

The New Hampshire Greenhouse Gas Emissions Reduction Fund

Year 3 (July 2011–June 2012) Evaluation





Year 3 (July 2011–June 2012) Evaluation

The New Hampshire Greenhouse Gas Emissions Reduction Fund

Matthew Magnusson, M.B.A.
UNIVERSITY OF NEW HAMPSHIRE

Cameron P. Wake, Ph.D.
INSTITUTE FOR THE STUDY OF EARTH, OCEANS, AND SPACE
UNIVERSITY OF NEW HAMPSHIRE

©2012

Carbon Solutions New England (CSNE)

Cameron P. Wake, Director
Earth Systems Research Center
Institute for the Study of Earth, Oceans, and Space
University of New Hampshire, Durham, NH

Carbon Solutions New England
University of New Hampshire
Morse Hall, 8 College Road, Durham, NH 03824
603 862-2329 CarbonSolutionsNE.org

Acknowledgements

The research for and writing of this report was funded by NH Public Utilities through a contract with the University of New Hampshire.

The transformational change required to build a low carbon society demands collaboration among a wide range of stake-holders including the private sector, government, non-profits, and universities. Carbon Solutions New England is a public-private partnership based at the University of New Hampshire to promote collective action to achieve a clean, secure energy future while sustaining our unique natural and cultural resources. New England is uniquely positioned to demonstrate an effective regional response by focusing our substantial entrepreneurial and intellectual resources on this issue.

Graphic Design: Kristi Donahue
UNH Institute for the Study of Earth, Oceans, and Space

This report is available online at CarbonSolutionsNE.org

NH Greenhouse Gas Emissions Reduction Fund Annual Evaluation (July 2011 – June 2012)

This report has been prepared by Carbon Solutions New England (CSNE), a public-private partnership based at the University of New Hampshire. CSNE's mission is to promote collective action to achieve a clean, secure energy future while sustaining New England's unique natural and cultural resources. CSNE achieves this through collaboration, conducting independent analysis and research, and communicating its findings to key decision makers.

As one of the 30 grant recipients of the first round of GHGERF grants awarded in 2009, CSNE was funded to document the economic, energy, and environmental impacts of the GHGERF program. Following expiration of the initial tracking grant in the fall of 2010, CSNE was retained by the PUC to perform this evaluation work on a contract basis, including the production of an annual report documenting the energy, economic, and environmental impacts resulting from GHGERF for the previous fiscal year (FY). This contract was renewed in the winter of 2011 through December 2012. This third annual report covers SFY 2011 (July 2010 to June 2011).

Contents

1	Executive Summary.....	4
2	Background	8
2.1	NH Greenhouse Gas Emissions Reduction Fund.....	8
2.2	StayWarm NH.....	8
2.3	2009 Grants.....	8
2.4	2010 Grants.....	9
3	Grant Activity	11
3.1	Energy Impacts.....	11
3.2	Employment Impact.....	14
3.3	Other Impacts	15
3.3.1	Workforce Development	15
3.3.2	Benchmarking and Audits	16
4	Discussion.....	17
5	Appendix A: Grant Description & Status.....	18
6	Appendix B: Grant Status with Award Amount	20

1 Executive Summary

The Greenhouse Gas Emissions Reduction Fund (GHGERF) was created by the New Hampshire legislature in 2008¹ and has been administered by the New Hampshire Public Utilities Commission (PUC). The purpose of the Fund was to support energy efficiency, energy conservation, and demand response programs to reduce New Hampshire's greenhouse gas emissions.² Funding was derived from the State's participation in the Regional Greenhouse Gas Initiative (RGGI), a cooperative effort by nine northeastern states to reduce carbon dioxide emissions in the electric power sector via a cap and trade program. RGGI conducts quarterly auctions of emissions allowances, the proceeds of which are distributed to the participating states, including New Hampshire.

As of June 2012, RGGI auctions had resulted in revenues to New Hampshire of \$38.7 million, of which \$21.8 million had been paid out to grants through June 2012. These funds have been distributed primarily through a competitive grant process administered by the PUC. All grant awards have required the approval of the Governor and Executive Council.

As of June 2012, cumulative energy savings due to projects that received GHGERF funds (\$21.8 million spent) are expected to be \$107.8 million through 2030 based on current energy prices. For every dollar spent as of June 2012, the expected return is \$4.95 in energy savings.

In the first round of funding, the GHGERF awarded \$17.7 million to 30 grantees in the summer and fall of 2009. Awards ranged from \$8,000 to \$7.6 million with the average award amount of \$590,000. In December 2010, the GHGERF awarded an additional \$13.4 million to six grantees with an average award amount of \$2.2 million. The total amount of GHGERF grant awards is equal to 0.5% of the \$6 billion that New Hampshire spends annually on energy across all sectors. These grants funded a wide variety of projects and programs which directly benefitted New Hampshire homes, schools, businesses, towns, and non-profit organizations. Details for each grant award are available at the PUC's website (<http://www.puc.nh.gov/Sustainable%20Energy/GHGERF.htm>).

Completed projects supported by GHGERF funds (as of June 2012) have resulted in annual reductions of fossil fuel energy use in NH by 227,400 million BTUs (MMBTUs). This is equivalent to the energy used by 2,000 NH households in one year. Additionally, the GHGERF creates annual energy savings for NH residents and businesses of over \$6.7 million and reduces annual carbon dioxide (CO₂) emissions by 22,900 metric tons. Cumulative energy savings due to projects completed as of June 2012 are estimated to be 4.0 million MMBTUs through 2030; this is equivalent to the annual energy use of 34,000 NH households. NH residents and businesses are expected to save \$107.8 million through 2030 based on

¹NH General Court, RSA 125-O: 23.

² In the 2012 legislative session, HB 1490 was passed which replaces the GHGERF with the Energy Efficiency Fund. The new law requires the first dollar of each allowance sale to go to augment funds in the energy efficiency programs run by NH's electric utility companies. All additional auction proceeds are to be rebated directly to customers thus reducing the amount of funding that will be available for energy efficiency projects. The existing grants awarded through GHGERF will be funded through the end of their contracts in June 2013 when the grant-based version of the RGGI program in NH will end.

NH Greenhouse Gas Emissions Reduction Fund Annual Evaluation (July 2011 – June 2012)

current energy prices. Carbon dioxide emissions reductions are estimated to be 366,500 metric tons through 2030.

Table 1: Grant activity during past 3 year period

Grants	Jul 09 - Jun 10	Jul 10 - Jun 11	Jul 11 - Jun 12
Started during reporting period	30	3	0
Reauthorized during reporting period	0	3	0
Active during reporting period	30	23	9
Completed During reporting period	10	14	3

Table 2: Annual energy reductions for projects completed over the past 3 years (July 2009 – June 2012)

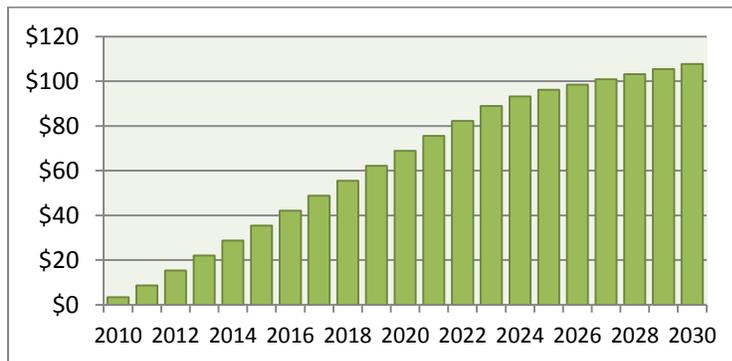
Time Period	Electric (kwh)	Oil (gallons)	Natural Gas (therms)	Propane (Gallons)	MMBTUs	GHG (metric tons)	Annual Savings
Jul 2009 – Jun 2010	16,965,886	74,380	502,409	48,349	124,230	12,065	\$3,457,085
Jul 2010 – Jun 2011	9,997,474	208,962	36,250	-89,934*	58,589	6,728	\$1,923,353
Jul 2011 – Jun 2012	4,480,389	110,873	97,808	41,899	44,544	4,095	\$1,307,309
Total	31,443,749	394,215	636,467	314	227,363	22,888	\$6,687,747

*Reflects an increase in propane usage due to fuel switching in some projects

Table 3: Projected energy savings through 2030 for projects completed as of June 2012

Fuel Type	Energy Reduced	MMBTU	Energy Savings (\$ millions)	CO2 reduced (thousand metric tons)
Electric	440.2 million (kWh)	1.5 million	\$61.2	217
Oil	7.9 million (gallons)	1.1 million	\$29.3	79.7
Natural Gas	13.1 million (therms)	1.4 million	\$17.3	69.7
Propane	12.7 thousand (gallons)	1.1 thousand	\$0.02	0.07
Total		4.0 million	\$107.8	366.5

Figure 1: Cumulative energy savings for projects completed as of June 2012 (\$ millions)

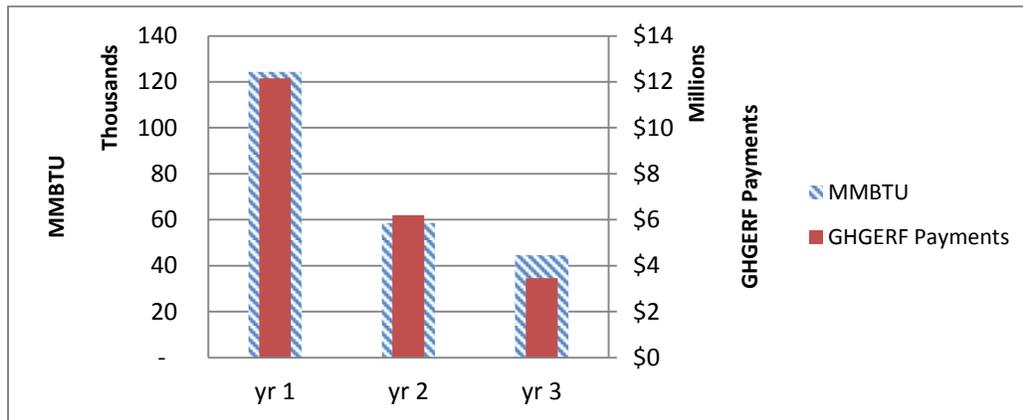


Over the past three years, energy savings per dollar spent by the fund has improved. During the first year, the energy-saved-to-GHGERF cost ratio was 10.2 MMBTUs saved per \$1,000 spent. The performance during the second year decreased slightly to 9.5 MMBTUs saved per \$1,000 spent. The grants awarded in 2010 were only just beginning during the second reporting period (Jul 2010- 2011) and did not deliver any significant energy reductions during the second reporting period.³ This past reporting period, the impact of the 2010 grants was in full force and energy savings improved to 12.9 MMBTUs per \$1,000 spent.

Table 4: Energy savings and cost for three year period

Time Period	MMBTUs for Projects Completed in the Reporting Period	GHGERF Funds Paid to Grants	MMBTUs Reduced per \$1,000 spent
Jul 2009 – Jun 2010	124,230	\$12,158,749	10.2
Jul 2010 – Jun 2011	58,589	\$6,195,484	9.5
Jul 2011 – Jun 2012	44,544	\$3,454,998	12.9

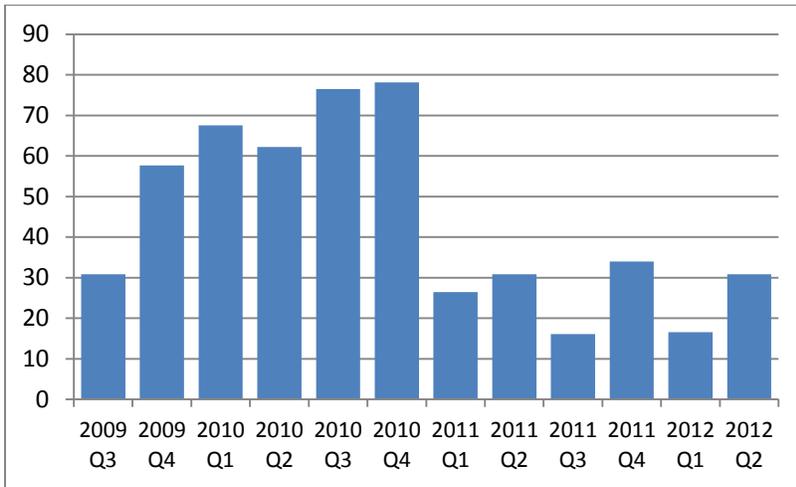
Figure 2: Energy savings and cost for three year period



The GHGERF grants directly supported 24 full time equivalent (FTE) jobs from July 2011 through June 2012. This is down 55% from the 53 FTE jobs that were supported by GHGERF in the previous year. The drop in employment was due to overall lower levels of grant activity created, at least in part by legislative uncertainty.

³ Regulatory uncertainty caused grantees to hold back on program development.

Figure 3: FTE jobs supported by GHGERF by Quarter



In addition to energy reductions, GHGERF has supported energy efficiency workforce development for 700 workers with over 11,300 training hours (as of June 2012). GHGERF has also financially supported almost 2,300 building benchmarking and energy audit evaluations. Workforce development and benchmarking/audit activities are essential foundational steps in developing the next wave of cost-effective projects that reduce energy use and save money for New Hampshire’s ratepayers .

During the past three years, GHGERF has delivered significant energy savings and served a wide-base of residential, commercial, and industrial energy customers throughout New Hampshire. The experience and capacity built during the three year period allowed GHGERF to deliver the highest amount of energy saved per dollar spent during this past reporting period. The model of having a central specialized expert organization work with multiple energy customers, as seen in all of the grants awarded in 2010, has proven to be a successful one and should be considered as NH’s RGGI program shifts to the NH electric utility energy efficiency programs.

2 Background

2.1 NH Greenhouse Gas Emissions Reduction Fund

The NH Greenhouse Gas Emissions Reduction Fund (GHGERF) was created by New Hampshire legislation, RSA 125-O: 23 in 2008.⁴ GHGERF is funded by New Hampshire's participation in the [Regional Greenhouse Gas Initiative \(RGGI\)](#), a cooperative effort among nine states – Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont – to reduce greenhouse gas emissions. The program creates a market for carbon dioxide emissions allowances sold at regional quarterly auctions. New Hampshire's share of the proceeds from the auctions are paid into the GHGERF. As of June 2012, the GHGERF had received \$37.8 million in auction proceeds. The GHGERF is administered by the NH Public Utilities Commission (PUC) with the Sustainable Energy Division assisting with fund management. [Annual reports](#) for the fund are prepared jointly by the Department of Environmental Services and the Public Utilities Commission and submitted to the NH Legislature. The reports summarize the allocation and spending of auction revenues.

2.2 StayWarm NH

The first major expenditure from GHGERF was \$1.2 million for the [StayWarmNH](#) program in winter 2008-2009. StayWarm provided assistance to low-income households by expanding existing weatherization and air sealing programs administered through the Community Action Agencies (CAAs), and by funding a do-it-yourself (DIY) weatherization kit and volunteer based weatherization efforts.⁵ By May 2009, 3,400 homes were reached by the program. Volunteers installed over 1,000 compact fluorescent lights (CFLs), providing lifetime energy savings of \$116,000, reducing CO₂ emissions by 400 metric tons, and saving 575,850 kWh of electricity. Of the 3,400 StayWarm kits distributed for DIY Installation, assuming half the four CFLs included in the kit were installed by homeowners, lifetime savings for those 6,800 bulbs would be \$760,000 or 3.75 million kWh of electricity, and CO₂ pollution would be reduced by 2,600 metric tons.⁶

2.3 2009 Grants

The next major round of expenditures supported the first round of grants that were awarded in the summer and fall of 2009. The first Request for Proposals (RFP) was issued in February of 2009. Out of 84 proposals submitted, 30 grants totaling \$17.7 million were awarded in four separate rounds: July 15, 2009, August 15, 2009, September 23, 2009, and October 21, 2009. Grants went to a variety of energy efficiency project types including, but not limited to, grants for education and outreach for the building trades, auditing and benchmarking for municipalities and schools, energy management for campuses, auditing and implementation for retail establishments and process improvements for several businesses. See previous annual reports for a discussion of the grants awarded in 2009.

⁴ RSA 125 O:23, available online at <http://www.gencourt.state.nh.us/rsa/html/X/125-O/125-O-23.htm>.

⁵ The StayWarm program was not part of the grant award process, but this expenditure was mandated by the Governor and Legislature.

⁶ "StayWarm Final Report 2008-2009" Available online at http://www.nh.gov/staywarm/#progress_reports.

2.4 2010 Grants

A second RFP was issued by the NH PUC in May 2010. Drawing on the experience from the first round of grants, the PUC targeted three specific program areas:

1. Program continuation for grants awarded in the first RFP that had demonstrated success in implementing their initial proposals.
2. Programs that reduce energy use and greenhouse gas emissions at large energy user sites.
3. Programs that reduce energy use and greenhouse gas emissions in the affordable housing sector.

This reflected a more targeted approach than the previous grant round which had been more flexible for program and project ideas that supported the goals of the GHGERF. The average grant size (\$2.2 million) was 3.7 times larger than the average grant size from the first RFP (\$0.6 million). A short description of each funded project appears in Appendix A. For additional information on each of the funded projects, their proposals, contracts, and quarterly reports are available on the [GHGERF webpage](#) hosted by the PUC.

Out of 29 proposals, 6 grants totaling \$13.4 million were awarded by the PUC and approved by the Governor and Council on December 8, 2010.

Table 5: Allocation of GHGERF funds from January 2008 – June 2011

Expenditure	Amount (\$ millions)	Percentage
StayWarmNH	\$1.2	3%
2009 Grants	\$17.7	50%
2010 Grants	\$13.4	38%
State Budget	\$3.1	9%
Total	\$35.4	100%

Table 6: Grants awarded in 2010 by recipient type

Recipient Type	Grants		Grant Funding		Average Award Size
	Count	Percentage	Amount	Percentage	
Non-Profit	2	33%	\$4,000,000	30%	\$2,000,000
Private	1	17%	\$5,000,000	37%	\$5,000,000
Public Entity	3	50%	\$4,400,000	33%	\$1,466,667
Total	6	100%	\$13,400,000	100%	\$2,233,333

Table 7: Grants awarded in 2010

Grant	Award Amount	Program Category ⁷	Entity Served	Contract Duration (Years)
TRC Companies	\$5,000,000	Energy Efficiency	Commercial & Industrial	2.5
Business Finance Authority of NH	\$2,000,000	Energy Efficiency	Commercial & Industrial	2.5
NH Community Loan Fund	\$2,000,000	Energy Efficiency	Affordable Housing	2.5
NH Housing Finance Authority	\$2,000,000	Energy Efficiency	Affordable Housing	2.5
Retail Merchants Assn of NH	\$2,000,000	Energy Efficiency	Commercial & Industrial	2.5
DRED - Division of Economic Development	\$400,000	Energy Efficiency	Workforce	2.5

The largest single grant was \$5.0 million (17% of total grant awards) and went to TRC Companies for their Pay for Performance Program (P4P) serving large energy users. Overall, approximately 67% of funding was allocated to benefit NH commercial and industrial businesses, 30% of funding was allocated to affordable housing, and 3% of funding was allocated to energy efficiency workforce development.

In the 2012 legislative session, the House and Senate passed HB 1490 which replaces GHGERF with the Energy Efficiency Fund; the bill was allowed to pass into law without signature by Gov. John Lynch.⁸ The new law requires the first dollar of each allowance sale to go to augment funds in the energy efficiency programs run by NH's electric utility companies. The law requires all additional auction proceeds to go directly to rebates for customers. This reduces the amount of funding that will be available for energy efficiency projects by approximately 50% at current allowance prices, and will effectively end the grant-based version of the RGGI-based program in NH in June 2013 or when the contracts expire. HB 1490 does allow for all existing grants awarded through GHGERF to go to completion.

⁷ As defined by RGGI, Inc. in Potential RGGI Benefits Metrics Draft #6 issued on 1/12/2012.

⁸ <http://www.gencourt.state.nh.us/legislation/2012/HB1490.html>

3 Grant Activity

3.1 Energy Impacts

Projects completed through June 2012 will result in annual energy savings of \$6.7 million at current energy prices and reduce CO₂ emissions by 18,900 metric tons annually. This is the equivalent to the annual energy usage of 1,400 NH households. For every dollar spent as of June 2012, the expected return is \$4.95 in energy savings.

Table 8: Annual energy reductions for projects completed over the past 3 years (July 2009 – June 2012)

Time Period	Electric (kwh)	Oil (gallons)	Natural Gas (therms)	Propane (Gallons)	MMBTU	GHG (metric tons)	Annual Savings
Jul 2009 – Jun 2010	16,965,886	74,380	502,409	48,349	124,230	12,065	\$3,457,085
Jul 2010 – Jun 2011	9,997,474	208,962	36,250	-89,934*	58,589	6,728	\$1,923,353
Jul 2011 – Jun 2012	4,480,389	110,873	97,808	41,899	44,544	4,095	\$1,307,309
Total	31,443,749	394,215	636,467	314	227,363	22,888	\$6,687,747

*Reflects an increase in propane usage due to fuel switching in some projects

Cumulative energy savings due to projects completed as of June 2012 are estimated to be 4.0 million MMBTUs through 2030; this is equivalent to the annual energy use of 34,000 NH households.⁹ NH residents and businesses are expected to save \$107.8 million through 2030 based on current energy prices. Carbon dioxide emissions reductions are estimated to be 366,500 metric tons through 2030.

Over the past three years, energy savings per dollar spent by the fund has increased. During the first year, the energy saved to GHGERF cost ratio was 10.2 MMBTUs saved per \$1,000 spent. The performance during the second year decreased slightly to 9.5 MMBTUs saved per \$1,000 spent. The grants awarded in 2010 were only just beginning during the second reporting period (Jul 2010- 2011) and did not deliver any significant energy reductions during the second reporting period. This past reporting period, the impact of the 2010 grants was in full force and energy savings improved to 12.9 MMBTUs per \$1,000 spent.

⁹ Cumulative savings was calculated by extrapolating annual energy savings over the assumed project lifetime. Electrical projects were assumed to have a lifetime of 13 years and building shell improvements and mechanical system upgrades were assumed to have a lifetime of 20 years.

Table 9: Energy savings and cost for three year period

Time Period	MMBTU for Projects Completed in the Reporting Period	GHGERF Funds Paid to Grants	MMBTU Reduced per \$1,000 spent
Jul 2009 – Jun 2010	124,230	\$12,158,749	10.2
Jul 2010 – Jun 2011	58,589	\$6,195,484	9.5
Jul 2011 – Jun 2012	44,544	\$3,454,998	12.9

Figure 4: Energy savings and cost for three year period

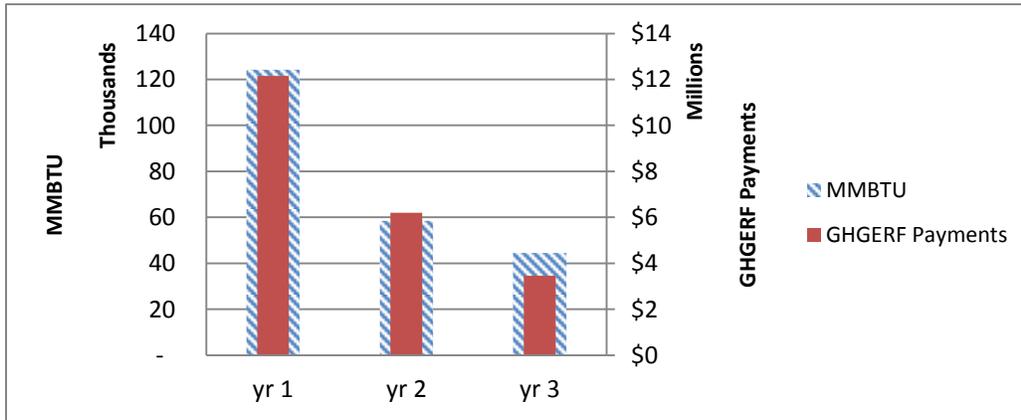
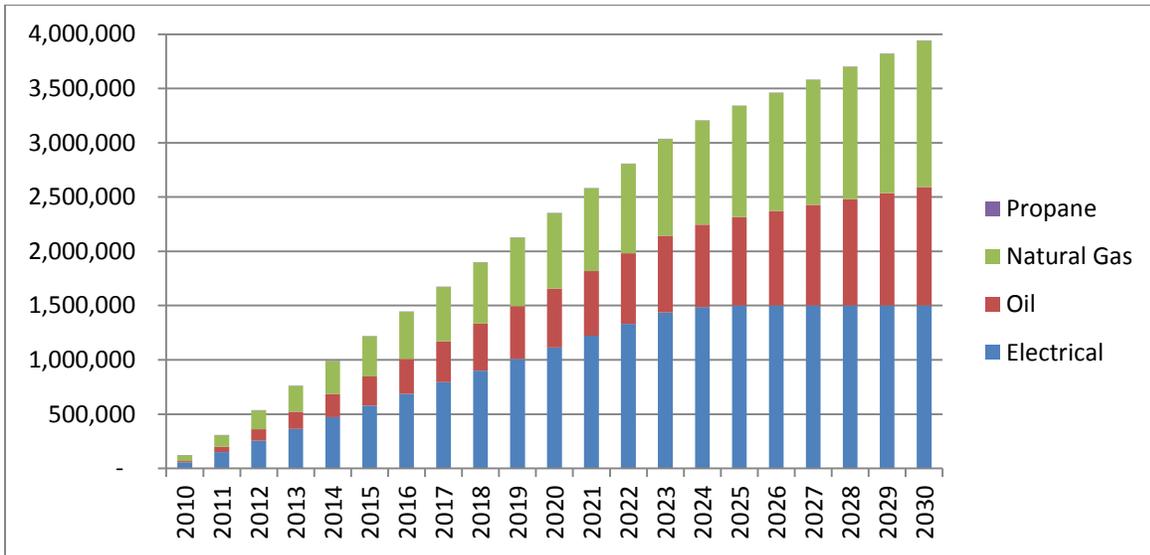


Table 10: Projected energy savings through 2030 for projects completed as of June 2012

Fuel Type	Energy Reduced	MMBTU	Energy Savings (\$ millions)	CO2 reduced (thousand metric tons)
Electric	440.2 million (kWh)	1.5 million	\$61.2	217
Oil	7.9 million (gallons)	1.1 million	\$29.3	79.7
Natural Gas	13.1 million (therms)	1.4 million	\$17.3	69.7
Propane*	12.7 thousand (gallons)	1.1 thousand	\$0.02	0.07
Total		4.0 million	\$107.8	366.5

Figure 5: Cumulative energy savings for grants funded in 2010 through 2030 by fuel type (MMBTU)



While it was outside the scope of work for this annual report to quantify the indirect avoided costs associated with the grants awarded—such as avoided electrical capacity costs, reduced price of energy due to lower demand, and avoided environmental externalities— it is important to mention that there are benefits which accrue to all energy users in regards to reductions in energy use from the grants awarded through GHGERF.

3.2 Employment Impact

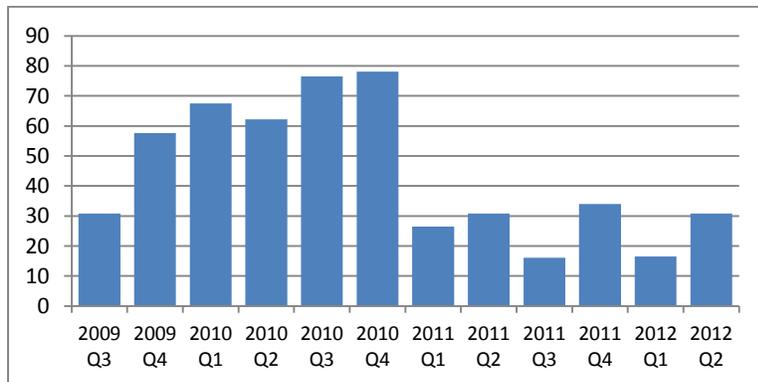
Direct employment impact associated with the grants was measured and documented by each grant recipient. Between July 2011 and June 2012, GHGERF grants supported 24 full-time equivalent (FTE) jobs.¹⁰ A FTE is a standard measurement for labor and is 2,080 work hours. Job activity ranged from construction jobs to professional service jobs.¹¹ The GHGERF grants directly supported 19 full time equivalent (FTE) jobs from July 2011 through June 2012. This is down 55% from the 53 FTE jobs that were supported by GHGERF in the previous year. The drop in employment was due to lower levels of grant activity caused by Legislative uncertainty as grantees were reluctant to pursue grant activity while the Legislature was debating New Hampshire’s participation in RGGI .

For every million dollars of GHGERF money expended through this reporting period, six FTE jobs were supported. This equates to one job supported for every \$167,600 of grant funds spent. The ratio of six FTE jobs per million dollars provided by GHGERF funding is somewhat higher than that reported from the America Recover and Reinvestment Act funding from the Department of Energy, which recorded 4.02 FTE jobs per million spent or one job for every \$248,750 spent.¹²

Table 11: Direct FTE jobs supported by GHGERF by quarter from July 2009 to June 2012

2009 Q3	2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4
31	58	67	62	76	78
2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2
26	31	16	34	17	31

Figure 6: FTE jobs supported by GHGERF by quarter



¹⁰ Supported means that funding from GHGERF went to pay for workers directly engaged in carrying out the activities of the grant. During the year of grant reporting, labor hours were reported by grant administrators for all grant employees and contractors and subcontractors that performed work carrying out the activities of the grant.

¹¹ Labor type was not classified nor was a distinction made between a new vs. retained job.

¹² Through June 2012, ARRA funded \$23.8 billion Dept of Energy projects that resulted in 95,751 FTE jobs. <http://www.recovery.gov/Transparency/RecipientReportedData/Pages/JobSummary.aspx>

3.3 Other Impacts

In addition to energy reductions, grants funded by GHGERF have also benefited workforce development and building benchmarking/audits.

3.3.1 Workforce Development

In this assessment framework, job training is defined as *formal activities that provide the “green” workforce the skills and knowledge to properly execute energy reduction projects.*¹³ There were many less formal education seminars funded through GHGERF, but those were not included in this specific measure of training. In this annual report, “training” was defined as in-depth classes that consisted of a half-day or more of instruction and provided specific energy reduction skill development.

Three grants (as of June 2011) funded formal training: Department of Resources & Economic Development – Lakes Regional Community College (DRED-LRCC), Home Builders & Remodelers Association of NH (HBRANH), and the Plymouth Area Renewable Energy Initiative (PAREI). Of the three, DRED-LRCC and HBRANH were specifically focused on providing workforce development, while PAREI included a training component for developing its member-based workforce. GHGERF supported a total of 72 formal training opportunities (courses) and resulted in 693 workers receiving formal training over 11,000 contact hours, or approximately 16 hours of training on average per worker.

Table 12: Training provided as of June 2012

Grant	Total Grant Award	Courses	Workers Trained	Contact Hours
Home Builders & Remodelers Assn of NH (HBRANH)	\$178,169	14	45 *	600*
Dept of Resources & Economic Development, Lakes Region Community College (DRED-LRCC) ¹⁴	\$574,000	72	643	10,588
Plymouth Area Renewable Energy Initiative (PAREI) ¹⁵	\$99,250	1	5	200
		87	693	11,388

*HBRANH did not report workers trained or contact hours for all courses offered

¹³ For a more detailed description of “green” employment, see “New Hampshire’s Green Economy and Industries: Current Employment and Future Opportunities,” University of New Hampshire, January 2009, Available online at <http://www.carbonsolutionsne.org/resources/reports/>

¹⁴ This includes amounts awarded from the first and second RFP. This program demonstrated success in energy efficiency workforce development and was awarded additional funding. The second RFP included PAREI as a partner.

¹⁵ Only a small amount of the overall grant to the Plymouth Area Renewable Energy Initiative’s scope of work went to workforce training. The grants to HBRANH and DRED-LRCC were primarily focused on workforce development and the grant funds per worker and grant funds per contact hour are more meaningful metrics.

3.3.2 Benchmarking and Audits

Another significant area of activity and a key component of initiating energy reduction installations are benchmarking and audits. Benchmarking is a less time-consuming and lower cost process which typically relies on an analysis of utility statements to determine a building’s energy use relative to other buildings with similar use. The Environmental Protection Agency (EPA) Portfolio Manager tool is a commonly used benchmarking tool in the commercial sector. Benchmarking is a tool to identify buildings that have above average energy demands and that may be good candidates for cost effective energy efficiency installations/retrofits. Audits are more time-consuming and costly and involve developing a prescriptive set of recommendations and measures that will, if implemented, reduce energy use in a building. GHGERF supported nearly 1,100 formal building benchmarking & audit activities for schools, towns, and residences.

Table 13: Benchmarking and audits as of June 2012

Grants	Total Grant Award	Buildings Benchmarked	Audits
Clean Air - Cool Planet	\$400,000	283	42
NH Community Loan Fund	\$2,000,000		123
NH Housing Finance Authority	\$2,000,000		1,277
LighTec, Inc	\$316,000		7
Plymouth Area Renewable Energy Initiative	\$99,250		33
Retail Merchants Association of NH ¹⁶	\$3,372,028	162	107
Southern NH Resource Conservation & Dev	\$87,000		25
Town of Hancock	\$8,500		6
Town of Jaffrey	\$16,250		9
Town of Warner	\$11,150		8
TRC, Inc. – EnergySmart Schools	\$499,948	201	
TRC, Inc. – P4P	\$5,000,000		4
		646	1,641

¹⁶ Retail Merchants Association of NH received a grant continuation in 2010 due to the success of the program. The amount awarded in 2009 was \$1,372,028 and in 2010 was \$2,000,000.

4 Discussion

The 30 grants awarded from GHGERF in a competitive process in 2009 met a wide range of needs in the energy efficiency marketplace and served a broad group of energy consumers across the State of New Hampshire. The six grants awarded in 2010 (including the continuation of 3 grants from 2009) built on the lessons learned from the first year of the program and were more targeted at specific sectors. The first three years of the program have delivered significant energy savings and provided positive economic impacts for the New Hampshire economy. The employment impact of GHGERF was the direct support of 132 full time equivalent jobs through June 2012.

The 2010 grants have, as expected, provided additional energy savings on top of the impressive energy savings realized by completion of the grants awarded in 2009. Lessons learned from the first round of grants resulted in a higher energy savings per dollar spent by GHGERF than in the previous two reporting periods. The model of having a central specialized expert organization work with multiple energy customers, as seen in all of the grants awarded in 2010, has proven to be a successful one and may be of benefit to consider as NH's RGGI program shifts to the NH electric utility energy efficiency programs.

5 Appendix A: Grant Description & Status

Grant	Proposal Description	RGGI Inc. Program Categories	Markets	Status as of June 30, 2011
Crotched Mtn Rehabilitation Ctr	Upgrade the heating distribution and control system of a building whose residents are mainly low-income	Clean & Renewable Energy, Energy Efficiency	Commercial	Completed - 2009 Q4
NH Institute of Art	Install geothermal heating and cooling system, premium building envelope measures, and a vegetated roof.	Clean & Renewable Energy, Energy Efficiency	Commercial	Completed - 2009 Q4
SAU 46/Merrimack Valley School District	Connect its office building to an existing, central biomass plant that is already providing heat to three nearby schools, and will upgrade lighting fixtures, compressors, air handlers and controls to reduce the use of electricity and natural gas.	Clean & Renewable Energy, Energy Efficiency	Municipal	Completed - 2009 Q4
Fraser NH LLC	The Fraser paper mill in Gorham will utilize reuse of hot water, hot air and condensate to reduce usage of #6 oil by 729,000 gallons per year through 5 specific projects.	Energy Efficiency	Industrial	Completed - 2010 Q1
Town of Fremont	The Fremont Safety Complex will be retrofitted by adding insulation to ceiling areas and performing air sealing to eliminate leaks.	Energy Efficiency	Municipal	Completed - 2010 Q1
Town of Gorham	Replace the heating system in the Gorham Fire Station by installing a high-efficiency oil furnace and a wood pellet boiler	Clean & Renewable Energy, Energy Efficiency	Municipal	Completed - 2010 Q1
Town of Hancock	Energy audits will be performed in each of the town's 8 municipal buildings	Energy Efficiency	Municipal	Completed - 2010 Q1
Town of Warner	Energy audits will be performed in each of the town's 13 municipal buildings	Energy Efficiency	Municipal	Completed - 2010 Q1
Town of Jaffrey	Energy audits will be performed in each of the town's 16 municipal buildings	Energy Efficiency	Municipal	Completed - 2010 Q2
UNH- Carbon Solutions New England	Track, analyze and report on the results of projects funded by the GHGERF.	Administration		Completed - 2010 Q2
Town of Walpole	Perform comprehensive, energy-saving retrofits of the Walpole Town Hall and the North Walpole Municipal Building.	Energy Efficiency	Municipal	Completed - 2010 Q3
Clean Air-Cool Planet	Provide 24 to 48 NH towns with baseline energy information, specific recommendations and on-going support necessary to renovate their most inefficient municipal buildings	Energy Efficiency	Municipal	Completed - 2010 Q4
Plymouth Area Renewable Energy Initiative	Expand its successful "Energy Raiser" programs to provide homeowners with the technical information and volunteer support to install solar hot water systems and to weatherize homes. 10 homes will be weatherized and 10 will have solar hot water systems installed. 5 will receive refrigerator replacements.	Clean & Renewable Energy, Energy Efficiency	Residential	Completed - 2010 Q4
Propell Energy	Install a high efficiency wood pellet boiler in New England College's Science Building.	Clean & Renewable Energy	Commercial	Completed - 2010 Q4
RECORE - NH Electric Utilities	National Grid, NH Electric Co-op, PSNH, and Unitil will expand the CORE Efficiency Programs by increasing the budget for current programs and adding new program elements.	Energy Efficiency	Residential, Commercial & Industrial	Completed - 2010 Q4
Stonyfield Farm Inc	Install a variety of measures that will reduce energy consumption at their plant in Londonderry.	Energy Efficiency	Industrial	Completed - 2010 Q4
Chosen Vale Inc dba Enfield Shaker Mus	The Great Stone Dwelling will be retrofitted. The Museum will also create an educational exhibit on saving energy and reducing greenhouse gas emissions.	Energy Efficiency	Commercial	Completed - 2011 Q1
Home Builders & Remodelers Assn of NH	Provide training to building professionals and educate homeowners, buyers and occupants.	Energy Efficiency	Workforce Development	Completed - 2011 Q1
LighTec Inc	Install high efficiency lighting systems in 16 schools	Energy Efficiency	Commercial	Completed

NH Greenhouse Gas Emissions Reduction Fund Annual Evaluation (July 2011 – June 2012)

Grant	Proposal Description	RGGI Inc. Program Categories	Markets	Status as of June 30, 2011
	and town buildings across the state.		& Industrial	- 2011 Q1
So NH Conservation & Development Area Council	Known as the New Hampshire Farm Energy Initiative, this program will provide up to 10 workshops on energy efficiency to agricultural business owners and operators. In addition, the initiative will provide comprehensive energy audits to 25 farms	Energy Efficiency	Commercial	Completed - 2011 Q1
City of Rochester	Install equipment to reduce energy demand at the city's Wastewater Treatment Facility.	Energy Efficiency	Municipal	Completed - 2011 Q2
No Country Res Cons & Dev Area Council	Conduct outreach to NH communities and organizations seeking to pursue district heat/power biomass systems.	Greenhouse Gas Abatement and Climate Change Adaptation	Municipal	Completed - 2011 Q2
Town of Temple	Perform comprehensive, energy-saving retrofits of the Municipal Building and the Mansfield Library, and create several other conservation and outreach programs.	Energy Efficiency	Municipal	Completed - 2011 Q2
UNH- Carbon Challenge	Create a residential energy portal (website) as a central source of sound information on energy efficiency programs, sustainable energy technologies, and available resources and incentives such as rebates and tax incentives. Also provide direct assistance to communities through public presentations, guidance on best practices, and progress reports.	Energy Efficiency	Residential	Completed - 2011 Q2
TRC - NH Energy Smart Schools Program	Launch a benchmarking initiative to measure the energy performance of 250 public K-12 schools.	Energy Efficiency	Municipal	Completed - 2011 Q3
Dartmouth College	Implement a Campus Energy and Sustainability Management system to achieve improved building energy performance, campus smart-grid technology, and innovative energy feedback systems.	Energy Efficiency	Commercial	Completed - 2011 Q4
NH Community Development Finance Auth	Establish a revolving loan fund to finance energy improvements in municipal buildings.	Energy Efficiency	Municipal	Completed - 2011 Q4
Business Finance Authority of NH	Establish a revolving loan fund to help businesses finance energy efficiency improvements.	Energy Efficiency	Commercial & Industrial	On-going
DRED - Division of Economic Development	Partner with Lakes Region Community College (LRCC) to develop a new training program to help develop a skilled labor force for energy efficiency improvements to buildings	Energy Efficiency	Workforce Development	On-going
NH Community Loan Fund	Deep energy efficiency retrofits in approximately 425 manufactured homes	Energy Efficiency	Residential	On-going
NH Housing Finance Authority	Implement the Greener Homes Program (GHP) to provide rigorous energy audits, and energy efficiency upgrades for low-income apartment units in New Hampshire	Energy Efficiency	Residential	On-going
Retail Merchants Assn of NH	Create an energy efficiency program for RMA members and other similarly situated businesses that includes audits and project financing.	Energy Efficiency	Commercial	On-going
TRC - P4P	Comprehensive, whole-building approach to saving energy in large commercial and industrial facilities while linking incentives directly to energy savings.	Energy Efficiency	Commercial & Industrial	On-going

6 Appendix B: Grant Status with Award Amount

Grant	2009		2010				2011				2012				2013	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Business Finance Authority			\$2,000,000				\$2,000,000									
Dartmouth College			\$330,936													
DRED - Lakes Region CC			\$174,000				\$400,000									
NH Community Development Finance Authority			\$1,500,000													
NH Community Loan Fund							\$2,000,000									
NH Housing Finance Authority							\$200,000									
Retail Merchants Assoc. of NH			\$1,372,028				\$2,000,000									
TRC NH EnergySmart Schools Program			\$499,948													
TRC - P4P							\$5,000,000									
City of Rochester			\$394,000													
Clean Air - Cool Planet			\$400,000													
Crotched Mountain Rehab. Center			\$176,531													
Enfield Shaker			\$51,354													
Fraser Papers			\$470,000													
Home Builders Assoc. of NH			\$178,169													
LighTec			\$316,000													
NH Institute of Art			\$146,060													
North Country Resource Conservation & Dev.			\$43,850													
Plymouth Area Renewable Energy Initiative			\$99,250													
Propell Energy			\$49,885													
RE-CORE			\$7,646,020													
SAU 46			\$83,685													
Southern NH Resource Conservation & Dev.			\$87,000													
Stonyfield Farm			\$148,927													
Town of Fremont			\$8,000													
Town of Gorham			\$26,000													
Town of Hancock			\$8,500													
Town of Jaffrey			\$16,250													
Town of Temple			\$332,100													
Town of Walpole			\$138,345													
Town of Warner			\$11,150													
UNH - NH Carbon Challenge			\$813,402													
UNH - Carbon Solutions New England			\$139,945													

Ended as of June 2012
 Ongoing as of June 2012

The Authors



Matt Magnusson is a graduate of the University of New Hampshire's (UNH) Whittemore School of Business and Economics with a Masters of Business Administration. He currently is earning his Ph.D. in Natural Resources and Environmental Studies at UNH and

also is an Adjunct Lecturer at UNH teaching Sustainability Business Models. He has provided analysis on the economic impacts of several different environmental public policy initiatives including work on the NH Renewable Portfolio Standard (RPS) and the Regional Greenhouse Gas Initiative (RGGI), a carbon cap and trade program in the Northeast.

Other research includes "New Hampshire's Green Economy and Industries: Current Employment and Future Opportunities", "Economic Impact of the Proposed Antrim 30 MW Wind Power Project in Antrim, New Hampshire", and the economic analysis of policies proposed in "The New Hampshire Climate Action Plan" performed for the NH Climate Change Task Force.



CAMERON WAKE is a research associate professor at the Institute for the Study of Earth, Oceans and Space at the University of New Hampshire and is the Josephine A. Lamprey Fellow in Climate and Sustainability at the UNH Sustainability Institute. Cameron leads a research program

investigating regional climate and environmental change through the analysis of ice cores, instrumental data, and phenological records. Cameron also directs [Carbon Solutions New England](#), a public-private partnership promoting collective action to achieve a clean, secure energy future while sustaining our unique cultural and natural resources, and helps lead the [New Hampshire Energy and Climate Collaborative](#), established to track and facilitate the implementation of New Hampshire's [2009 Climate Action Plan](#). More on Cameron's research is available online at: <http://www.eos.sr.unh.edu/Faculty/Wake>.

Dr. Wake received a B.Sc. in Geology (1984) from the University of Ottawa, an M.A. in Geography (1987) from Wilfrid Laurier University, and a Ph.D. in Earth Sciences (1993) from the University of New Hampshire.

CARBON SOLUTIONS
NEW ENGLAND
CarbonSolutionsNE.org

