation, ` carpooling, ride-sharing and other lower energy alternatives.
  -Identify areas within and adjacent to the village that could accommodate future development, higher density, and a mix of uses in a walkable and bikeable pattern.
  -Retain the two rural zones where conservation, farming and forestry are the priority, and residential units are allowed at a lower density overall.

- Why a 35 foot setback from all property lines in all districts? Each district should have standards that relate directly to the vision for that area for the community, and the future land use pattern.

- Article V – *Districts and Uses:*

Village and Historic Preservation District:

- Two acre lot size requirements and 250' of frontage do not create a village environment, and a greater mix of uses should be permitted in a walkable/bikable pattern.
- Consider reducing the lot size in this district, and expand the uses to include retail, and a broader range of residential use
- Establish design guidelines to promote aesthetics and energy efficiency.
- *Article IV Section 13* is too restrictive for village scale development. Consider using a conditional use permit that will give the Planning Board some oversight if necessary.

Rural Residential and Agricultural District

– Consider expanding the types of housing units allowed, and requiring the use of the Conservation Development provision in this District.

Mountain District – The uses are fine, but the minimum lot size should be greater for the parcels that do not fall under the Conservation Design provision.

- There are no opportunities to create multi-family housing in Temple. This form of housing can be very energy efficient, promotes the efficient use of land, and provides densities that may support transportation alternatives. Under NH law opportunities for multi-family units must be allowed in 50% of the community.

- Promote home based businesses and telecommuting by continuing to provide flexibility for these uses. New uses developed in the Village could potentially support these small business uses as well.

- Adopt steep slope regulations and other natural resource regulations that help focus development in key areas of Temple

- *Accessory Apartments:*
  - Allowing accessory apartments throughout Temple is great!
  - Consider being more flexible and allowing these units in accessory structures on the property by right, and not just on lots that are twice the minimum lot size.
  - Consider allowing accessory apartment in Planned Residential Developments.

- Section 12 - *Farming* – Currently lacks detail or guidance. Consider adding some farm friendly regulations that provide flexibility. See the New Hampshire Coalition for Sustainable Agriculture documents for suggestions.

- Section 13 – *Industry, Commercial and Non-commercial Enterprises:*
  - Consider changing this provision to a conditional use permit issued by the Planning Board, and providing the opportunity for greater flexibility in the siting of these uses if they met the conditions outlined by the Board.

- Consider including regulatory incentives in this provision for development projects that embrace energy conservation and other objectives. This may include greater density or other relief from dimensional standards, or an expedited review process.
-Or - Develop a new "green" business ordinance to regulate new non-residential development, and provide incentives for meeting performance standards set by the Town (i.e. Leadership in Energy and Environmental Design (LEED) Certification, Sustainable Sites Certification, producing renewable energy on site, etc.)

- Section 19 – *Planned Residential Development* –
  - Include in the purpose statement – Promote an energy efficient land use pattern, and energy efficient design.
  - Consider promoting active agriculture and forestry on appropriate portions of the open space in these developments.
  - Consider reducing the steep slope standard to 15%.
  - Do not allow undevelopable land to be counted toward the required open space
  - Consider adding incentives such as density bonuses for projects that incorporate a higher % of protected land (like MDCD), achieve LEED certification, or a similar standard, include a shared a renewable energy system, district heating, workforce housing units, or other significant components identified within the ordinance.
  -The Mountain District Conservation Development provision is an excellent tool. Consider using this in the Rural Agricultural district as well!
  -Consider allowing this provision for non-residential uses as well to ensure the same commitment to design and open space protection.

- Temple should consider adopting a regulatory provision for Small Wind Generators. This will create a clear review process and standards for future applications.

3.2 Subdivision Regulations:

Jeffrey H. Taylor & Associates conducted an independent review of the Subdivision Regulations, and our comments are identified below.

- Building orientation should be a recommended review element, so as to increase the number of passive solar units in the community

- Consider providing incentives for projects that are eligible for Energy Star, LEED certification or other equivalent green building standard.

- *Low Impact Development:*
  – Adopt LID provisions that will better control and infiltrate stormwater on the site without a need for traditional infrastructure (storm drains, etc.).

-Set a standard for the volume of treatment, and allow the use of these innovative LID treatment methods (vegetative and structural) which clean storm water and recharge the aquifers.
-Allow or encourage the use of porous pavements (asphalt and concrete - with appropriate design specifications) to encourage stormwater infiltration and reduce winter maintenance requirements.

- Adopt outdoor lighting regulations that require full cutoff fixtures and reduce the potential for light pollution and save energy.

- Acknowledge the energy implications of landscaping – refer to *Integrated Landscaping: Following Nature's Lead* (NH Cooperative Extension), require the use of indigenous species, and promote the use of edible landscaping that is visually interesting and provides a food source for animals and humans.

- *Roads*:
  – Require all dead-ends to have a provision for future connections to adjacent parcels.
  - Require all roadways to use LID techniques for handling stormwater.
  - Ensure that narrow roadways continue to be an option on low volume roads.
  - Adopt access management guidelines that will reduce the number of curb cuts on collector streets in Temple.

3.3 Site Plan Review:

Jeffrey H. Taylor & Associates conducted an independent review of the Site Plan Review Regulations, and our comments are identified below.

- In the purpose statement, stress the need to promote energy efficiency and conservation in the design and operation of new structures.

- Building orientation should be a recommended review element, so as to increase the number of passive solar units in the community

- Consider providing incentives for projects that are eligible for Energy Star, LEED certification, or other equivalent green building standard.

- Consider the use of voluntary or mandatory architectural guidelines for new uses located in the Village or other nodes of development

- *Low Impact Development:*
  – Adopt LID provisions that will control and infiltrate stormwater on the site without a need for traditional infrastructure (storm drains, etc.).
  -Set a standard for the volume for treatment, and allow the use of these innovative LID treatment methods (vegetative and structural) which clean storm water and recharge the aquifers.

-Allow or encourage the use of porous pavements (asphalt and concrete - with appropriate design specifications) to encourage stormwater infiltration and reduce winter maintenance requirements.

- Adopt outdoor lighting regulations that require full cutoff fixtures and reduce the potential for light pollution and save energy.

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  - Ensure that narrow roadways continue to be an option on low volume roads.
  - Adopt access management guidelines that will reduce the number of curb cuts on collector streets in Temple.

Summary

This Master Plan and Land Use Regulation Audit should serve as an implementation tool for the Town of Temple. Our suggestion would be to address and prioritize these issues for implementation. The Audit highlights the fact that the Master Plan does not address issues related to energy consumption and green house gas emissions, and this needs to be addressed to better guide future development and conservation initiatives in Temple. Then the land use regulations can help implement this energy efficient land use vision in Temple. The recommendations in this report directly or indirectly would serve the purpose to reduce energy usage and/or greenhouse gas emissions for Temple citizens.

RESUMES

JOHN KIELEY
Chairman, Temple Board of Selectmen

A native of southern New Hampshire, John holds a Bachelor's degree from Norwich University and a Master's degree from the University of Michigan's Graduate School of Business Administration. A Fellow of the Society of Actuaries, he has spent his career in financial consulting in both Boston and New York. He retired in 2004 as an owner with Hewitt Associates, now an NYSE-listed company.

John is the Chairman of the Temple Board of Selectmen and the Temple-Greenville Police Board. He is also a member of the Temple Planning Board and Conservation Commission and serves as Vice-Chairman of the ConVal School District Selectmen's Advisory Committee.

John is the President of the Board of Trustees of the Monadnock Conservancy, Board Treasurer of the Lukas Foundation and a member of the Monadnock Region Board for the New Hampshire Charitable Foundation.

John and his wife Connie own Temple Highlands, LLC, a conservation-based land investment company.

Dr. Robert Wills

President, INTERGRID, LLC

PO Box 48, 184 Hill Road, Temple, NH 03084

(603) 801-4749 rwills@Intergrid.org

Dr. Robert Wills, P.E., is President of INTERGRID, LLC, a consulting engineering company that works in the areas of:

- Power electronics for renewable energy systems
- Wind monitoring systems and wind site assessment
- Codes and standards development for renewable energy technologies
- Commercial building energy management and control

He was previously founder and Vice President of Technology at Advanced Energy, Inc., a Wilton, NH, based inverter manufacturer. Advanced Energy made inverters for the photovoltaic & fuel cell markets.

EMPLOYMENT

2003 -	President, *Intergrid, LLC.*
1998 – 2002	VP Technology, *Advanced Energy Systems, Inc.*
1995- 1998	President, *Advanced Energy Systems, Inc.*.
1988-2006	Founder & Technical Director of the *American Tour de Sol,* the first multi-day solar and electric car event in the USA.
1981-87	President, *Skyline Engineering*, Post Mills, VT. Solar PV installations, commercial building energy management.
1981-87	Electronics & Instrumentation Engineer, U.S.A. Cold Regions Research and Engineering Laboratory, Hanover New Hampshire.
1977-80	Glaciologist & Electronics Engineer, Australian Antarctic Research Expedition, Mawson Antarctica. (15 months in Antarctica).
1975-1977	Engineer, Buildings Branch, *Telecom Australia*. Responsible for the design of commercial building electrical and HVAC systems.

EDUCATION

1987	D.E. (Doctor of Engineering) Thayer School of Engineering, Dartmouth College, Hanover, NH.
1984	M.E., Thayer School of Engineering, Dartmouth College, Hanover, NH.
1974	B.E. (Electrical), University of Melbourne, Australia. First Class Honors Degree.

Licensed Professional Engineer in the disciplines of Electrical, Mechanical Engineering.

ASSOCIATION & COMMITTEE MEMBERSHIP

- IEEE Standards Association, American Solar Energy Society, American Wind Energy Association, National Fire Protection Association.
- Former board member & life member, Northeast Sustainable Energy Association
- US National Electrical Code, Code Making Panel 4 (Representing the American Wind Energy Association).
- IEEE Codes and Standards Association – involved in the development of several key standards for renewable energy (IEEE 929/UL 1741/IEEE 1547/IEEE 1547.3).
- Underwriter's Labs Standards Technology Panel, UL1741 (Inverters for Renewable Energy).
- Chair, Power Subcommittee, EMerge Alliance (a group of major US companies working to promote distribution of DC power in commercial buildings)

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Margaret Dillon
Education and Professional Accreditations

MS, Environmental Science
BPI Certified Professional
Building Analyst and Envelope Specialist, Building Performance Institute
MS Certificate Sustainable Design, Boston Architectural College
LEED AP
Certified HERS Rater GDS #005
Building Science Thermographer
120+ hours AIA qualified continuing education

Building Performance Assessment and Consulting References

Municipalities

Joe Byk, Peterborough Selectman
Contact: 924-2190; joebyk@gmail.com

Dick Ames, Jaffrey Energy Committee
RAmes14779@aol.com

Other NH Towns or Energy Committees I've worked with
Hanover, Temple, Walpole, Wolfeboro

Other Clients

Mark Toussaint
Energy Efficiency Services, PSNH
Phone: 634-2301; toussmd@nu.com

Dick Henry
Executive Director, The Jordan Institute
Contact: 226-1009; dhenry@thejordaninstitute.org

Jack Ruderman: jack.ruderman@nh.gov

Nancy Hirschberg
Vice President of Natural Resources, Stoneyfield
Contact: NHirshberg@stoneyfield.com

Cotton Cleveland
President, Mather Associates
Contact: 526-2795; mather@tds.net

HONEY HASTINGS

COMMUNITY SERVICE

Town of Temple government:Temple Economical Energy Committee (TEEC), Zoning Board of Adjustment,Conservation Commission, Budget Advisory Committee.
Local Non-profits: Friends of Temple Town Hall, Village Green Committee

PROFESSIONAL EXPERIENCE

Private Law Practice: Offices in Hillsborough County, New Hampshire, 1982 to present.
Unbundled legal services, including Collaborative Law.
Areas of practice: divorce, legal separation, post-divorce, parenting, child support and alimony, property division (including retirement benefits), wills, living wills, health care proxies, unwed families. From 1982 to 2005, litigation of all these areas, as well as paternity, grandparents' rights, interstate and international child abduction, interstate family disputes including Uniform Child Custody Jurisdiction Act cases, premarital agreements, adoption, guardianships of minors and family law appellate work.
Continuing Education Presenter: (see specifics below), 1987 to present.
Expert Witness: Family law practice and procedure, legal malpractice, professional conduct, 1995 to present
Private Mediation Practice: "Professional Mediation," NH, 1995 to present.
Mediation of divorce, after divorce, and custody disputes; premarital agreements; probate disputes; workplace and community issues.
N.H. Court-Referred Domestic Relations Mediation Program: 2004 to present
Guardian *ad litem:* 1983-85, 2006 to present
Parenting Coordinator: 2006 to present
Office of Legislative Services: 1980 - 1981; bill drafter for New Hampshire Legislature

PUBLICATIONS

The New Hampshire Divorce Handbook, Amoskeag Press, 1st ed. 1999, 2nd ed, 2007
"Dispute Resolution Options in Divorce and Custody Cases," *NH Bar Journal,* Summer 2005
"Custody Rights in New Hampshire: History and Current Law," *NH Bar Journal,* 1999
"Marital Property Division in NH: Recent Developments," *NH Bar Journal*, Spring 1995
"Drafting Custody Agreements," *Compleat Lawyer*, Winter 1994 (ABA General Practice Section)
"Low Cost Divorces," *Family Advocate*, Fall 1999 (ABA Family Law Section)
"Tips for a Successful Solo Practice," *NH Bar Journal*, Summer 1992
Domestic Violence & Mediation, Amoskeag Continuing Education, 2008

CONTINUING EDUCATION PRESENTATIONS

Collaborative Law Training, *panelist,* 2000, 2002, 2006, 2008, Collaborative Law Alliance of NH
Health Insurance Statutes & Other Family Law Updates, *presenter,* Amoskeag Continuing Education, 2008
Ethical Challenges for Divorce & Family Mediators, *presenter,* Amoskeag Continuing Education, 2006, 2008
, 2005, 2008
The Law and Mediated Agreements, *co-presenter,* NH Conflict Resolution Association, 2006
Moving from Litigation to Transactions and ADR, Association for Conflict Resolution, 2006
The Parental Rights & Responsibilities Act, Family Division (for judges/masters), *co-presenter,* Sept. 2005
Writing Agreements that Work, *presenter,* Amoskeag Continuing Education 2008
The Parental Rights & Responsibilities Act, NHBA, *panelist*, September 2005

The Parental Rights & Responsibilities Act, Amoskeag Continuing Education, *presenter,* September 2005
Asset Division, the Law, the Practicalities, and the Drafting Challenges, *presenter*, NHCRA, 2005
Developments in Family Law, NHWB, *panelist*, December 2004
Collaborative Law & Mediation, *co-presenter*, NHCRA, 2004
Writing Better Mediated Divorce Agreements, *presenter,* NHCRA, 2004
Bankruptcy and Divorce, NHBA, *panelist*, 2004
Complex Divorce Issues, NBI, *presenter,* 2003
Retirement Plan and QDRO basics, Nashua Bar Association, NHBA, *co-presenter,* 2002
Divorce Litigation, NHBA, *panelist,* 2003
Developments in the Law, NHBA, *panelist* on family law, 1996 -2005
NH Practical Skills for New Lawyers, revised materials (1997, 1999, 2002), *co-presenter* on family law, 1996-2005
Legal Updates, and Creative Custody and Support Provisions, NH Mediators Association, *presenter,* 1999
Creative Property Divisions, NH Mediators Association, *presenter*, 1999
Ethics for Mediators, NH Mediators Association, *panelist*, 1999
50 Ways to Improve Your Family Law Practice, ABA, General Practice Section, Toronto, *panelist,* 1998
Practical Divorce Practice, *panelist*, ABA, 1998
Legal Update for Marital Mediators, NH Conflict Resolution (formerly Mediators) Assn., *presenter,* 1998, 2000-2003
Family Law Practice Update, NHBA *panelist*, 1998
New Superior Court Rules and Forms, *co-presenter*, 1998
Bankruptcy Update, NHBA, *panelist* on family law, 1997
New Financial Affidavit Form, NH Superior Court, *co-presenter*, 1997
What Mediators Need to Know About Retirement Benefits, A Gathering of Family Mediators in New England, *presenter*, 1996, 1998; NH Mediators Association, *presenter*, 1998
(Divorce) Finances for the Next Millennium, NHBA, *panelist* on child support & legislation, 1996
Child Support, Family Law Legislation, and Ethics, Coos County Bar Association, *presenter*; 1996
Pensions and Developments in Family Law, Coos County Bar Association, *presenter*, 1996
Retirement Benefits and QDROs, NHBA, Family Law Section, *co-presenter*, Keene and Exeter, May 1996
Alimony in NH, NHBA, Family Law Section, *panelist*, 1995
Hague Convention on Civil Aspects of International Abduction, AAML-MA Chapter, *presenter*, 1995
Grandparental Custody Rights: Comparison of New England States, ISFL North American Conference, *presenter*, Quebec City, 1996
Client Communications: Use of Standard Letters (hot tip) AAML-MA, *hot tip presenter*, 1995
Family Law in NH, moderator/panelist, 1987, 1988, 1989, 1990, 1992
Family Law Litigation in NH, panelist, 1991, 1994
Key Issues in Family Law in NH, *moderator/panelist,* 1993
Domestic Law in NH, *panelist*, 1994
Paralegals in Family Law Practice, *panelist*, 1995
(Other presentations given 1987-1994.)

CONTACT INFORMATION

P.O. Box 1112
17 Main Street
Wilton, NH 03086
phone : 654-5000
fax: 654-6000
hhastings@nhdivorce.com
www.nhdivorce.com

GAYLE A. RICHARDS
7 Mountain View Road
Temple, New Hampshire 03084
603-320-2315
E-mail gaylernh@aol.com

PROFESSIONAL PROFILE

Extensive experience in design and development of on-line and batch software applications. Design, development and testing of data warehouse applications. Development of quality assurance strategies. Full Life-cycle experience in the finance, banking, insurance and retail industries.

TECHNICAL SKILLS

SOFTWARE:	CICS, DB2 7.1 & 8.1, COBOL, COBOLII, COBOL 370, SQL, VSAM, JCL, MQ Series, IMS DB/DC, SDF II, BMS/GT Screen Generator, TSO/SPF, ChangeMan, ENDEVOR, Librarian, Panvalet, SPUFI, Platinum, QMF, Intertest, VIASOFT/Smartest, XCOM and Network Data Mover (NDM), Expediter (online and batch).
OPERATING SYSTEMS:	VMS, OS/MVS, MVS/ESA
HARDWARE:	IBM 3390, IBM 3083, IBM 4341 and IBM 370

PROFESSIONAL EXPERIENCE

Sapphire, INC. 7/2007 - Present
IT Consultant

Performed onsite consulting at TJX corporate location. Upgraded Automated Distribution Systems for TJMaxx, Marshalls, HomeGoods, Winners, HomeSense, TKMaxx and AJ Wright companies on an IBM mainframe using COBOL, CICS, DB2, DB2/SQL, JCL, IMS DB/DC, ChangeMan, FileAid for DB2, SDF II, Expediter. Performed program analysis, development, testing and software migration management. Functioned as Technical Lead on a small batch project, participated in team projects and handled independent production enhancements through the full life-cycle.

CIBER, INC. 2003 – 6/2007
IT Consultant

Performed onsite consulting at a major corporate locations. Designed, developed and tested batch, CICS and DB2 applications software.

For Fidelity Investments:

Coded and tested major modifications to a CICS replication program using WebMQ XML.
Designed, developed, tested and implemented batch processes and CICS programs using DB2 and VSAM access methods to provide mainframe data to web applications and online 3270 Screens and reporting and table maintenance for stock option applications. Developed online and batch processes to handle all aspects, including FTP processes, for the Health Savings Account Project Phases 1 and 2, 2005 and 2006.

For a Pharmacy :

Developed, tested and implemented a program supporting the automation of the inventory of prescriptions held at each of approximately four thousand client stores. Analyzed, modified and tested batch reporting modules.

BEVERLY EDWARDS

41 TWILLINGATE ROAD
TEMPLE, NH 03084
H. 603-878-3227
C. 617-335-0604

ORGANIZATIONAL EXPERIENCE

- Chair, Temple Economical Energy Committee (TEEC) – Appointed - 2007 – Present
- Organizer/Fundraiser, Lexington Civil Rights Committee, Lexington, MA
- Fundraiser/Organizer, Project Place (a shelter and support program for run-away teens), Boston, MA
- Co-Founder/Fundraiser/Organizer, Cambridge Women's Center, Cambridge, MA
- Special Needs Coordinator, Lynn Head Start, Lynn, MA
- Co-Organizer, Boston Therapists Confronting Severe Abuse, Boston, MA

PROFESSIONAL MEMBERSHIPS

Polarity Therapists of America

PROFESSIONAL EXPERIENCE

Polarity Therapist, 1981 – Present

EDUCATIONAL AFFILIATIONS

DePauw University, Greencastle, IN

University of Illinois, Champaign-Urbana, IL

Northeastern University, Boston, MA

University of Massachusetts, Boston

MARY BETH AYVAZIAN

Community Activities

Member, Temple, NH Planning Board – Term 2009-2012
Member, Temple, NH Zoning Board of Adjustment – Appointed 2007 - Present
Secretary, Temple Economical Energy Committee (TEEC) – Appointed 2007 – Present
Pro Bono Attorney, Women's Bar Foundation – 2008
Outdoor Leader, Greater Westfield Youth and Family Services – 1986 - 1988

Professional Memberships

Admitted to the Massachusetts Bar, November, 2007
Member of the Women's Bar Association
Member of the Women's Bar Foundation
Member of the Massachusetts Bar Association
Member of the Boston Bar Association

Education

Massachusetts School of Law, J.D.
Simmons College, B.A. Communications

Professional Experience

Ovum, Inc., Global Account Manager
Represent analysts in a global, technology advisory firm serving the telecommunications and software industries.

Massachusetts School of Law, Teaching Assistant, CyberSpace and the Law

District Court of the Commonwealth of Massachusetts, Salem Division, Judicial Intern
Served the Honorable Robert A. Cornetta, Chief Justice

AT&T, Inc., Data Network Account Manager, Global Accounts
Network plan and billing design for large enterprise organizations including quasi-governmental organizations and universities.

NoonAyvazian Advertising, Inc., Vice President and Partner
Boutique business-to-business, print advertising firm.

Contact Information

Home
41 Twillingate Road
Temple, NH 03084
603-878-2667
Mba1957@msn.com

Business
P.O. Box 960765
Boston, MA 02196-765
617-901-6710
mayvazian@massesq.com

SARAH HARPSTER

85 Spruce Street
Keene NH 03431
603-352-2172

ecosarah.com
sarah@ecosarah.com

EXPERIENCE

Grassroots Outreach Coordinator 2008-present
New England Coalition for Sustainable Population, Keene, NH

- Make public presentations about the role of population in sustainability
- Educate the public through the media about population and sustainability

CA-CP Consultant, CA-CP Fellow, Cool Monadnock Intern 2007-present
Clean Air–Cool Planet & Antioch New England Institute, Keene, NH

- Educate and organize local businesses and communities in carbon reduction campaigns
- Conduct greenhouse gas emissions inventories for businesses and municipalities

Green Sanctuary Team Assistant 2007-present
Keene Unitarian Universalist Church, Keene, NH

- Help develop and implement sustainable changes to church building and programs
- Publicize program through public speaking and newspaper article

Community Researcher 2007
Advocates for Community Empowerment, Gilsum, NH

- Researched and documented NH statutes pertaining to local control
- Produced NH community fact guide for addressing environmental issues

Library Public Services Assistant 2004-2006
John W. Dickhaut Library, Methodist Theological School in Ohio, Delaware, OH

- Trained and supervised library student staff
- Provided public relations through direct and written communications

Student Associate Pastor 2002-2003
New Life UMC, Columbus, OH

- Organized and supervised volunteers in outreach ministries
- Provided worship leadership, led adult Bible study, provided pastoral care

NGO Communications Coordinator 1997-1999
Consejo Asesor Internacional de la Juventud Rural (CAJIR), Santo Domingo, DR

- Researched project proposals
- Translated documents and verbal communications (Spanish/English)

EDUCATION

Master of Science, Environmental Advocacy and Organizing 2008
Antioch University New England, Keene, NH

Master of Divinity; Master of Theological Studies 2005
Methodist Theological School in Ohio, Delaware, OH

Bachelor of Arts, Anthropology and Latin American Studies 1996
Colgate University, Hamilton, NY

Christa Koehler
40 Woodburn Street, Apt. 42
Keene NH, 03431
(603) 313-5182
Ckoehler@cleanair-coolplanet.org

EDUCATION

Antioch New England Graduate School, Keene, New Hampshire
Masters of Science in Resource Management and Administration, April 2003

Pace University, Pleasantville, New York
Bachelor of Arts, June 1997, Cumulative Q.P.A. 3.75
Major: Political Science Concentration: Environmental Policy
Minor: Literature and Communications

HONORS & ASSOCIATIONS

Cum Laude Graduate
Pace University Campus Enrichment Service Award
Alpha Chi National Honor Society
Pi Gamma Mu International Honor Society
New Hampshire Planner Association (NHPA) Executive Committee, Sustainability Coordinator
New Hampshire Sustainable Energy Association (NHSEA), Vice President

SKILLS

Computer skills: Proficient in IBM PC, Macintosh OS Systems, Microsoft Word, Access, Power Point, Excel & Publisher, Word Perfect, Internet Applications, HTML Language, Quarke Express, Adobe PhotoShop, FileMaker Pro, Lotus, Q&A, PC Anywhere and Arcview 'GIS'
Language skills: Knowledge of Basic Conversational Spanish.

WORK EXPERIENCE

Clean Air Cool Planet
Community Program Manager May 2006 – Present
Project Manager for all communities in northeast working on climate change:
case studies, technical liaison, facilitate visioning sessions, outreach/media, climate change scientist, presentations, grant writing.

City of Keene Planning Department, Keene, New Hampshire
Planner April 2001 – May 2006
Climate Change Coordinator for City
Site Plan & Subdivision Technical Review
Zoning and Master Plan Review
Environmental Planning and Permitting Processes

Westport/Weston YMCA, Westport, Connecticut
Director of Marketing and Membership September 1998 – September 2000
Responsible for marketing campaign and Membership Department
Created and managed computer programs and databases
Produced and designed the Westport YMCA Program Brochure & Web Page

United Nations Association of the United States of America, New York, New York
Delegate/Intern January 1997 - May 1997
NGO Delegate to the Commission on Sustainable Development
Assisted in the creation of a formal policy on Sustainable Development for UNA-USA
Research and Advocacy of Environmental Issues

MARYANNE PENDLETON
TEMPLE, NH

EDUCATION

B.A., Endicott College, Beverly, Massachusetts - attended on full scholarship.

New England School of Photography

ECLECTIC PROFESSIONAL AND LABOR EXPERIENCE

Single mother - raised 3 children

Sheepherder, Needham, MA Day Camp,

Lift Operator, Wachusett Mountain

Ski Instructor, taught special needs population

Coat Check Clerk, Wayside Inn, Sudbury, MA

Word Processing Instructor to Captain of the QEII, Boston Harbor

COMMUNITY ACTIVISM

Member, Temple Economical Energy Committee, Temple, NH

Civil Rights Activist - in support of Martin Luther King Jr.

Free Tibet Activist including advocating for human rights in China

Gay Rights Activist, Boston, MA