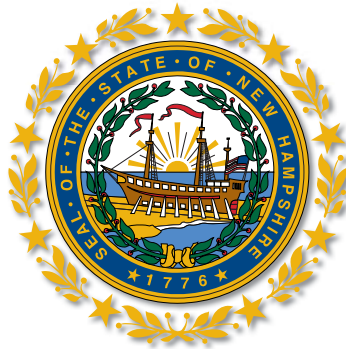


# Emerging Green Construction in New Hampshire



**State of New Hampshire**  
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**New Hampshire Employment Security**  
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The aim of this green industry paper, and others like it, is to review the kind of greening that is currently taking place in New Hampshire's businesses, focusing on practices utilized by different industries. Furthermore, we examine how changes in business processes and practices have led to the development of new skills, knowledge and tasks among employees. New certifications and accreditations related to green are also discussed.

We would like to thank the businesses and industry professionals that have answered questions about their green processes and green certifications.

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## Introduction

The construction sector is regarded as having significant potential to “go green” and as a result provide green jobs for workers. According to the U.S. Green Building Council, the green construction market has grown dramatically and should continue to grow.<sup>1</sup> Green buildings are considered to have lower energy usage and therefore cost less to operate. The higher initial cost of the green construction is paid back by lower operating cost over a ten-year span.<sup>2</sup> The additional construction cost of enhancing the energy efficiency of the current building stock will also be paid back over time in savings related to the reduced usage of energy. There are numerous well-established membership organizations for home builders, construction companies, consultants and other building professionals that offer certifications in energy-efficient design, building techniques and use of environmentally sustainable materials. These organizations train and qualify construction workers to meet new building code standards as well as meet customer demand for more energy efficient and environmentally friendly structures.


## Green Incentives


The goals of the 2009 American Recovery and Reinvestment Act (ARRA), were to stimulate business activity and improve the environment. The U.S Department of Energy awarded 71.5 million to New Hampshire between February 17, 2009 and September 30, 2011 for renewable and energy efficiency grants and contracts.<sup>3</sup> In order to be eligible for weatherization and similar project funding under this provision, New Hampshire’s building energy codes needed to be revised. Residential building codes were mandated to meet or exceed the most recent International Energy Conservation Code® (IECC®); while commercial energy codes had to meet or exceed the ANSI/ASHREA/IESNA standard 90.1-2007. Thus, New Hampshire adopted the 2009 IECC energy codes, which satisfied both requirements. In New Hampshire, the IECC 2009 codes went into effect on April 1, 2010 in which the state committed to reach a 90 percent compliance rate by 2017.<sup>4</sup> The 2009 IECC codes support greener, high performance building by requiring stricter energy efficiency standards in both the commercial sector and residential home construction.<sup>5</sup> As of January 2011, New Hampshire was one of 18 states adopting the code.<sup>6</sup>


1. “Green Jobs Study.” Nov 2009. Booz Allen Hamilton for U.S. Green Building Council. 29 Jun 2011. <[www.usgbc.org/ShowFile.aspx?DocumentID=6435](http://www.usgbc.org/ShowFile.aspx?DocumentID=6435)>.
2. “2008 Green Building Market Barometer.” Nov 2008, Turner Construction Company. July 29, 2011 <[www.usgbc.org/ShowFile.aspx?DocumentID=5361](http://www.usgbc.org/ShowFile.aspx?DocumentID=5361)>.
3. New Hampshire Total Amounts by City. 31 Oct 2011. Recovery.gov. 21 Nov 2011. <[www.recovery.gov/Pages/TextView.aspx?data=stateInfoCities&state=NH](http://www.recovery.gov/Pages/TextView.aspx?data=stateInfoCities&state=NH)>.
4. “Recovery Act – State Energy Program, New Hampshire Governor’s Assurance File.” New Hampshire Office of Energy and Planning. 29 Jun 2011. <[www.nh.gov/oep/recovery/documents/assurance.pdf](http://www.nh.gov/oep/recovery/documents/assurance.pdf)>.
5. New Hampshire Energy Code Challenge. Bringing the Future of Building Construction to NH Today. 2010 Workshop Series. 9 Nov 2010. Laconia, NH.
6. “American Recovery and Reinvestment Act of 2009, Title III: Borrowing Authority. Section 410: Additional State Energy Grants. H.R. 1-33(2).” U.S. Government Printing Office. 22 Dec 2010. <[rwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111\\_cong\\_bills&docid=f:h1enr.pdf](http://rwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf)>.


## American Recovery and Reinvestment Act (ARRA) Funding

As of summer 2011, New Hampshire received ARRA funding for these alternative energy, energy efficiency, and weatherization programs:

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The Energy Efficiency and Conservation Block Grant Program (EECBG) part of the Office of Energy and Planning (OEP) was allocated \$9.6 million for the administration and distribution of subgrants and \$6.6 million for the state's ten largest municipalities.<sup>a</sup> EECBG grant projects include comprehensive energy audits and building energy efficiency upgrades for large facilities like schools, town buildings, and ice rinks.<sup>b</sup>
- 

The State Energy Program (SEP) an ongoing federally funded OEP program was awarded an additional \$25.8 million in ARRA funding to provide energy efficiency upgrades for buildings, expansion of alternative fuels and Rideshare opportunities, public policy and innovative initiatives for Energy Efficiency and Renewable Energy. Examples of programs include the NH Energy Code Challenge, a building energy codes training program, and the expansion of the Business Energy Efficiency Program (BEEP) providing free comprehensive energy audits to commercial and industrial companies.<sup>c</sup>
- 


Weatherization received special attention in the ARRA bill,<sup>d</sup> allotting an additional \$23.2 million allocation beyond the standard formula funding for New Hampshire's Federal Weatherization Assistance Program. The program funds weatherization for homes of low-income residents. Obligation of all funds was required by September 30, 2010 and funding must be expended by March 31, 2012.<sup>e</sup>
- 


The ARRA funded Better Buildings Program is administered by the OEP and operated by the Community Development and Finance Authority. The program focuses on energy efficiency services for commercial and residential projects in Berlin, Plymouth, and Nashua.<sup>f</sup>


- a. Office of Energy and Planning. American Recovery and Reinvestment Act of 2009. FAQ's about the Energy Efficiency and Conservation Block Program 8. 14 Nov 2011. <[www.nh.gov/oep/recovery/eecbg\\_faqs.htm](http://www.nh.gov/oep/recovery/eecbg_faqs.htm)>.
- b. "OEP Announces EECBG Award Recipients." 10 Mar 2010. Energy Efficiency and Conservation Block Program. New Hampshire Office of Energy and Planning. 27 Jan 2011. <[www.nh.gov/oep/recovery/eecbg\\_award\\_recipients.htm](http://www.nh.gov/oep/recovery/eecbg_award_recipients.htm)>.
- c. State Energy Program. New Hampshire Office of Energy and Planning. 27 Jan 2011. <[www.nh.gov/oep/recovery/sep.htm](http://www.nh.gov/oep/recovery/sep.htm)>.
- d. "\$58,638,594 from the American Recovery and Reinvestment Act to the NH Office of Energy and Planning for Energy Programs." 16 Jun 2009. American Recovery and Reinvestment Act of 2009. New Hampshire Office of Energy and Planning. 23 Dec 2010. <[www.nh.gov/oep/recovery/documents/flow\\_chart.pdf](http://www.nh.gov/oep/recovery/documents/flow_chart.pdf)>.
- e. Federal Weatherization Assistance Program. New Hampshire Office of Energy and Planning. 13 Dec 2010. <[www.nh.gov/oep/recovery/weatherization.htm](http://www.nh.gov/oep/recovery/weatherization.htm)>.
- f. About Us. BetterBuildings NH. New Hampshire Community Development Finance Authority. 14 Nov. 2011. <[www.betterbuildingsnh.com](http://www.betterbuildingsnh.com)>.


## Other Green Incentives

In addition to ARRA funding, other incentives have helped New Hampshire businesses and residents invest in renewable energy and energy projects.


 Property tax exemptions for the installation of renewable energy heating systems are offered by eighty-three communities. Specifically, 81 municipalities offer solar exceptions, 44 offer wind power exemptions, and 31 municipalities offer central wood heating exemptions. A complete list is available through the Office of Energy and Planning.<sup>g</sup>


 The federal government offers income tax credit for residential renewable energy efficiency systems. An extensive list is updated by the Database of State Incentives for Renewable Energy and Efficiency (DSIRE).<sup>h</sup>


 The Public Utilities Commission (PUC) and utility companies offer various Renewable Energy Rebates, Energy Star, and energy efficiency upgrade incentives such as energy efficient appliances, heating systems, and lighting; programmable thermostats, and weatherization upgrades.<sup>i</sup> The residential and commercial programs have various guidelines, eligibilities, and expirations. DSIRE offers a complete list.<sup>j</sup>

 The Greenhouse Gas Emissions and Reduction Fund (GHGERF) is funded through New Hampshire's participation in the Regional Greenhouse Gas Initiative (RGGI). GHGERF grants sponsor job training, energy audits, and retrofits for businesses, non-profits, and educational institutions.<sup>k</sup>

In addition to tax and rebate incentives, local financial institutions are offering green loans to finance energy efficient home improvement projects. Among these are:

 Energy Efficiency Consumer Loans are offered at Meredith Village Savings Bank.<sup>l</sup>

 As of October, 2011, ten Credit Unions offer the New Hampshire Credit Unions' Greenlight Loans: energy saving home improvement loans.<sup>m</sup>

 Laconia Savings Bank has a Certified Green Professional Mortgage Consultant to assist consumers with Energy Star loans.<sup>n</sup>

g. Office of Energy and Planning. Renewable Energy. 1 Jul 2011. <[www.nh.gov/oepp/programs/energy/renewableenergy/NHMunicipalitieswithPropertyTaxExemptionsforRenewables.htm](http://www.nh.gov/oepp/programs/energy/renewableenergy/NHMunicipalitieswithPropertyTaxExemptionsforRenewables.htm)>

h. Database of State Incentives for Renewable Energy and Efficiency (DSIRE). 1 Jul 2011 <[www.dsireusa.org/incentives/index.cfm?CurrentPageID=1&State=NH&RE=1&EE=1](http://www.dsireusa.org/incentives/index.cfm?CurrentPageID=1&State=NH&RE=1&EE=1)>.

i. See Appendix A on page 19 for a list of various Green Incentives available to New Hampshire residents.

j. Ibid.

k. Public Utilities Commission. Sustainable Energy. Greenhouse Gas Emissions Reduction Fund. 14 Nov 2011. <[www.puc.nh.gov/Sustainable%20Energy/GHGERF.htm](http://www.puc.nh.gov/Sustainable%20Energy/GHGERF.htm)>.



l. The Energy Solution Loan. Meredith Village Savings Bank. 23 Nov 2010. <[www.mvsb.com/energy/energy\\_loan.php](http://www.mvsb.com/energy/energy_loan.php)>.

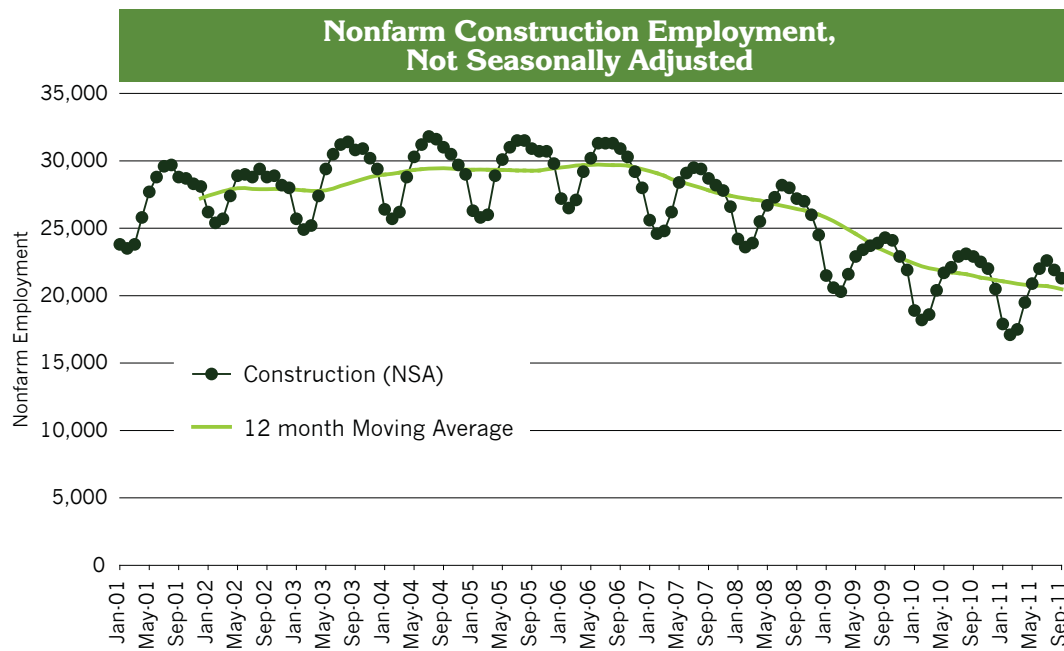
m. New Hampshire Credit Union League. Energy Efficiency Loans. New Hampshire Credit Unions' Greenlight Loans. <[www.gocu.org/advantages/energy-efficiency-loans](http://www.gocu.org/advantages/energy-efficiency-loans)>.

n. Thompson, Peter. Laconia Savings Bank. Telephone Conversation. 23 Nov 2010.

## Construction in New Hampshire

Employment in many of New Hampshire’s industry sectors was significantly affected by the most recent recession. However, even prior to the start of the Great Recession in December 2007, employment in New Hampshire’s Construction sector had started to decline. Over the past ten years:

-  Construction employment peaked at 31,800 in July 2004; and
-  By February 2011, Construction employment (not seasonally adjusted) had dropped to 17,100, the lowest level for February since 1996.

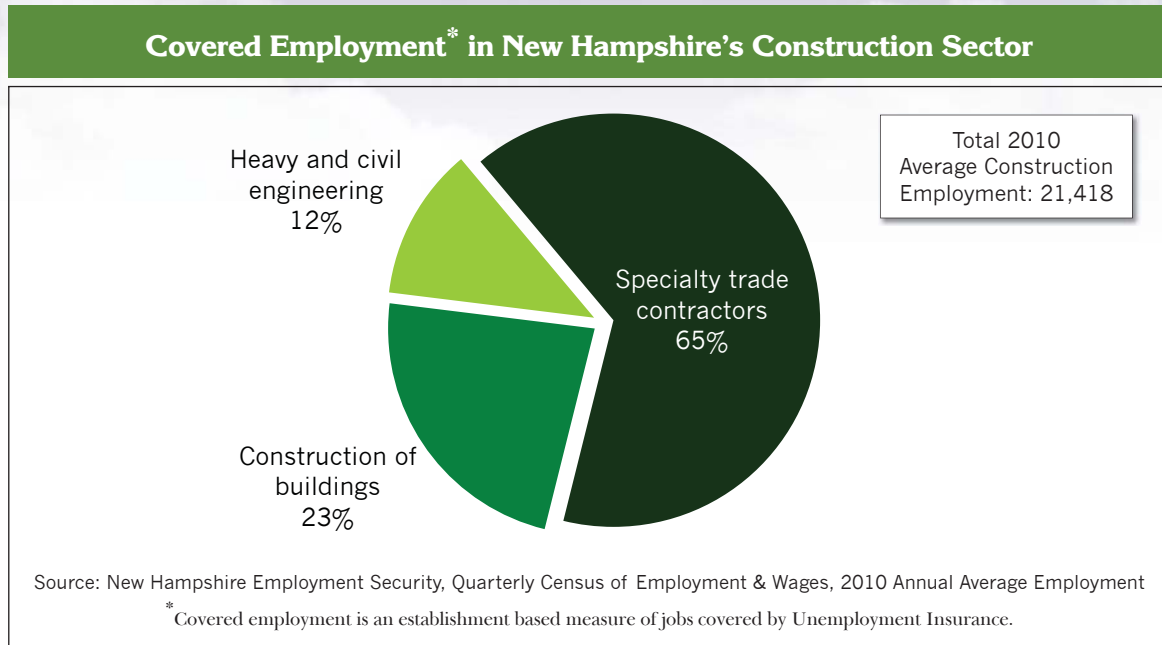


Source: New Hampshire Employment Security, Current Employment Statistics

### The Composition of Construction

According to the North America Industry Classification System, the Construction sector consists of the three following subsectors:

- Construction of buildings** Establishments primarily involved in building construction including new work, additions, alterations, maintenance and repairs.
- Heavy and Civil engineering** Establishments primarily involved in the construction of entire engineering projects such as highways and dams.
- Specialty Trade contractors** Establishments that have specialized primary activities such as plumbing, electrical, pouring concrete, and painting.



The largest subsector, *Specialty trade contractors*, has a great potential for green jobs. An increasing number of contractors offer energy efficient and pollution reduction options, such as builders framing ENERGY STAR® certified structures, painters using low VOC (volatile organic compound) paints, and roofing, flooring, and paving workers using similar environmentally-friendly products.

Another construction-related industry where green practices and use of green materials are already incorporated is *Architectural, engineering, and related services* which includes landscaping, designing, engineering and architectural services. New Hampshire's average annual covered employment in this industry group was 4,707 in 2010. Examples of evolving green services in this group are Leadership in Energy and Environmental Design (LEED®) standard architecture, energy efficient and environmentally sustainable landscaping, and engineering for renewable energy projects, LEED building projects, and energy efficient projects.

Together, the *Architectural, engineering, and related services* industry group and the Construction sector cover all stages of the planning and building process. It is possible to utilize green practices and products throughout a construction project.



## Green Occupations in the Construction Industry

Another way to study employment trends in green construction is to examine data by occupation. *O\*Net*, the *Occupational Information Network*, gathers information on occupations, and the knowledge, skills, abilities, activities, and tasks required to perform each one.<sup>7</sup> Researchers at the National Center for O\*Net Development identified three ways that green economic activity impacts occupations. The impacts were defined as occupations that would experience increased demand due to green economic activity, occupations that would experience enhanced skills due to the green economy, and unique new and emerging occupations resulting from green economic activity.<sup>8</sup>

For occupations experiencing *increased demand* due to the green economy, the context of work may change, but general tasks will remain the same. For example, insulation workers use a similar or slightly different technique as the material they use differs. As energy cost goes up, the incentive to improve the energy efficiency of a building becomes larger and the need for services performed by insulation workers will increase.

O\*Net Green Increased Demand Occupations

O*NET-SOC Code	O*NET-SOC Title	Alternative Job Titles Reported
17-3011.01	Architectural Drafters	Architecture Technicians
47-2011.00	Boilermakers	
47-2031.01	Construction Carpenters	
47-2031.02	Rough Carpenters	
47-2051.00	Cement Masons and Concrete Finishers	
47-2073.00	Operating Engineers and Other Construction Equipment Operators	
47-2111.00	Electricians	
47-2131.00	Insulation Workers, Floor, Ceiling, and Wall	
47-2221.00	Structural Iron and Steel Workers	
47-3012.00	Helpers--Carpenters	
49-9021.02	Refrigeration Mechanics and Installers	Refrigeration Engineers
49-9051.00	Electrical Power-Line Installers and Repairers	Electrical Power Line Installers and Repairers
49-9098.00	Helpers--Installation, Maintenance, and Repair Workers	
51-2041.00	Structural Metal Fabricators and Fitters	Metal Fabricators
51-4121.06	Welders, Cutters, and Welder Fitters	
51-4121.07	Solderers and Brazers	
51-8021.00	Stationary Engineers and Boiler Operators	Boiler Technicians
53-7051.00	Industrial Truck and Tractor Operators	Industrial Truck Drivers
53-7062.00	Laborers and Freight, Stock, and Material Movers, Hand	

Source: The Occupational Information Network (O\*NET). <[www.onetcenter.org/green.html](http://www.onetcenter.org/green.html)>

7. The Green Economy. The Occupational Information Network (O\*NET). 18 Nov 2010. <[www.onetcenter.org/green.html](http://www.onetcenter.org/green.html)>.
8. "Greening of the World of Work: Implications for O\*NET-SOC and New and Emerging Occupations." Appendix B: Green Enhanced Skills Occupations by Sector. O\*NET Research and Technical Reports. February 2009. The Occupational Information Network (O\*NET). 13 May 2011. <[www.onetcenter.org/reports/Green.html](http://www.onetcenter.org/reports/Green.html)>.

Conversely, occupations classified as *enhanced skills* are expected to experience significant changes to the work and worker requirements. This means that the job title will remain the same, but new green tasks, skills, knowledge, and credentials may be required. Examples of occupations with green *enhanced skills* include construction managers obtaining knowledge of environmental protection practices, civil engineers gaining skills to work in renewable energy generation, and landscape architects enhancing their knowledge of natural pesticides and efficient land management.<sup>9</sup> Many of the professionals in *enhanced skills* occupations will need to obtain some sort of green certification and/or attend workshops and seminars related to green building.





Green Enhanced Skills

O*NET-SOC Code	O*NET-SOC Title	Alternative Job Titles Reported
11-1021.00	General and Operations Managers	Building and Facilities Managers
11-9021.00	Construction Managers	Energy Efficient Site Foremen; Environmental Construction Engineers; Program Managers, Environmental Construction; Site Supervising Technical Operators; Solar Commercial Installation Electrician Foremen; Solar Installation Managers/Project Foremen; Weatherization Operations Managers
13-1073.00	Training and Development Specialists	Green Material Construction Trade Instructors
13-2051.00	Financial Analysts	Green Material Value-Added Assessors
17-1011.00	Architects, Except Landscape and Naval	Commercial Green Building and Retrofit Architects; Green Building Architects; Green Building Design Specialists; Green Building Designers (Commercial/Residential); Residential Green Building and Retrofit Architects
17-1012.00	Landscape Architects	Sustainable Landscape Architects
17-2051.00	Civil Engineers	Energy Infrastructure Engineers; Hydro-electric Plant Structural Engineers; Structural Design Engineers; Wastewater Plan Civil Engineers; Water Systems Designers and Engineers
17-2071.00	Electrical Engineers	Wind Farm Electrical Systems Designers, Smart Grid Engineers
17-2141.00	Mechanical Engineers	Heating Engineers; HVAC Engineers; HVAC Sensor and Digital Control Designers; Industrial Green Systems and Retrofit Designers; Senior HVAC Engineers
19-3051.00	Urban and Regional Planners	Sustainable Communities Designers
47-2061.00	Construction Laborers	Biofuels Plant Construction Workers; Nuclear Plant Construction Workers
47-2152.01	Pipe Fitters and Steamfitters	Green Pipefitters
47-2152.02	Plumbers	Green Plumbers
47-2181.00	Roofers	Cool Roofing Installers
47-2211.00	Sheet Metal Workers	
47-4011.00	Construction and Building Inspectors	Infrastructure/Construction Technicians
47-4041.00	Hazardous Materials Removal Workers	Hazardous Materials Handlers
49-9021.01	Heating and Air Conditioning Mechanics and Installers	Ground Water/Heat Pump Contractors or Installers, Heating/Air Conditioning Installers
49-9042.00	Maintenance and Repair Workers, General	Environmental Maintenance Workers; Water Purification Systems Service Technicians, Building Control Operators, Building Maintenance Engineers
51-8013.00	Power Plant Operators	Equipment Operators/Controls Operators

Source: The Occupational Information Network (O\*NET). <[www.onetcenter.org/green.html](http://www.onetcenter.org/green.html)>

<sup>9</sup>. The Green Economy. The Occupational Information Network (O\*NET). 18 Nov 2010. <[www.onetcenter.org/green.html](http://www.onetcenter.org/green.html)>.

*New and emerging occupations* are unique occupations that are generated directly from the green economy's activities and technologies. Examples of new and emerging occupations include:

-  *Energy engineers/ energy managers*  
These workers reduce energy costs and improve energy efficiency by designing, developing, or evaluating energy efficiency projects;
-  *Industrial energy engineer, or Environmental solutions engineer*  
These workers design, develop, and assess energy related programs and projects;
-  *Weatherization installers and technicians*  
These workers weatherize homes to make them more energy efficient; and
-  *Energy auditors*  
These workers audit energy use in buildings and process systems.<sup>10</sup>



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<sup>10</sup>. Ibid.

## New and Emerging Occupations in Energy Efficiency

*Energy auditor* — a new and emerging occupation — is gaining recognition. An *Energy auditor* identifies areas of a building prone to heat loss and makes recommendations to improve efficiency, with the goal of savings on energy bills. *Energy auditors* must have a background in construction or building science, and they use specialty equipment such as a blower door (a diagnostic tool that measures air tightness of a building) and infrared cameras. *Energy auditors* do not need a state-issued license in New Hampshire, although there are voluntary certified energy auditor credentialing programs available, such as the BPI Certified Building Analyst credential. As new construction comes into compliance with the IECC 2009 building code, jobs in this field will likely increase as energy audits are mandated by the code. Not only will this increase demand for green jobs like *Energy auditors*, it will also create more energy efficient houses and commercial buildings throughout the state, reducing New Hampshire's energy demand and carbon emissions. However, these new building standards may increase building costs.

When an *Energy auditor* identifies a building's heat loss, a *Weatherization technician* performs the recommended remediation work. This occupation emerged from existing skills of HVAC technicians and general repairmen. *Weatherization technicians*, also called *Retrofit installers*, or *Weatherization installers*, have knowledge of the energy audit process and subsequent diagnostics, but ultimately their tasks involve installing, repairing, and weatherizing windows, doors and ventilation systems. In addition, *Weatherization technicians* seal the thermal envelope, reduce heat loss, and increase

O\*Net New and Emerging Green Occupations

O*NET-SOC Code	O*NET-SOC Title	Description
17-2199.03	Energy Engineers	Design, develop, and evaluate energy-related projects and programs to reduce energy costs or improve energy efficiency during the designing, building, or remodeling stages of construction. May specialize in electrical systems; heating, ventilation, and air-conditioning (HVAC) systems; green buildings; lighting; air quality; or energy procurement.
13-1199.01	Energy Auditors	Conduct energy audits of buildings, building systems and process systems. May also conduct investment grade audits of buildings or systems.
47-4099.99	Weatherization Installers and Technicians	Perform a variety of activities to weatherize homes and make them more energy efficient. Duties include repairing windows, insulating, air-sealing, and performing heating, ventilating, and air-conditioning (HVAC) work. May perform energy audits and advise clients on energy conservation measures.
n/a	Testing, Adjusting and Balancing (TAB) Technicians	Test, adjust, and balance HVAC systems so they perform as designed.

Source: The Occupational Information Network (O\*NET). <[www.onetcenter.org/green.html](http://www.onetcenter.org/green.html)>

energy efficiency through air sealing, insulating, and covering sources of heat loss. They may perform general carpentry repairs, and replace lighting, fans, thermostats, and faucet fixtures. *Weatherization technicians* must have a basic knowledge of building science, energy codes, human health, and safe work practices.<sup>11</sup> While *Weatherization technicians* tend to be younger, due in part to the intense labor and difficult working environments, exposure to high heat, the elements, and confined spaces, *Energy auditors* tend to be older with more certifications and education.<sup>12,13</sup> To encourage cross education between these two occupations, the Belknap-Merrimack County Community Action Program in New Hampshire created teams to allow *Weatherization installers* to become part of the auditing process and vice versa.<sup>14</sup> As the average age of a U.S. residential builder is 53 years old,<sup>15</sup> employment opportunities with the potential to develop a skilled younger workforce may be important to the construction industry's future.









11. "NREL Job Tasks Analysis: Energy Auditor." May 2011. National Renewable Energy Laboratory. U.S. Department of Energy. 20 Jul 2011. <[www1.eere.energy.gov/wip/pdfs/51672.pdf](http://www1.eere.energy.gov/wip/pdfs/51672.pdf)>.
12. Shields, Jack. Assistant Director of Energy Conservation. Weatherization Program. Belknap- Merrimack Community Action Program. Personal Interview. 16 Nov 2010.
13. Duncan, Andy. Energy Training Manager. Lakes Region Community College. Personal Interview. 14 Nov. 2011.
14. Shields, Jack. Assistant Director of Energy Conservation. Weatherization Program. Belknap- Merrimack Community Action Program. Personal Interview. 16 Nov 2010.
15. "Profile of the Typical Single-Family Builder in 2009." 1 Jul 2010. National Association of Home Builders. 13 May 2011. <[www.nahb.com/generic.aspx?sectionID=734&genericContentID=140366](http://www.nahb.com/generic.aspx?sectionID=734&genericContentID=140366)>.

## Professional Education, Certifications, and Accreditations

With any emerging sector, assessing quality and standards can be difficult. In order to appraise and accredit individual professionals and individual projects, certification programs have been developed to distinguish green buildings and green builders from their non-green counterparts. There are numerous well-established professional and membership organizations offering educational programs, certifications, and accreditations for the construction industry, many with



both public and private sponsorship. These certifications have rigorous requirements to ensure that green construction follows quantifiable guidelines that offer marked energy efficiency improvement over non-green construction. Some of the providers of popular programs for construction-related professionals include:

-  U.S. Green Building Council® (USGBC), which developed the Leadership in Energy and Environmental Design (LEED®) building certification system and exam-based building professional credentials.
-  National Association of Home Builders (NAHB), which offers Certified Green Professional™ (CGP) and Master Certified Green Professional (MCGP) curriculums, and partnered with the International Code Council to develop the National Green Building Standard™ (ICC 700).
-  Building Performance Institute® (BPI), which developed technical standards for home performance and weatherization retrofit work, as well as certifications for individuals and company accreditations.
-  Residential Energy Services Network (RESNET®), which developed the Home Energy Rating System (HERS®) and certifies energy auditors and home energy raters.
-  Green Building Initiative™ (GBI), which sponsors Green Globes® Personnel Certifications, a certification program for green building and management professionals.
-  International Code Council® (ICC), which developed the International Green Construction Code™ (IGCC) and develops and administers certifications and testing programs for code and construction professionals.

There are also several local providers of green building certification programs. The Home Builders & Remodelers Association of New Hampshire (HBRANH) is a large organization representing 1,000 New Hampshire companies employing over 60,000 workers. HBRANH established the Build Green NH Council, with the goal of providing information about designing, building, and remodeling energy-efficient, sustainable, and healthy homes.<sup>16</sup> In September 2009, this organization received a grant from the Public Utilities Commission (PUC) through the Renewable Energy Fund for a Build Green NH program manager, and also to provide “education for members to design, build and remodel homes that meet the National Green Building Standard.”<sup>17</sup>

### **Certified Building Analyst**

The Building Performance Institute, Inc.<sup>®</sup> (BPI) Certified Building Analyst program offers training in energy auditing and efficiency, insulation, air sealing and building envelope diagnostic skills, and prepares attendees for passing the accompanying certifying tests. BPI training programs in New Hampshire include offerings at: Keene State College, Manchester Community College, and Lakes Region Community College. As of November 2011, the Lakes Region Community College (LRCC) program was partnered with the New Hampshire Division of Economic Development, the Plymouth Area Renewable Energy Initiative (PAREI) and BPI. Over 120 professionals took the LRCC course between September 2009 and June 2010. Of those who participated in the course, 83 percent became BPI certified. To assess the program, LRCC followed up with participants, surveying those with usable email addresses. There were 70 survey respondents, a 60 percent participation rate. Participants explained they wanted to learn new skills for a new job or business opportunity and that this course increased their ability to perform their existing job duties. For example, one participant is a remodeler who is getting more work and can now incorporate building science and energy auditing into his work. According to BPI, certified professionals are in demand and enjoy increased employment opportunities.<sup>18</sup> BPI certification in New Hampshire has grown significantly over the last four years. The first certification was in 2007,



<sup>16</sup>. Build Green NH Council. Build Green NH. 13 May 2011. <[www.buildgreennh.com/pages/build-green-nh-council](http://www.buildgreennh.com/pages/build-green-nh-council)>.

<sup>17</sup>. Buck, K. “NH PUC Grant to Assist Professionals with training to Build and Remodel ‘Green’ homes.” 28 Sep 2009. Build Green NH. 26 Oct 2010. <[www.buildgreennh.com/newsroom/puc-grant-for-green-building-+training](http://www.buildgreennh.com/newsroom/puc-grant-for-green-building-+training)>.

<sup>18</sup>. Certified Building Professionals. Building Performance Institute, Inc. 15 Nov 2010. <[www.bpi.org/professionals.aspx](http://www.bpi.org/professionals.aspx)>.

with 27 certifications by 2008, 84 total certifications in 2009, and, as of October 2011, there were 313 active BPI certified professionals in New Hampshire.<sup>19</sup>

### **New Hampshire Energy Code Workshop**

The New Hampshire Energy Code Workshop is a free, day-long course that offers continuing education credits for contractors and building professionals to keep up to date on new energy building codes. This program is a public-private partnership between the Public Utilities Commission, the New Hampshire Office of Energy and Planning, and all of New Hampshire's electric utility companies. The residential workshop trains building professionals on the IECC 2009 residential building codes, focusing on new changes to energy efficiency requirements, notably insulation, air sealing, and the importance of the thermal envelope in building. The Commercial workshop also reviews thermal envelope requirements, as well as lighting standards and mechanical requirements.



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### **LEED® Accredited Professional**

While LEED certification usually refers to a building project, it can also refer to a LEED Accredited Professional, known as a LEED AP®. To become a LEED AP, an individual must pass an exam that demonstrates their knowledge of green building practices and LEED building requirements. Current standards require that an individual work on some part of a LEED project before pursuing certification. This means individuals do not need to be LEED certified to work on a LEED project. Common practices for LEED projects are to have LEED certified project managers but not general crew members. Project managers are more likely to be LEED accredited professionals, mostly due to the cost of achieving certification. In New Hampshire, LEED certifications have been growing, and there are currently about 400 LEED certified professionals.<sup>20</sup>

### **Lead Abatement Certifications**

In addition to green building professional certifications, the Environmental Protection Agency's Renovation, Repair and Painting Rule, which was adopted on April 22, 2010, is a rule that affects all builders, whether or not they employ green construction

<sup>19</sup>. Arnold, Beth. Building Performance Institute, Inc. Personal Communication. 26 Oct 2011.

<sup>20</sup>. LEED Professional Directory. Green Building Certification Institute. 13 May 2011. <[www.gbci.org](http://www.gbci.org)>.



techniques. This rule requires that all “firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities, and schools built before 1978 must be certified and must follow specific work practices to prevent lead contamination.”<sup>21</sup> Firms working on any pre-1978 home or child-occupied facility must be certified and at least one employee must be a Certified Renovator. That employee is responsible for training other employees and overseeing work practices.

Initially, contractors had difficulty getting certified due to a lack of trainers. Kendall Buck, the executive vice president of Home Builders & Remodelers Association of New Hampshire (HBRNH), stated that when the new rule was announced there were only 65 approved instructors for the hundreds of thousands of contractors across the country that needed the course. The shortage forced the EPA to grant an eight month extension, meaning that uncertified contractors could avoid the \$37,500 per day fine for non-compliance.<sup>22</sup> The fines are now in effect, and to become a Certified Renovator, individuals must attend an eight-hour certification course taught by an approved instructor. HBRANH facilitates courses by approved instructors for both members and non-members.<sup>23</sup> Getting certified costs money and to perform work as lead-safe adds additional costs to the construction process. The industry claims that it is hard to pass along the additional costs to consumers, due to the already struggling housing market. Yet, the New England coordinator for the EPA stated that the costs are not excessive when compared to child safety.<sup>24</sup>

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21. Renovation, Repair and Painting (RRP). Lead in Paint, Dust and Soil, United States Environmental Protection Agency. 5 Jan 2011. <[www.epa.gov/lead/pubs/renovation.htm](http://www.epa.gov/lead/pubs/renovation.htm)>.

22. Ireland, Doug. “EPA Delays enforcement of New Lead Paint Rule.” 24 June 2010. Eagle-Tribune. 21 Jul 2011. <[www.eagletribune.com/latestnews/x383281638/EPA-delays-enforcement-of-new-lead-paint-rules](http://www.eagletribune.com/latestnews/x383281638/EPA-delays-enforcement-of-new-lead-paint-rules)>.

23. The Construction Institute of New Hampshire. Home Builders and Remodelers Association of New Hampshire. 20 Jul 2011. <[www.hbranh.com/index/cinh](http://www.hbranh.com/index/cinh)>.

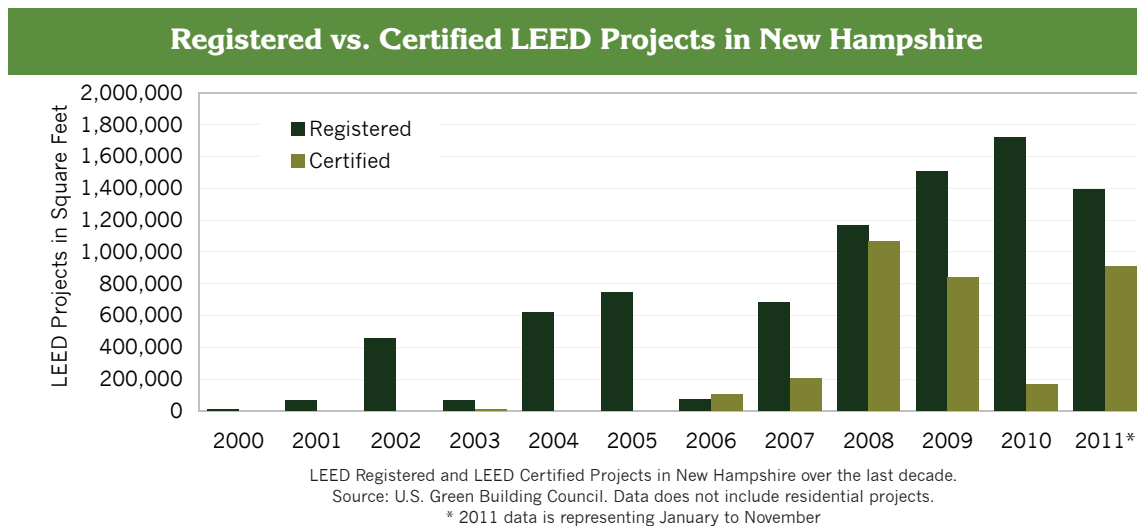
24. Quinton, Amy. “New Hampshire Contractors Face New Lead Paint Rules.” 30 Mar 2010. New Hampshire Public Radio. 21 Jul 2011. <[www.nhpr.org/node/31810](http://www.nhpr.org/node/31810)>.

## Green Certification of Buildings

Green certifications are not only available to building and construction professional workers. The construction project itself may be certified as a green building. Certifications are available for both residential and commercial buildings.

To rank a building project as green, the energy rating system developer Residential Energy Services Network (RESNET™) has official standards acknowledged by the federal government, the Environmental Protection Agency's ENERGY STAR® Program, and the U.S. Mortgage Industry for verifying a residential building's energy performance. The auditing and rating process can help consumers get tax incentives, ENERGY STAR rebates, and mortgage loans.<sup>25</sup> The rating's result is called the Home Energy Rating System (HERS) Index, a relative energy efficiency index. The HERS Index is on a scale of 0 to 150, with a lower score meaning a more energy efficient house. A score of 100 is a standard home built to code, a score of 80 or below signifies an ENERGY STAR home, and score of 0 indicates a net-zero energy home. The rating is performed by a certified third party auditor called a Home Energy Rater (HERS Rater).<sup>26</sup> According to the National Registry of Accredited Rating Providers as of October 2011, there are only three HERS raters located in New Hampshire.<sup>27</sup>

An accreditation popular with commercial projects, but also used to rank residential buildings, is LEED® Certification, offered by the U.S. Green Building Council. For a building project to become LEED certified, a third party rating system must rate all aspects of a building project based on the following six categories: indoor



<sup>25</sup>. About RESNET. Residential Energy Services Network. 7 Dec 2010. <[www.resnet.us/about](http://www.resnet.us/about)>.

<sup>26</sup>. "2010 NH Energy Code Workshop Series." NH Energy Code Challenge. 9 Nov 2010. <[www.nhenergycode.com/live/index.php](http://www.nhenergycode.com/live/index.php)>.

<sup>27</sup>. Northeast Home Energy Rating System Alliance. Residential Energy Services Network. 30 Nov 2010. <[www.resnet.us/programs/search\\_directory](http://www.resnet.us/programs/search_directory)>.

environmental quality, materials and resources used, energy use and atmosphere, water efficiency, sustainable sites, and innovation. The project's results are labeled as either Platinum, Gold, Silver, or simply LEED Certified depending on the score.<sup>28</sup> As of November 2011, there were 44 completed LEED projects, or 3,388,040 square feet, in New Hampshire. Yet, there are twice as many projects pending registration to become LEED certified, equating to 94 pending buildings, or 5,215,011 square feet.<sup>29</sup> The lag time between the initial registration phase and project certification phase is illustrated by data for the period 2000 to 2005, during which 2,030,823 square feet of projects were registered, but only 10,000 square feet, 0.4 percent, actually achieved LEED certification. A successfully certified LEED building offers good marketing opportunities to the owner. In addition, LEED buildings should achieve higher energy performance. Yet, critics point out that the LEED program doesn't monitor actual energy consumption; instead LEED ratings are based on predicted energy consumption.<sup>30</sup>



Other notable programs providing certification that a commercial building is sustainably built at or above code levels include:



### **Green Globes™**

Green Globes provides an environmental management tool with third party verification. While Green Globes are very similar to LEED, distinctions are marked by online applications aimed at reducing the costs and time of project submissions. Green Globes are used by large developers, property managers, and the Canadian Federal Government. In the U.S., the Green Globes program is operated by the Green Building Initiative™ (GBI).<sup>31</sup>

<sup>28</sup>. LEED. U.S. Green Building Council. 20 Jul 2011. <[www.usgbc.org/DisplayPage.aspx?CMSPageID=51](http://www.usgbc.org/DisplayPage.aspx?CMSPageID=51)>.

<sup>29</sup>. Public LEED Project Directory. U.S. Green Building Council. Nov 2011. <[www.usgbc.org/LEED/Project/RegisteredProjectList.aspx](http://www.usgbc.org/LEED/Project/RegisteredProjectList.aspx)>.

<sup>30</sup>. Cater, Franklin. "Critics Say LEED Program Doesn't Fulfill Promises." 8 Sep 2010. National Public Radio. 7 Dec 2010. <[www.npr.org/templates/story/story.php?storyId=129727547](http://www.npr.org/templates/story/story.php?storyId=129727547)>.

<sup>31</sup>. Green Globes. 23 Dec 2010. <[www.greenglobes.com/default.asp](http://www.greenglobes.com/default.asp)>.



### **The Living Building Challenge™**

The Living Building Challenge offers certification of net-zero energy buildings. The Living Building Challenge™ program comes from the International Living Building Institute™, a non-governmental organization dedicated to promoting sustainable buildings around the world. The program is unique because the rating system is performance-based and tracks actual energy consumption for a year before the building can be certified.<sup>32</sup>



### **The International Code Council®**

The International Code Council (ICC) offers optional paths to meet energy code compliance. In 2009, the ICC launched a green compliance option known as the International Green Construction Code™ (IGCC). The IGCC, or “Safe and Sustainable by the Book,” focuses on building design and performance of new and existing commercial structures.<sup>33</sup>



### **American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE®)**

The American Society of Heating, Refrigeration, and Air-Conditioning Engineers provides guides and tools for achieving energy savings. While the ASHRAE 90.1 standards do not specifically offer a green building rating program, the standards are designed to function in a complementary set of codes, or if necessary, as a substitution for the aforementioned codes to allow more flexibility in green design compliance.<sup>34</sup>



These green standards and certification programs often require construction industry professionals and building project certifiers to complete moderate to extensive training and to pay fees to earn or maintain their certifications. Earning these certifications makes the construction professional or their building project more credible and marketable, and signifies the builder is prepared to take on energy efficient building projects.

<sup>32</sup>. “NH Commercial Energy Code Workshop Series.” Nashua N.H. 9 Dec 2010.

<sup>33</sup>. International Green Construction Code. International Code Council. 23 Dec 2010. <[www.iccsafe.org/cs/igcc/pages/](http://www.iccsafe.org/cs/igcc/pages/)>.

<sup>34</sup>. About ASHRAE. American Society of Heating, Refrigeration, and Air-Conditioning Engineers. 13 May 2011. <[www.ashrae.org](http://www.ashrae.org)>.

## Obstacles to Green Construction Projects

While the percentage of energy efficient projects in building construction has increased, overall green construction has been slowed by the most recent economic recession.<sup>35</sup> High levels of both unemployment and foreclosure shrank residential consumer demand and depressed housing prices, while a contraction in industry output reduced commercial demand for new construction.

Another obstacle comes from a “blind spot” in the current mortgage underwriting process.<sup>36</sup> Consumers have found difficulty in acquiring financing for additional green features. Appraisers may be unable to assign an appropriate market value for green features, and if an appraisal does not place a value on a green feature of a home then that feature cannot be financed.<sup>37</sup> Appraisals are based on comparables. Comparables are similar houses in the same area as a project, but the data used for comparables is often derived from a Multiple Listing Service (MLS) which does not include green features.<sup>38</sup> RESNET<sup>®</sup> states that appraisers have been slow to credit energy efficiency features, primarily due to the lack of market data correlating energy efficiency features to a positive effect on the sales price of houses. To counteract this situation, RESNET suggests incorporating home energy rating systems into the existing MLS database.<sup>39</sup> By integrating industry-backed standards or ratings systems, appraisers and consumers would have the ability to quantify the added value of energy efficient and green features. Currently, Alaska, Colorado and Rhode Island are taking steps to incorporate energy ratings into market values, often allowing appraisers to add value to higher rated homes.<sup>40</sup> Similar ideas include a burgeoning Green MLS called “Listed Green” which is recognized by USGBC<sup>®</sup>, ENERGY STAR, and Built Green<sup>™</sup>.<sup>41</sup> In September 2011, the Appraisal Institute released an addendum to its standard appraisal report targeted to analyze values of energy-efficient home features.<sup>42</sup>

35. “Green Building Market Booms Despite Economy.” 18 Nov 2010. USA Today. 21 Jul 2011. <content.usatoday.com/communities/greenhouse/post/2010/11/report-green-building-surges/1>.

36. “Appraisers Making Headway in Recognizing Value of Green Home Features.” 16 May 2011. National Association of Home Builders. 21 Jul 2011. <www.nahb.org/news\_details.aspx?sectionID=1831&newsID=12705>.

37. Boucher, Eric. Northway Bank. Personal Interview.

38. Les, Christie. “Green Home face a red light.” 10 Mar 2010. CNN Money.com. 14 Dec 2010. <money.cnn.com/2010/03/10/real\_estate/green\_homes\_redlight/>.

39. “Home Energy Raters: A Primer.” Residential Energy Services Network. 14 Dec 2010. <www.resnet.us/ratings/HP09>.

40. Ibid.

41. Listed Green. 27 Dec 2010. <www.listedgreen.com>.

42. “Appraiser Institute Issues Form to Help Real Estate Appraisers Analyze Green Features.” The Appraisal Institute. News and Advocacy. News Releases. 26 Oct 2011. <www.appraisalinstitute.org/newsadvocacy/news/2011/09292011\_green\_features.aspx>.

To help real estate practitioners better understand and to successfully market properties with green features the National Association of Realtors began offering NAR Green Designation in November of 2008. The designation requires 18 hours of coursework; including six hours of specialization in either residential, commercial, or property management. Designees must maintain memberships with the Green Resource Council and the national association of REALTORS®<sup>43</sup> Since the program's inception, 6,800 participants have earned the designation, 38 of whom are designated in the state of New Hampshire as of October 2011.<sup>44</sup>

## Conclusion

The construction sector in New Hampshire is greening through energy efficient building and materials in both the residential and commercial sectors for new building and remodelling projects. New energy codes, ARRA grants, and consumer demand for energy savings have helped to generate new green occupations within the construction industry. Equally, existing occupations have evolved, requiring new green accreditations and certifications. Green certifications and standards are diverse and offer industry professionals numerous tools to distinguish their knowledge and skills. However, so many different credentials may be cumbersome for consumers to understand, and the market still struggles to place value on green features.

The interest in better building performance has created a demand for training in green products and services. These green training opportunities are of value to professional and skilled laborers in Construction as well as other industries. Architects and engineers may need additional training in order to design energy efficient buildings. Even utility companies have collaborated to increase awareness about residential and commercial energy codes and to promote the opportunities for energy efficient projects. Training has emerged for lending agents, real estate brokers, and appraisers, who are beginning to realize the need for measuring the market value for green features. Green building also spurs green product innovation. Industries within manufacturing develop more efficient building products such as spray foams, structural insulated panels, high-efficiency HVAC systems, among others. As construction guidelines aim to make buildings more efficient, *Green Construction* will become a larger and larger share of the overall construction sector.

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<sup>43</sup>. "Designation FAQs." Green Resource Council. 2 Nov 11. <[www.greenresourcecouncil.org/designation\\_faqs.cfm](http://www.greenresourcecouncil.org/designation_faqs.cfm)>.

<sup>44</sup>. Green Resource Council. 2 Nov 11. <[www.greenresourcecouncil.org/find\\_an\\_nar\\_green\\_designee.cfm](http://www.greenresourcecouncil.org/find_an_nar_green_designee.cfm)>.

**Appendix A: New Hampshire Home Energy Improvement Incentive Programs, 2010**

Name of Program	Program Inclusions	Max Incentive	Source Link
Local Option Property Tax Exemption	Passive solar space heat, solar water heat, solar space heat, photovoltaic's, wind, wood fired central heating systems	Varies local option	<a href="http://www.nh.gov/oepp/programs/energy/RenewableEnergyIncentives.htm">http://www.nh.gov/oepp/programs/energy/RenewableEnergyIncentives.htm</a>
National Grid-Residential Energy Efficiency Incentive Programs	Refrigerators/freezers, lighting, duct/air sealing, insulation, comprehensive measures- whole building	Varies max limit \$4,000	<a href="http://ma.nationalgridservices.com/ThinkSmartThinkGreen.pdf">http://ma.nationalgridservices.com/ThinkSmartThinkGreen.pdf</a>
National Grid-(Gas) Energy Efficiency Incentive Programs	Water heaters, furnaces, boilers, programmable thermostats, caulking weather stripping, duct air sealing, building insulation windows.	heating rebates \$100-1,000	<a href="http://ma.nationalgridservices.com/ThinkSmartThinkGreen.pdf">http://ma.nationalgridservices.com/ThinkSmartThinkGreen.pdf</a>
National Grid Solar Thermal Rebate Program	Solar water heat, solar space heat, solar thermal process heat	15% off project up to \$1,500 max	<a href="http://ma.nationalgridservices.com/ThinkSmartThinkGreen.pdf">http://ma.nationalgridservices.com/ThinkSmartThinkGreen.pdf</a>
PSNH Residential Energy Sector	Numerous programs: residential and commercial renewable energy and energy efficiency	Various	<a href="http://www.psnh.com/SaveEnergyMoney/For-Home/Energy-Saving-Programs-and-Rebates.aspx">http://www.psnh.com/SaveEnergyMoney/For-Home/Energy-Saving-Programs-and-Rebates.aspx</a>
Unittil	Energy efficiency programs: electrical and natural gas. Energy star appliance rebates.	Various	<a href="http://www.unittil.com/energy-efficiency/energy-efficiency-programs/electric-programs-rebates-assistance">http://www.unittil.com/energy-efficiency/energy-efficiency-programs/electric-programs-rebates-assistance</a>
New Hampshire Electric Co-op	Small Steps Conservation Starts with You - solar hot water	Up to \$1,500	<a href="http://www.smallsteps.coop/coop_programs/">http://www.smallsteps.coop/coop_programs/</a>
Low Income Energy Assistance Grant Program	Washer/Dryers, dishwashers, refrigerators/freezers, lighting, programmable thermostats, caulking/ weather-stripping, air/ duct sealing, insulation, windows & doors	max \$3,600	<a href="http://www.nhec.com/residential_energyassistance_home.php">http://www.nhec.com/residential_energyassistance_home.php</a>
Home Performance with ENERGY STAR	Insulation, Air sealing, Thermostats, hot water measures, Refrigerator rebates, Lighting upgrades, Health and safety measures, Insulating and sealing duct work	up to 75% of energy efficiency upgrades Max \$4,000	<a href="http://www.nhec.com/residential_homeenergysolutions.php">http://www.nhec.com/residential_homeenergysolutions.php</a>

All offerings, eligibility, and incentives are subject to change.

